

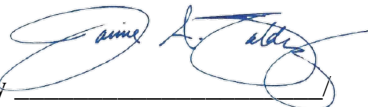
**CONTRACT BIDDING DOCUMENTS
SPECIFICATIONS AND STANDARD DRAWINGS**

FOR THE

GOLETA TRAIN DEPOT PROJECT

**27 SOUTH LA PATERA LANE,
GOLETA, CALIFORNIA 93117**


Project No. 9079

By 
Jaime Valdez,
Neighborhood Services Director

Project Number: 9079
Bid Number:


Bid's Due: May 16, 2024 @ 2:00 P.M.
Virtual Bid Opening: May 16, 2024 @ 2:30 P.M.

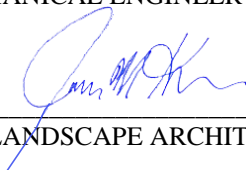
For use with Construction Specification Institute (CSI) Standard Specifications and Caltrans Standard Specifications and Plans 2023 Edition (including applicable amendments)

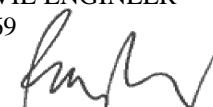

ANIL VERMA, FAIA, ARCHITECT
CA. LICENSE NO: C21756



PAUL FEATHER, SE, STRUCTURAL ENGINEER
CA. LICENSE NO: 4547


CHRIS RAUCH, PE, MECHANICAL ENGINEER
CA. LICENSE NO: M20097


MATT BRITTEN, PE, CIVIL ENGINEER
CA. LICENSE NO: C61869


JAMES KEENAN, ASLA, LANDSCAPE ARCHITECT
CA. LICENSE NO: 3899


RAY CRUZ, PE, ELECTRICAL ENGINEER
CA. LICENSE NO: 8906


SHAWN KOWALEWSKI, PE, CIVIL ENGINEER
CA. LICENSE NO: C59539 (FOR LA PATERA LN)



**BIDDING DOCUMENTS FOR GOLETA TRAIN DEPOT
AND SOUTH LA PATERA LANE IMPROVEMENT PACKAGES**

This contract shall be in conformance with the Construction Specification Institute (CSI) Standard Specifications and Caltrans Standard Specifications and Plans 2023 Edition (including amendments current as of the date of the Notice Inviting Sealed Bids, which are incorporated by reference) and supplements with CALTRANS STANDARD SPECIFICATIONS, 2023 EDITION.

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EXHIBIT “C” Storm Water Pollution Prevention Plan (SWPPP) prepared by ENGEO dated October 26, 2023



- EXHIBIT “D” Water Pollution Control Plan (WPCP) prepared by ENGEO dated December 11, 2023
- EXHIBIT “E” Contractor Insurance Requirements for UPRR and for AMTRAK
- EXHIBIT “F” Easement Agreement (Amtrak at Lumberyard) dated August 18, 2009 and Goleta MOU Agreement with Amtrak dated July 22, 2009.
- EXHIBIT “G” Limited Phase II Investigation Work Plan prepared by All Phase Environmental, Inc. dated December 19, 2023
- EXHIBIT “H” Limited Phase II Investigation prepared by All Phase Environmental, Inc. dated December 9, 2023
- EXHIBIT “I” Asbestos Survey and Hazardous Material Inspection Report prepared by All Phase Environmental, Inc. dated December 6, 2023
- EXHIBIT “J” Lead-Based Paint Survey Report prepared by All Phase Environmental, Inc. dated December 11, 2023
- EXHIBIT “K” Amtrak Encroachment Exhibit prepared by RailPros dated January, 2024
- EXHIBIT “L” Environmental Impact Report (EIR) for Train Depot and Categorical Exemption (CE) for South La Patera Lane Improvements
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A. Standards

1. City of Goleta Standards / County of Santa Barbara Standard Plans

- <https://www.cityofgoleta.org/your-city/public-works/engineering-division/standard-details-documents-and-downloads>
- https://library.qcode.us/lib/goleta_ca/pub/municipal_code
- <https://santabarbaraca.gov/government/departments/public-works/engineering-division>

2. Green Book Standard Plans

- <https://dot.ca.gov/-/media/dot-media/programs/local-assistance/documents/tcc/2022/item-5-greenbook.pdf>

3. Caltrans Standard Plans

- <https://dot.ca.gov/programs/design/july-2023-ccs-standard-plans-and-standard-specifications>

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SECTION 00 11 16

NOTICE TO CONTRACTORS INVITING SEALED BIDS FOR THE GOLETA TRAIN DEPOT PROJECT NO. 9079

PUBLIC NOTICE IS HEREBY GIVEN that the City of Goleta (“CITY”), invites sealed bids for the above stated project and will receive such bids via electronic transmission on the City of Goleta PlanetBids portal site until 2:00 PM, May 16, 2024, and will be publicly opened and posted promptly thereafter. Copies of the Contract Documents may be obtained from the Planet Bids Website: <https://pbsystem.planetbids.com>.

The work includes all labor, material, supervision, and equipment necessary to construct and deliver a finished GOLETA TRAIN DEPOT PROJECT NO. 9079. Work includes construction of the Goleta Train Depot building and associated site work (parking, landscaping and access) as well as pedestrian and bicycle improvements along South La Patera Lane from Hollister Avenue to the train depot. The contract period is Six-Hundred Eight (608) calendar days to Final Completion.

Project Cost

The estimated cost of Project construction is approximately \$16.5M (including all Add Alternates). The Basis of Award will be determined on the Base Bid Construction Price not including Alternate Bid Items.

Project Duration

The successful contractor (after receipt of Notice to Proceed) shall have 608 calendar days to complete all work called for under the Contract Documents.

The Project location

Project Location is at 27 South La Patera Lane, Goleta Ca 93117.

Project Description

Construction of a new full-service multi-modal train station facilities next to the existing Amtrak platform at 27 South La Patera Lane. The Goleta Train Depot building will be approximately 9,000 square feet. It will include a lobby, e-ticketing area, waiting room, café, community meeting room, restrooms, bike storage lockers, and outdoor plaza spaces. The project site is approximately 2.5 acres, is relatively flat, and rectangular. The site is currently developed with a 39,800 square-foot warehouse structure, with an associated parking lot, outdoor storage area, and vehicle yard proposed to be removed as part of this project. In addition, South La Patera Lane is being re-configured to accommodate improvements such as continuous bike lanes, sidewalks, street lights, and landscaped parkways.

Bid Submittal Instructions

Bidders must be registered on the City of Goleta’s PlanetBids portal in order to receive addendum notifications and to submit a bid. Go to PlanetBids for bid results and awards. It is the responsibility of the bidder to submit the bid with sufficient time to be received by PlanetBids prior to the bid opening



date and time. Allow time for technical difficulties, uploading, and unexpected delays. Late or incomplete bids will not be accepted. All communications related to this project shall be conducted through PlanetBids. Questions about alleged patent ambiguity of the plans, specifications, or estimate must be asked before bid opening. After bid opening, the CITY does not consider these questions as bid protests. All bids must be submitted electronically through PlanetBids on or before 2:00 PM (PST) May 16, 2024.

Virtual Bid Opening

Bid opening will through a ZOOM meeting at 2:30 PM on May 16, 2024. The ZOOM link is <https://us06web.zoom.us/j/86833177412?pwd=TjWRSHWQI7a1mlQOeOWclV4E7ZDH08O.1>.

Bidders may call in to listen live to the Bid Opening by dialing 1 669 444 9171 and then entering the following when prompted:

Webinar ID: 868 3317 7412

Webinar Passcode: 996412

Questions and Communications

All questions must be submitted electronically through PlanetBids. The deadline for receipt of questions is May 2, 2024, 2:00 PM

Mandatory Pre-Bid Meeting

A mandatory pre-bid meetings will be held on Monday, April 17, 2024, at 10:00 AM and on April 24, 2024 at 10:00 AM at the Project Site (27 South La Patera Lane, Goleta, CA 93117). Interested bidders are required to attend at least one of these pre-bid meetings and will be held responsible for all information presented. It is required that the Bidders have fully inspected the Project site in all particulars and become thoroughly familiar with the terms and conditions of the Bid Plans and Special Provisions and local conditions affecting the performance and costs of the Work prior to bidding and it is recommended that this be done prior to attending this meeting.

Bid Security

The bid must be accompanied by a bid security in the form of a money order, a certified cashier's check, or bidder's bond executed by an admitted surety, made payable to CITY. The bid security shall be an amount equal to ten percent (10%) of the total annual bid amount included with their proposals as required by California law.

Note: All bids must be accompanied by a scanned copy of the bid security uploaded to PlanetBids. The original security of the three (3) lowest bidders must also be mailed or submitted to the office of the City Clerk at 130 Cremona Drive, Suite B, Goleta, California 93117, in a sealed envelope and be received or postmarked within three (3) City business days after the bid due date and time; otherwise, the bid shall be considered non-responsive. The sealed envelope should be plainly marked on the outside, "SEALED BID SECURITY FOR GOLETA TRAIN DEPOT PROJECT NO. 9079."

Performance Security

Pursuant to Public Contract Code section 22300, the successful bidder may substitute certain securities for funds withheld by CITY to ensure performance under the Contract or, in the alternative, request the CITY to make payment of retention to an escrow agent.



Affirmative Action

The Project is subject to compliance monitoring and enforcement by the Department of Industrial Relations (DIR) per California Labor Code Section 1771.4, including prevailing wage rates and apprenticeship employment standards. Affirmative action to ensure against discrimination in employment practices on the basis of race, color, national origin, ancestry, sex, or religion will also be required. The CITY hereby affirmatively ensures that all business enterprises will be afforded full opportunity to submit bids in response to this notice and will not be discriminated against on the basis of race, color, national origin, ancestry, sex, or religion in any consideration leading to the award of contract.

Department of Industrial Relations (DIR)

Pursuant to Labor Code sections 1725.5 and 1771.1, all contractors and subcontractors that wish to bid on, be listed in a bid proposal, or enter into a contract to perform public work must be registered with the DIR. No Bid will be accepted, nor any contract entered into without proof of the contractor's and subcontractors' current registration with the DIR to perform public work. If awarded a contract, the Bidder and its subcontractors, of any tier, shall maintain active registration with the DIR for the duration of the Project. Failure to provide proof of the contractor's current registration pursuant to Labor Code Section 1725.5 may result in rejection of the bid as non-responsive.

Contractor License

A contract may only be awarded to the lowest responsive and responsible bidder properly licensed in accordance with the laws of the State and the City of Goleta. Contractor shall possess a valid Class B - General Building Contractor license prior to award of Contract. Said license shall be maintained during the contract period. It is the Bidder's and Contractor's responsibility to obtain the correct Contractor's licenses. Bidders shall be skilled and regularly engage in the general class or type of work called for under this contract.

Performance and Payment Bonds

The successful Bidder will be required to furnish a Performance Bond and a Payment Bond each in an amount equal to 100% of the Contract Price. Each bond shall be in the forms set forth herein, shall be secured from a surety company that meets all State of California bonding requirements, as defined in Code of Civil Procedure Section 995.120, and that is a California admitted surety insurer.

Prevailing Rate of Wages

Pursuant to California Labor Code Section 1773, the City has ascertained the General Prevailing Rate of Wages in the County in which the work is to be done to be as determined by the Director of Industrial Relations of the State of California. Contractor is hereby made aware that information regarding prevailing wage rates may be obtained from the State Department of Industrial Relations and/or the following website address: <https://www.dir.ca.gov/OPRL/2022-2/PWD/Southern.html> The Contractor is required to post a copy of the applicable wage rates at the job site. Attention is directed to Section 7 "Legal Relations and Responsibility to the Public" of the Standard Construction Specifications.

Contractor Experience

The Contractor Company, including the Responsible Managing Officer (RMO) for the Contractor Company, shall demonstrate a minimum of ten (10) years' experience successfully performing projects of substantially similar type, magnitude, and character of the work bid.



Rejection of Bids

The CITY reserves the right to reject all bids, reject any bid that is not responsive to the invitation, or to waive any minor irregularity and to take all bids under advisement for a period of up one hundred and twenty (120) calendar days. Failure to provide proof of the Contractor's current registration pursuant to Section 1725.5 of the Labor Code may result in rejection of the bid as non-responsive. Failure to comply with enforcement provisions pursuant to Section 1771.4 of the Labor Code may result in a determination that the Bidder is not responsible.

Liquidated Damages

The Liquidated Damages shall be \$3,000 per day.

Protest

Any protest to an intended award of this contract shall be made in writing addressed to the City Clerk according to Article 31 of Specification Section 00 2113 and filed and received by the City not more than five (5) calendar days following the date of City's Notice of Intent to Award the Contract. Any protest may be considered and acted on by the City Council at the time noticed for award of the contract. To request a copy of the notice of agenda for award, please contact the City Clerk (805) 961-7505 or register on the CITY's website (www.cityofgoleta.org).

All questions about this project and bidding requirements must be submitted in writing through PlanetBids.

CITY OF GOLETA

Deborah S. Lopez, City Clerk

Anticipated Publication Dates:

Santa Barbara Independent: April 11, 2024 and April 18, 2024

END OF NOTICE INVITING BIDS – 00 11 16



SECTION 00 21 13

INSTRUCTIONS TO BIDDERS

ARTICLE 1. SECURING DOCUMENTS

Bids must be submitted to the City on the Bid Forms which are a part of the Bid Package for the Project. The proposal forms, bid security, and all other documents required to be submitted with the bid must be submitted via electronic transmission on the City of Goleta PlanetBids portal site. Bid and Contract Documents may be obtained from PlanetBids in the Notice Inviting Bids

Bidders must be registered on the City of Goleta's PlanetBids portal in order to receive addendum notifications and to submit a bid. Go to PlanetBids for bid results and awards. It is the responsibility of the bidder to submit the bid with sufficient time to be received by PlanetBids prior to the bid opening date and time. Allow time for technical difficulties, uploading, and unexpected delays. **Late or incomplete bids will not be accepted.**

Failure to acknowledge addenda may make a bid nonresponsive and not eligible for award of the contract.

ARTICLE 2. EXAMINATION OF SITE AND CONTRACT DOCUMENTS

At its own expense and prior to submitting its Bid, each Bidder shall visit the site of the proposed work and fully acquaint itself with the conditions relating to the construction and labor required so that the Bidder may fully understand the work, including but not limited to difficulties and restrictions attending the execution of the work under the contract. Each Bidder shall carefully examine the Drawings, and shall read the Specifications, Contract, and all other documents referenced herein. Each Bidder shall also determine the local conditions which may in any way affect the performance of the work, including local tax structure, contractors' licensing requirements, availability of required insurance, the prevailing wages and other relevant cost factors, shall familiarize itself with all federal, state and local laws, ordinances, rules, regulations and codes affecting the performance of the work, including the cost of permits and licenses required for the work, and shall make such surveys and investigations, including investigations of subsurface or latent physical conditions at the site or where work is to be performed as may be required. Bidders are responsible for consulting the standards referenced in the Contract. The failure or omission of any Bidder to receive or examine any contract documents, forms, instruments, addenda, or other documents, or to visit the site and acquaint itself with conditions there existing shall in no way relieve any Bidder from any obligation with respect to its Bid or to the contract and no relief for error or omission will be given except as required under State law. The submission of a Bid shall be taken as conclusive evidence of compliance with this Article.

ARTICLE 3. INTERPRETATION OF DRAWINGS AND DOCUMENTS

Prospective Bidders unclear as to the true meaning of any part of the Drawings, Specifications or other proposed contract documents may submit to the City a written request for interpretation through PlanetBids. The prospective Bidder submitting the request is responsible for prompt delivery.



Interpretation of the Drawings, Specifications or other proposed contract documents will be made only by a written addendum duly issued through PlanetBids. The City will not be responsible for any other explanation or interpretations of the proposed documents. If a Prospective Bidders becomes aware of any errors or omissions in any part of the Contract Documents, it is the obligation of the Prospective Bidder to promptly bring it to the attention of the City through PlanetBids.

Before submitting its bid, bidder will carefully study and compare the various documents comprising the Contract Documents and compare them with any other work being bid concurrently or presently under construction which relates to the Work for which the bid is submitted; will examine the project site, the conditions under which the Work is to be performed, and the local conditions; and will at once report to the City's representative errors, inconsistencies, or ambiguities discovered. The drawings and specifications contained in these Contract Documents do not constitute a representation or warranty that any conditions shown therein actually exist.

Clarifications, interpretations, corrections, and changes to the Contract Documents will only be made by addenda. Purported clarifications, interpretations, corrections, and changes to the Contract Documents made in any other manner will not be binding and bidders will not rely upon them.

ARTICLE 4. PRODUCT SUBSTITUTIONS

Requests for product substitutions will be considered during the bidding process. All requests shall be submitted through a Bid RFI process (through PlanetBids), so that all bidders will be informed. Bidders wishing to obtain authorization for an or equal substitution of an equivalent material, product or equipment, shall submit all requests for or equal substitution using the form included as EXHIBIT N, together with data substantiating Bidder's representation that the non-specified item is of equal quality to the item. Requests for product substitutions not handled through the Bid RFI process will not be considered. Authorization of an equal substitution of equivalent materials is solely within the discretion of the City and, if given, shall be made by Addendum issued by the City before Bid Opening. Bids shall not be based on any or equal substitution request that has not been authorized in writing by City Addendum. In the absence of a written Addendum authorizing a pre-Bid or equal substitution request, the request shall be deemed denied.

ARTICLE 5. MANDATORY PRE-BID MEETING

A mandatory pre-bid meetings will be held on Monday, April 17, 2024, at 10:00 AM and on April 24, 2024 at 10:00 AM at the Project Site (27 South La Patera Lane, Goleta, CA 93117). Interested bidders are required to attend one or both of these pre-bid meetings and will be held responsible for all information presented. It is required that the Bidders have fully inspected the Project site in all particulars and become thoroughly familiar with the terms and conditions of the Bid Plans and Special Provisions and local conditions affecting the performance and costs of the Work prior to bidding and it is recommended that this be done prior to attending this meeting.



ARTICLE 6. ADDENDA

The City reserves the right to revise the Contract Documents prior to the Bid opening date. Revisions, if any, shall be made by written Addenda. All Addenda issued by the City shall be included in the Bid and made part of the Contract Documents. Pursuant to Public Contract Code Section 4104.5, if the City issues an Addendum which includes material changes to the Project less than 72 hours prior to the deadline for submission of Bids, the City will extend the deadline for submission of Bids. The City may determine, in its sole discretion, whether an Addendum warrants postponement of the Bid submission date. Bidders must be registered on the City's PlanetBids portal to receive addendum notifications. Addenda will be posted on PlanetBids portal. The Bidder shall indicate the Addenda received prior to bidding in the space provided in the Bid Form. Failure to indicate all Addenda may be sufficient cause for rejecting the Bid.

ARTICLE 7 ALTERNATE BIDS

If alternate bid items are called for in the Contract Documents, the time required for completion of the alternate bid items has already been factored into the Contract duration and no additional Contract time will be awarded for any of the alternate bid items. The City may elect to include one or more of the alternate bid items, or to otherwise remove certain work from the Project scope of work. Accordingly, each bidder must ensure that each bid item contains a proportionate share of profit, overhead, and other costs or expenses which will be incurred by the bidder.

ARTICLE 8. COMPLETION OF BID FORMS

Bids will be submitted on the proposal forms included with the Contract Documents. Bids not submitted on the City's proposal forms will be rejected. All blanks on the proposal forms will be filled in legibly. Bidder's failure to submit a price for any alternate or unit price will result in the bid being considered as non-responsive. If alternates are called for and no change in the lump sum base bid is required, enter "no change."

Each bidder must fill out the "bidders statement of past contract disqualifications" form stating any and all instances of contract disqualifications due to a violation of a law or safety regulation. The bidder must explain the circumstances of each disqualification.

Bidder will make no stipulations on the proposal forms nor qualify the bid in any manner. The bids will be based upon full completion of all the Work as shown on the plans and specifications. It is expressly understood that the plans are drawn with as much accuracy as is possible in advance, but should errors, omissions or discrepancies exist in the plans which show conditions that vary from those encountered in construction, the bidder (if awarded the contract) specifically agrees to construct a completed Work ready for the use and in the manner which is intended.

Bidder is aware of and, if awarded the contract, will comply with legal requirements in its performance of the Work and is required to pay City business license fee(s).

Bidder shall not damage or endanger and shall preserve and protect adjacent properties.



Bidder has familiarized itself with the staging and material storage constraints of the Project site and surrounding buildings and will confine its staging and storage operations to approved areas.

Bidder will coordinate its construction activities with the other contractors and utility companies performing work on the Project site, if any, including, but not limited to, any separate contractor retained by the City.

ARTICLE 9. BID DELIVERY AND MODIFICATIONS OF BIDS

The proposal forms, bid security, and all other documents required to be submitted with the bid must be submitted via electronic transmission on the City of Goleta PlanetBids portal site. Bidders must be registered on the City of Goleta's PlanetBids portal in order to submit a bid. Go to PlanetBids for bid results and awards. It is the responsibility of the bidder to submit the bid with sufficient time to be received by PlanetBids prior to the bid opening date and time. Allow time for technical difficulties, uploading, and unexpected delays. Late or incomplete bids will not be accepted.

Each Bidder shall submit its Bid in strict conformity with the requirements of the Contract Documents. Unauthorized additions, modifications, revisions, conditions, limitations, exclusions or provisions attached to a Bid may render it non-responsive and may cause its rejection. Bidders shall not delete, modify, or supplement the printed matter on the Bid Forms, or make substitutions thereon. Oral, telephonic and electronic modifications will not be considered.

Bids may not be modified, withdrawn, or canceled within one hundred twenty (120) calendar days after the bid deadline unless otherwise provided in any supplementary instructions to bidders. If a Bidder withdraws, cancels or modifies its bid within the time specified above, the bidder shall be prohibited from further bidding on the project and the bid bond shall be forfeited. The City, at its discretion, may award the bid to the next responsive and responsible bidder. In the event the next bidder refuses to enter into the contract, that bidder's bid bond shall then be forfeited.

ARTICLE 10. SUBCONTRACTORS

Bidder shall set forth the name, address of the place of business, and contractor license number of each subcontractor who will perform work, labor, furnish materials or render services to the bidder on said contract and each subcontractor licensed by the State of California who, under subcontract to bidder, specially fabricates and installs a portion of the Work described in the Drawings and Specifications in an amount in excess of one half of one percent (0.5%) of the total bid price, and shall indicate the portion of the work to be done by such subcontractor in accordance with Public Contract Code Section 4104. Substitution of subcontractors after the bid deadline who are listed in the proposal form will only be allowed with the City's written consent and in accordance with California law

ARTICLE 11. LICENSING REQUIREMENTS

Pursuant to Business and Professions Code Section 7028.15 and Public Contract Code Section 3300, all bidders must possess proper licenses for performance of this Contract. Subcontractors must possess the appropriate licenses for each specialty subcontracted. Pursuant to Business and Professions Code



Section 7028.5, the City shall consider any bid submitted by a contractor not currently licensed in accordance with state law and pursuant to the requirements found in the Contract Documents to be nonresponsive, and the City shall reject the Bid. The City shall have the right to request, and Bidders shall provide within ten (10) calendar days, evidence satisfactory to the City of all valid license(s) currently held by that Bidder and each of the Bidder's subcontractors, before awarding the Contract.

ARTICLE 12. BID GUARANTEE (BOND)

Each bid must be accompanied by bid security, in the amount of 10% of the Total Base Bid on the base Contract Work, excluding any Alternate Bid Items, as security for bidder's obligation to enter into a contract with the City on the terms stated in the proposal forms and to furnish all items required by the Contract Documents.

All bids must be accompanied by a scanned copy of the bid security uploaded to PlanetBids. The original security of the three (3) apparent lowest bidders must be mailed to the office of the City Clerk at 130 Cremona Drive, Suite B, Goleta, California 93117, in a sealed envelope and be received within three (3) city business days after bid due date and time; otherwise, the bid will be considered non-responsive. The sealed envelope should be plainly marked on the outside identifying the names as shown in the notice inviting sealed bids.

If the apparent lowest responsible bidder fails to sign the contract and furnish all items required by the bidding documents within the time limits specified in these bidding instructions, the City may reject such bidder and select the next apparent lowest responsible bidder until all bids have been exhausted or the City may reject all bids. In the event the bid is rejected, such bidder will be liable for and forfeit to the City the amount of the difference, not to exceed the amount of the bid security, between the amount of the disqualified bid and the larger amount for which the City procures the Work. The City may also use the bid security to cover the cost of rebidding the project.

If a bid bond is submitted and an attorney-in-fact executes the bid bond on behalf of the surety, a notarized and current copy of the power of attorney will be affixed to the bid bond. The surety issuing the bid bond must be admitted to provide surety within the State of California.

The City will retain the bid security until the occurrence of one of the following:

- All items required by the bidding documents have been furnished and the contract has been signed by the successful bidder and the City.
- The specified time has elapsed during which bids may be withdrawn.
- All bids have been rejected.

ARTICLE 13. IRAN CONTRACTING ACT OF 2010

In accordance with Public Contract Code Section 2200 *et seq.*, the City requires that any person that submits a bid or proposal or otherwise proposes to enter into or renew a contract with the City with respect to goods or services of one million dollars (\$1,000,000) or more, certify at the time the bid is submitted or the contract is renewed, that the person is not identified on a list created pursuant to subdivision (b) of Public Contract Code Section 2203 as a person engaging in investment activities in



Iran described in subdivision (a) of Public Contract Code Section 2202.5, or as a person described in subdivision (b) of Public Contract Code Section 2202.5, as applicable.

The form of such Iran Contracting Certificate is included with the bid package and must be signed and dated under penalty of perjury.

ARTICLE 14. COMPLIANCE WITH ECONOMIC SANCTIONS IN RESPONSE TO RUSSIA'S ACTIONS IN UKRAINE

Per Executive Order N-6-22, all contractors and grantees that have agreements valued at \$5 million or more with agencies/departments subject to the California Governor's authority are directed to report to their contracting or grantor agency or department regarding their compliance with economic sanctions imposed by the U.S. government in response to Russia's actions in Ukraine, as well as sanctions imposed under state law, if any.

The form of compliance is included with the bid package and must be signed and dated under penalty of perjury.

ARTICLE 15. NONCOLLUSION DECLARATION

Bidders on all public works contracts are required to submit a declaration of non-collusion with their bid. This form is included with the bid package and must be signed and dated under penalty of perjury.

ARTICLE 16. PUBLIC WORKS CONTRACTOR REGISTRATION CERTIFICATION

Pursuant to Labor Code sections 1725.5 and 1771.1, all contractors and subcontractors that wish to bid on, be listed in a bid proposal, or enter into a contract to perform public work must be registered with the Department of Industrial Relations. No bid will be accepted nor any contract entered into without proof of the contractor's and subcontractors' current registration with the Department of Industrial Relations to perform public work. If awarded a contract, the bidder and its subcontractors, of any tier, shall maintain active registration with the Department of Industrial Relations for the duration of the Project. To this end, Bidder shall sign and submit with its Bid the Public Works Contractor Registration Certification on the form provided, attesting to the facts contained therein. Failure to submit this form may render the bid non-responsive. In addition, each Bidder shall provide the registration number for each listed subcontractor in the space provided in the Designation of Subcontractors form.

ARTICLE 17. BIDDER INFORMATION AND EXPERIENCE FORM

Each Bidder shall complete the questionnaire provided herein and shall submit the questionnaire along with its Bid. Failure to provide all information requested within the questionnaire along with the Bid may cause the bid to be rejected as non-responsive. The City reserves the right to reject any Bid if an investigation of the information submitted does not satisfy the City that the Bidder is qualified to properly carry out the terms of the contract.



ARTICLE 18. WORKERS' COMPENSATION CERTIFICATION

In accordance with the provisions of Labor Code Section 3700, Contractor shall secure the payment of compensation to its employees. Contractor shall sign and file with the City the following certificate prior to performing the work under this Contract:

I am aware of the provisions of Section 3700 of the Labor Code, which require every employer to be insured against liability for workers' compensation or to undertake self-insurance in accordance with the provisions of that code, and I will comply with such provisions before commencing the performance of the work of this contract.

The form of such Workers' Compensation Certificate is included as part of this document.

ARTICLE 19. SIGNING OF BIDS

All Bids submitted shall be executed by the Bidder or its authorized representative. Bidders may be asked to provide evidence in the form of an authenticated resolution of its Board of Directors or a Power of Attorney evidencing the capacity of the person signing the Bid to bind the Bidder to each Bid and to any Contract arising therefrom.

If a Bidder is a joint venture or partnership, it may be asked to submit an authenticated Power of Attorney executed by each joint venturer or partner appointing and designating one of the joint venturers or partners as a management sponsor to execute the Bid on behalf of Bidder. Only that joint venturer or partner shall execute the Bid. The Power of Attorney shall also: (1) authorize that particular joint venturer or partner to act for and bind Bidder in all matters relating to the Bid; and (2) provide that each venturer or partner shall be jointly and severally liable for any and all of the duties and obligations of Bidder assumed under the Bid and under any Contract arising therefrom. The Bid shall be executed by the designated joint venturer or partner on behalf of the joint venture or partnership in its legal name.

ARTICLE 20. SUBMISSION OF SEALED BIDS

Once the Bid and supporting documents have been completed and signed as set forth herein, they shall be submitted, along with the Bid Guarantee and other required materials via electronic transmission on the City of Goleta PlanetBids portal site which can be accessed at the CITY website, and will be publicly opened and posted promptly thereafter. Bids received after the time and day set for the receipt of bids shall not be accepted.

ARTICLE 21. OPENING OF BIDS

At the time and place set for the opening and reading of bids, or any time thereafter, each and every bid received prior to the time and day set for the receipt of bids will be publicly opened and posted promptly thereafter. The City will not accept any Bid received after the specified date and time. It is the bidder's sole responsibility to ensure that its Bid is received as specified. Bids may be submitted earlier than the date(s) and time(s) indicated.



The public reading of each bid will include the following information:

- A. The name and business location of the bidder.
- B. The nature and amount of the bid security furnished by bidder.
- C. The bid amount.

A responsive Bid is a Bid that conforms, in all material respects, to these Instructions to Bidders. Non-responsive Bids will be rejected.

A responsible bidder means a bidder who has demonstrated the attributes of trustworthiness, quality, fitness, capacity, and experience to satisfactorily perform fully the requirements of the Contract. .

In addition to other provisions of the Bidding Documents, upon the request of the City, a bidder whose Bid is under consideration for the award of the Contract shall promptly submit satisfactory evidence to City showing the bidder's financial resources, experience in the field, and organization and other factors evidencing bidder's ability to successfully execute and complete the Contract.

The City reserves the right to reject any or all bids and to waive discrepancies, irregularities, informalities, or any other error in the bid or bidding, when to do so seems to best serve the public interest. The right of the City to waive errors applies even if the Bidding Documents state that a discrepancy, irregularity, informality, or other error make a bid nonresponsive, so long as the error does not constitute a material error. The City reserves the right, in its sole discretion, to: judge the bidder's representations as stated in the proposal forms and any post-Bid information to determine whether or not bidder is qualified to perform the Work; be the sole judge regarding the suitability of the products, services, or supplies offered; to not purchase all items or the full quantity of each item listed in the Bid Item List; reject any or all Bids; waive any deficiencies, irregularities, or informalities in any Bids or in the bidding process; modify, cancel, or withdraw the Notice Inviting Sealed Bids; issue a new Notice Inviting Sealed Bids; suspend or abandon the Project; seek the assistance of outside technical experts in Bid evaluation; require a bidder to provide a guarantee (or guarantees) of the Contract by a third party; and not issue a Notice to Proceed after execution of the Contract. In submitting a Bid in response to the Notice Inviting Sealed Bids, the bidder is specifically acknowledging the City holds these rights. The Notice Inviting Sealed Bids does not commit the City to enter into a Contract, to reject, in its sole discretion, all Bids, nor does it obligate the City pay for any costs incurred by bidders in preparation and submission of a Bid or in anticipation of a Contract. By submitting a Bid, the bidder disclaims any right to be paid for such costs.

The City may reject any bid not accompanied by the required bid security or any other item required by the bidding documents, or a bid which is in any other way materially incomplete, irregular or not responsive to the bid request in the sole determination of the City

ARTICLE 22. WITHDRAWAL OF BID

Any bid may be withdrawn either personally or by written request, incurring no penalty, at any time prior to the scheduled closing time for receipt of bids. Requests to withdraw bids shall be worded so as



not to reveal the amount of the original bid. Withdrawn bids may be resubmitted until the time and day set for the receipt of bids, provided that resubmitted bids are in conformance with the instructions herein.

Bids may not be modified, withdrawn, or canceled within one hundred twenty (120) days after the bid deadline unless otherwise provided in any supplementary instructions to bidders. If a bidder withdraws, cancels or modifies its bid within the time specified above, the bidder shall be prohibited from further bidding on the project and the bid bond shall be forfeited. The City, at its discretion, may award the bid to the next responsive and responsible bidder. In the event the next bidder refuses to enter into the contract, that bidder's bid bond shall then be forfeited.

Bids may be withdrawn after bid opening only by providing written notice to City within five (5) working days of the bid opening and in compliance with Public Contract Code Section 5100 *et seq.*, or as otherwise may be allowed with the consent of the City.

ARTICLE 23. BIDDERS INTERESTED IN MORE THAN ONE BID

No Bidder shall be allowed to make, file or be interested in more than one bid for the same work unless alternate bids are specifically called for. A person, firm or corporation that has submitted a sub-proposal to a Bidder, or that has quoted prices of materials to a Bidder, is not thereby disqualified from submitting a sub-proposal or quoting prices to other bidders. No person, firm, corporation, or other entity may submit a sub-proposal to a Bidder, or quote prices of materials to a Bidder, when also submitting a prime Bid on the same Project.

ARTICLE 24. SUBSTITUTION OF SECURITY

The Contract Documents call for monthly progress payments based upon the percentage of the Work completed. The City will retain a percentage of each progress payment as provided by the Contract Documents. At the request and expense of the successful Bidder, the City will substitute securities for the amount so retained in accordance with Public Contract Code Section 22300.

ARTICLE 25. PREVAILING WAGES

The City has obtained from the Director of the Department of Industrial Relations the general prevailing rate of per diem wages in the locality in which this work is to be performed for each craft or type of worker needed to execute the Contract. These rates are available at Engineering Division of the City or may be obtained online at <http://www.dir.ca.gov>. Bidders are advised that a copy of these rates must be posted by the successful Bidder at the job site(s).

ARTICLE 26. DEBARMENT OF CONTRACTORS AND SUBCONTRACTORS

In accordance with the provisions of the Labor Code, contractors or subcontractors may not perform work on a public works project with a subcontractor who is ineligible to perform work on a public project pursuant to Labor Code Sections 1777.1 or 1777.7. Any contract on a public works project entered into between a contractor and a debarred subcontractor is void as a matter of law. A debarred subcontractor



may not receive any public money for performing work as a subcontractor on a public works contract. Any public money that is paid to a debarred subcontractor by the Contractor for the Project shall be returned to the City. The Contractor shall be responsible for the payment of wages to workers of a debarred subcontractor who has been allowed to work on the Project.

ARTICLE 27. INSURANCE REQUIREMENTS

Prior to commencing work, the successful bidder shall purchase and maintain insurance as set forth in the General Conditions.

ARTICLE 28. PERFORMANCE BOND AND PAYMENT BOND REQUIREMENTS

The successful bidder will be required to furnish a Labor and Material Payment Bond and a Faithful Performance Bond each in an amount equal to one hundred percent (100%) of the contract price. Each bond shall be secured from a surety company that meets all State of California bonding requirements, as defined in California Code of Civil Procedure Section 995.120 and is admitted by the State of California. Each bond shall be accompanied, upon the request of City, with all documents required by California Code of Civil Procedure Section 995.660 to the extent required by law. All bonding and insurance requirements shall be completed and submitted to City within ten (10) working days from the date the City provides the successful bidder with the Notice of Intent to Award.

ARTICLE 29. SALES AND OTHER APPLICABLE TAXES, PERMITS, LICENSES AND FEES

Contractor and its subcontractors performing work under this Contract will be required to pay California sales tax and other applicable taxes, and to pay for permits, licenses and fees required by the agencies with authority in the jurisdiction in which the Work will be located, unless otherwise expressly provided by the Contract Documents.

ARTICLE 30. PERMIT FEE ALLOWANCE

Notwithstanding anything contained herein, the Bid Form contains an allowance for the Contractor's cost of acquiring miscellaneous permits and inspections fees that may be charged to the Contractor by the Agency of Jurisdiction. The allowance is included within the Bid Form to eliminate the need by bidders to research or estimate the costs of permits and construction inspection fees prior to submitting a bid. No other costs payable by Contractor to the Agency of Jurisdiction are included within the allowance.

ARTICLE 31. FILING OF BID PROTESTS

Any registered Bidder may file a protest provided that each and all of the following are complied with:

- a. The bid protest is in writing;
- b. Protests based upon alleged defects or improprieties in the Bidding Documents are filed with the City prior to the Bid Deadline;



- c. All other protests are filed and received by the City not more than five (5) calendar days following the date of City's Notice of Intent to Award the Contract; and
- d. The written bid protest sets forth, in detail, all grounds for the bid protest, including without limitation all facts, supporting documentation, legal authorities and argument in support of the grounds for the bid protest. All factual contentions must be supported by competent, admissible and credible evidence.
- e. Any matters not set forth in the written bid protest shall be deemed waived. Any bid protest not conforming to the foregoing shall be rejected by the City as invalid.

ARTICLE 32. BASIS OF AWARD; BALANCED BID

The City shall award the Contract to the lowest responsible Bidder submitting a responsive Bid. The lowest Bid will be determined on the basis of the Base Bid Price.

The City may reject any Bid which, in its opinion when compared to other Bids received or to the City's internal estimates, does not accurately reflect the cost to perform the Work. The City may reject as non-responsive any Bid which unevenly weights or allocates costs, including but not limited to overhead and profit to one or more particular bid items.

ARTICLE 33. AWARD PROCESS

The City may retain all bids for a period of one hundred twenty (120) days for examination and comparison, and to delete any portion of the Work from the contract.

- a. The City may waive nonmaterial irregularities in a bid and will accept the lowest responsive bid from a responsible bidder as determined by the City.
- b. The City will determine the low bidder on the basis of the total base bid price in words on the bidding sheet as described on the bidding sheet.
- c. City Staff will identify the apparent lowest responsive and responsible bidder and notify such bidder within one hundred and twenty (120) calendar days (unless the number of days is modified in any Addendum issued to bidders) after the Bid Deadline. Within fifteen (15) days after receiving the City's written notice that bidder was identified as the apparent lowest responsible bidder, bidder will submit to the City all of the following items as required by the City:



- i. Two originals of the contract signed by bidder.
 - ii. One original of the payment bond.
 - iii. One original of the performance bond.
 - iv. Certificates of insurance and additional insured endorsements on forms provided by the city.
 - v. Copy of current City of Goleta business license certificate.
 - vi. Names of all subcontractors, with their DIR registration number, license numbers, addresses, telephone number, facsimile number and trade on bidders' company stationery. Evidence, as required by the city, of the reliability and responsibility of the proposed subcontractors such as statements of experience, statements of financial condition, and references.
- d. A contractor or subcontractor shall not be qualified to bid on, be listed in a bid proposal, subject to the requirements of Section 4104 of the Public Contract Code or engage in the performance of any contract for public work, as defined in this chapter, unless currently registered and qualified to perform public work pursuant to Section 1725.5. It is not a violation of this section for an unregistered contractor to submit a bid that is authorized by Section 7029.1 of the Business and Professions Code or by Section 10164 or 20103.5 of the Public Contract Code, provided the contractor is registered to perform public work pursuant to Section 1725.5 at the time the contract is awarded. This Project is subject to compliance monitoring and enforcement by the California Department of Industrial Relations.
- e. If bidder submits the two original signed contracts and all other items within fifteen (15) days after receiving the City's notification, and all such items comply with the requirements of the bidding documents, the City will submit the bid to the City Council for award of Contract. Following City Council Award of Contract, the City will sign the contract and return a signed copy of the contract to bidder.

ARTICLE 34. EXECUTION OF CONTRACT

As required herein the Bidder to whom an award is made shall execute the Contract in the amount determined by the Contract Documents. The City may require appropriate evidence that the persons executing the Contract are duly empowered to do so. The Contract and bond forms to be executed by the successful Bidder are included within these Specifications and shall not be detached.

ARTICLE 35. QUESTIONS

Questions regarding this Notice Inviting Bids must be submitted via electronic transmission on the City of Goleta PlanetBids portal site by 2:00 pm on May 2, 2024. No other members of the City's staff or governing body should be contacted about this procurement during the bidding process. Any and all inquiries and comments regarding this Bid must be communicated in writing, unless otherwise instructed by the City. The City may, in its sole discretion, disqualify any Bidder who engages in any prohibited communications.



SECTION 00 41 43
BID FORMS

1.1 Bid.

Bids will be received via electronic transmission on the City of Goleta PlanetBids portal site until **2:00 P.M. May 16, 2024.**

NAME OF BIDDER: _____
(full name)

(full address)

The undersigned hereby declare that we have carefully examined the location of the proposed Work, and have read and examined the Contract Documents, including all plans, specifications, and addenda, if any for the following Project:

Project: Goleta Train Depot Project No 9079

Location: 27 South La Patera Lane, Goleta, CA 93117

We hereby propose to furnish all labor, materials, equipment, tools, transportation, and services, and to discharge all duties and obligations necessary and required to perform and complete the Project, as described and in strict conformity with the Drawings, and these Specifications for TOTAL BID PRICE indicated herein.

The undersigned acknowledges receipt, understanding, and full consideration of the following addenda to the Contract Documents:

Addenda No. _____
Addenda No. _____
Addenda No. _____
Addenda No. _____

1. Attached is the required Bid Guarantee in the amount of not less than 10% of the Total Bid Price.
2. Attached is the completed Designation of Subcontractors form.
3. Attached is the fully executed Non-collusion Declaration form.
4. Attached is the completed Iran Contracting Act Certification form.



5. Attached is the completed Ukraine Form of Compliance.
6. Attached is the completed Public Works Contractor Registration Certification form.
7. Attached is the completed Contractor's Certificate Regarding Workers' Compensation form.
8. Attached is the completed Bidder Information and Experience form.

TOTAL BASE BID PRICE:

TOTAL BASE BID PRICE FOR Goleta Train Depot Project	
\$	Total Bid Price in Numbers
\$	Total Bid Price in Written Form
In case of discrepancy between the written price and the numerical price, the written price shall prevail.	

ALTERNATIVE BID PRICES:

TOTAL "ALTERNATIVE BID ITEM 1" BID PRICE FOR Goleta Train Depot Project (Installation of Unit Pavers in lieu of Asphaltic Concrete paving at La Patera Lane turnaround)	
\$	Total Bid Price for Alternative Bid Item 1 in Numbers
\$	Total Bid Price for Alternative Bid Item 1 in Written Form
In case of discrepancy between the written price and the numerical price, the written price shall prevail.	



ALTERNATIVE BID PRICES CONTINUED:

TOTAL “ALTERNATIVE BID ITEM 2” BID PRICE FOR Goleta Train Depot Project
(Installation of Unit Pavers in lieu of Asphaltic Concrete paving and standard striping)

\$ _____
Total Bid Price for Alternative Bid Item 2 in Numbers

\$ _____
Total Bid Price for Alternative Bid Item 2 in Written Form

In case of discrepancy between the written price and the numerical price, the written price shall prevail.

ALTERNATIVE BID PRICES:

TOTAL “ALTERNATIVE BID ITEM 3” BID PRICE FOR Goleta Train Depot Project
(Fire Lane Paving: Installation of Unit Pavers in lieu of Concrete paving at west plaza area)

\$ _____
Total Bid Price for Alternative Bid Item 3 in Numbers

\$ _____
Total Bid Price for Alternative Bid Item 3 in Written Form

In case of discrepancy between the written price and the numerical price, the written price shall prevail.

ALTERNATIVE BID PRICES:

TOTAL “ALTERNATIVE BID ITEM 4” BID PRICE FOR Goleta Train Depot Project
(Entire South La Patera Lane Improvement Project package)

\$ _____
Total Bid Price for Alternative Bid Item 4 in Numbers

\$ _____
Total Bid Price for Alternative Bid Item 4 in Written Form

In case of discrepancy between the written price and the numerical price, the written price shall prevail.



ALTERNATIVE BID PRICES CONTINUED:

TOTAL “ALTERNATIVE BID DEDUCT ITEM 5” BID PRICE FOR

Goleta Train Depot Project

(La Patera Improvement Package / Deduct from Alternative Bid Item 4 above: Omission of installation of landscape related items identified on landscape (L) sheets and street pole lights and Wiring identified on electrical (E) sheets. Electrical conduits and sleeves not omitted)

\$ _____

Total Bid Price for Alternative Bid Deduct Item 5 in Numbers

\$ _____

Total Bid Price for Alternative Bid Deduct Item 5 in Written Form



DESIGNATION OF SUBCONTRACTORS

Bidder proposes to subcontract certain portions of the Work which are in excess of one-half of one percent (0.5%) of the total amount base bid or \$10,000, whichever is greater, and to procure materials and equipment from suppliers and vendors.

These Subcontractors are identified as follows:

Work to be Performed	Subcontractor License Number	Subcontractor DIR Registration Number (Note1)	Percent of Total Bid	Subcontractor's Name & Address
1) ABATEMENT	_____	_____	_____	_____
2) DEMOLITION	_____	_____	_____	_____
3) EARTHWORK	_____	_____	_____	_____
4) CONCRETE	_____	_____	_____	_____
5) STRUCTURAL & MISC STEEL	_____	_____	_____	_____
6) ROUGH CARPENTRY	_____	_____	_____	_____



Work to be Performed	Subcontractor License Number	Subcontractor DIR Registration Number (Note1)	Percent of Total Bid	Subcontractor's Name & Address
7) ROOFING				
8) GLASS AND GLAZING				
9) L P S & DW				
10) FLOORING				
11) PAINTING				
12) FIRE PROTECTION				
13) EXTERIOR WALL PANELS				



Department of Neighborhood Services and Public Safety
GOLETA TRAIN DEPOT PROJECT

Work to be Performed	Subcontractor License Number	Subcontractor DIR Registration Number (Note1)	Percent of Total Bid	Subcontractor's Name & Address
14) INTERIOR WALL PANELS	_____	_____	_____	_____
15) DOORS	_____	_____	_____	_____
16) EXTERIOR BI-FOLD DOORS	_____	_____	_____	_____
17) SITE CONCRETE	_____	_____	_____	_____
18) SITE UTILITIES	_____	_____	_____	_____
19) PLUMBING	_____	_____	_____	_____
20) HVAC	_____	_____	_____	_____
21) ELECTRICAL	_____	_____	_____	_____



Work to be Performed	Subcontractor License Number	Subcontractor DIR Registration Number (Note1)	Percent of Total Bid	Subcontractor's Name & Address
22) LANDSCAPE & IRRIGATION				
23)				
24)				
25)				
26)				

Note 1: Bidders have 24 hours after the Bid Deadline to submit this information
 Note 2: Bidder may add additional lines/pages to Designate Subcontractors as needed.



The undersigned agrees that this Bid Form constitutes a firm offer to the City which cannot be withdrawn for the number of calendar days indicated in the Notice Inviting Bids from and after the Bid opening, or until a Contract for the Work is fully executed by the City and a third party, whichever is earlier.

The successful bidder hereby agrees to sign the contract and furnish the necessary bonds and certificates of insurance within ten (10) working days after the City provides the successful bidder with the Notice of Award.

Upon receipt of the signed contract and other required documents, the contract will be executed by the City, after which the City will prepare a letter giving Contractor Notice to Proceed. The official starting date shall be the date of the Notice to Proceed, unless otherwise specified. The undersigned agrees to begin the Work within ten (10) working days of the date of the Notice to Proceed, unless otherwise specified.

The undersigned has examined the location of the proposed work and is familiar with the Drawings and Specifications and the local conditions at the place where work is to be done.

If awarded the contract, the undersigned agrees that there shall be paid by the undersigned and by all subcontractors to all laborers, workers and mechanics employed in the execution of such contract no less than the prevailing wage rate within Santa Barbara County for each craft, classification, or type of worker needed to complete the Work contemplated by this contract as established by the Director of the Department of Industrial Relations. A copy of the prevailing rate of per diem wages are on file at the City's Administration Office and shall be made available to interested parties upon request.

Enclosed find cash, bidder's bond, or cashier's or certified check No. _____ from the _____ Bank in the amount of _____, which is not less than ten percent (10%) of this bid, payable to City of Goleta as bid security and which is given as a guarantee that the undersigned will enter into a contract and provide the necessary bonds and certificates of insurance if awarded the Work.

The bidder furthermore agrees that in case of bidder's default in executing said contract and furnishing required bonds and certificates of insurance, the cash, bidder's bond, or cashier's or certified check accompanying this proposal and the money payable thereon shall become and shall remain the property of the City of Goleta.

Bidder is an individual _____, or corporation _____, or partnership _____, organized under the laws of the State of _____.

Bidder confirms license(s) required by California State Contractor's License Law for the performance of the subject project are in full effect and proper order. The following are the Bidder's applicable license number(s), with their expiration date(s) and class of license(s):



If the Bidder is a joint venture, each member of the joint venture must include the required licensing information.

Sureties that will furnish the Faithful Performance Bond and the Labor and Material Payment Bond, in the form specified herein, in an amount equal to one hundred percent (100%) of the contract price within ten (10) working days from the date the City provides the successful bidder the Notice of Award. Sureties must meet all of the State of California bonding requirements, as defined in California Code of Civil Procedure Section 995.120 and must be authorized by the State of California.

The insurance company or companies to provide the insurance required in the contract documents must have a Financial Strength Rating of not less than “A-” and a Financial Size Category of not less than “Class VII” according to the latest Best Key Rating Guide. At the sole discretion of the City, the City may waive the Financial Strength Rating and the Financial Size Category classifications for Workers’ Compensation insurance.

(signatures continued on next page)



I hereby certify under penalty of perjury under the laws of the State of California that all of the information submitted in connection with this Bid and all of the representations made herein are true and correct.

Executed at _____, on this ____ day of _____, ____.

(Bidders Name – Print or Type)

(Name and Title)

(Corporate Seal)

(Signature)

Names of individual members of firm or names and titles of all officers of corporation and their addresses are listed below:

Name _____ Title _____

Complete Address _____

Phone _____ FAX _____

Name _____ Title _____

Complete Address _____

Phone _____ FAX _____

Name _____ Title _____

Complete Address _____

Phone _____ FAX _____

Name _____ Title _____

Complete Address _____

Phone _____ FAX _____



1.2 Bid Bond

[Note: Not required when other form of Bidder’s Security, e.g. cash, certified check or cashier’s check, accompanies bid.]

The makers of this bond are, _____, as Principal, and _____, as Surety and are held and firmly bound unto the City of Goleta, hereinafter called the City, in the penal sum of TEN PERCENT (10%) OF THE TOTAL BID PRICE of the Principal submitted to City for the work described below, for the payment of which sum in lawful money of the United States, well and truly to be made, we bind ourselves, our heirs, executors, administrators, successors and assigns, jointly and severally, firmly by these presents.

THE CONDITION OF THIS OBLIGATION IS SUCH that whereas the Principal has submitted the accompanying bid dated _____, 20 _____, for GOLETA TRAIN DEPOT PROJECT NO. 9079.

If the Principal does not withdraw its Bid within the time specified in the Contract Documents; and if the Principal is awarded the Contract and provides all documents to the City as required by the Contract Documents; then this obligation shall be null and void. Otherwise, this bond will remain in full force and effect.

Surety, for value received, hereby stipulates and agrees that no change, extension of time, alteration or addition to the terms of the Contract Documents shall in affect its obligation under this bond, and Surety does hereby waive notice of any such changes.

In the event a lawsuit is brought upon this bond by the City and judgment is recovered, the Surety shall pay all litigation expenses incurred by the City in such suit, including reasonable attorneys’ fees, court costs, expert witness fees and expenses.

By their signatures hereunder, Surety and Principal hereby confirm under penalty of perjury that surety is an admitted surety insurer authorized to do business in the State of California.

IN WITNESS WHEREOF, the above-bound parties have executed this instrument under their several seals this _____ day of _____, 20____, the name and corporate seal of each corporation.

(Corporate Seal)

Contractor/ Principal

By _____

Title _____

(Corporate Seal)

Surety

By _____

Attorney-in-Fact

(Attach Attorney-in-Fact Certificate)

Title _____



Notary Acknowledgment

A notary public or other officer completing this certificate verifies only the identity of the individual who signed the document to which this certificate is attached, and not the truthfulness, accuracy, or validity of that document.

STATE OF CALIFORNIA
COUNTY OF _____

On _____, 20____, before me, _____, Notary Public, personally
Date Name And Title Of Officer (e.g. "Jane Doe, Notary Public")
appeared _____, who proved to me on the basis of satisfactory
Name(s) of Signer(s)

evidence to be the person(s) whose name(s) is/are subscribed to the within instrument and acknowledged to me that he/she/they executed the same in his/her/their authorized capacity(ies), and that by his/her/their signature(s) on the instrument the person(s), or the entity upon behalf of which the person(s) acted, executed the instrument.

I certify under PENALTY OF PERJURY under the laws of the State of California that the foregoing paragraph is true and correct.

WITNESS my hand and official seal.

Place Notary Seal Above

Signature of Notary Public

OPTIONAL

Though the information below is not required by law, it may prove valuable to persons relying on the document and could prevent fraudulent removal and reattachment of this form to another document.

CAPACITY CLAIMED BY SIGNER

DESCRIPTION OF ATTACHED DOCUMENT

- Individual
- Corporate Officer

	Title(s)		Title or Type of Document
<input type="checkbox"/> Partner(s)	<input type="checkbox"/> Limited <input type="checkbox"/> General		Number of Pages
<input type="checkbox"/> Attorney-In-Fact			Date of Document
<input type="checkbox"/> Trustee(s)			
<input type="checkbox"/> Guardian/Conservator			
<input type="checkbox"/> Other:			

Signer is representing:
Name Of Person(s) Or Entity(ies)

Signer(s) Other Than Named Above

NOTE: This acknowledgment is to be completed for Contractor/Principal.



Notary Acknowledgment

A notary public or other officer completing this certificate verifies only the identity of the individual who signed the document to which this certificate is attached, and not the truthfulness, accuracy, or validity of that document.

STATE OF CALIFORNIA
COUNTY OF _____

On _____, 20____, before me, _____, Notary Public, personally
Date Name And Title Of Officer (e.g. "Jane Doe, Notary Public")
appeared _____, who proved to me on the basis of satisfactory
Name(s) of Signer(s)

evidence to be the person(s) whose name(s) is/are subscribed to the within instrument and acknowledged to me that he/she/they executed the same in his/her/their authorized capacity(ies), and that by his/her/their signature(s) on the instrument the person(s), or the entity upon behalf of which the person(s) acted, executed the instrument.

I certify under PENALTY OF PERJURY under the laws of the State of California that the foregoing paragraph is true and correct.

WITNESS my hand and official seal.

Place Notary Seal Above

Signature of Notary Public

OPTIONAL

Though the information below is not required by law, it may prove valuable to persons relying on the document and could prevent fraudulent removal and reattachment of this form to another document.

CAPACITY CLAIMED BY SIGNER

DESCRIPTION OF ATTACHED DOCUMENT

- Individual
- Corporate Officer

Title(s)		Title or Type of Document
<input type="checkbox"/> Partner(s)	<input type="checkbox"/> Limited <input type="checkbox"/> General	Number of Pages
<input type="checkbox"/> Attorney-In-Fact		Date of Document
<input type="checkbox"/> Trustee(s)		
<input type="checkbox"/> Guardian/Conservator		
<input type="checkbox"/> Other:		
Signer is representing: Name Of Person(s) Or Entity(ies)		Signer(s) Other Than Named Above

NOTE: This acknowledgment is to be completed for the Attorney-in-Fact. The Power-of-Attorney to local representatives of the bonding company must also be attached.

END OF BID BOND



1.3 List of Subcontractors

In compliance with the Subletting and Subcontracting Fair Practices Act Chapter 4 (commencing at Section 4100), Part 1, Division 2 of the Public Contract Code of the State of California and any amendments thereof, Bidder shall set forth below: (a) the name and the location of the place of business, (b) the California contractor license number, (c) the DIR public works contractor registration number unless exempt pursuant to Labor Code Sections 1725.5 and 1771.1, and (d) the portion of the work which will be done by each subcontractor who will perform work or labor or render service to the Bidder in or about the construction of the work or improvement to be performed under this Contract in an amount in excess of one-half of one percent (0.5%) of the Bidder's Total Bid Price.

If a Bidder fails to specify a subcontractor or if a contractor specifies more than one subcontractor for the same portion of work, then the Bidder shall be deemed to have agreed that it is fully qualified to perform that portion of work and that it shall perform that portion itself.

Work to be done by Subcontractor	Name of Subcontractor	Location of Business	CSLB Contractor License No.	DIR Registration Number	% of Work



Work to be done by Subcontractor	Name of Subcontractor	Location of Business	CSLB Contractor License No.	DIR Registration Number	% of Work

(Attach additional sheets if necessary)

Name of Bidder _____

Signature _____

Name and Title _____

Dated _____



1.4 Bidder Information and Experience Form

ARTICLE 36. INFORMATION ABOUT BIDDER

(Indicate not applicable (“N/A”) where appropriate.)

NOTE: Where Bidder is a joint venture, pages shall be duplicated and information provided for all parties to the joint venture.

1.0 Name of Bidder: _____

2.0 Type, if Entity: _____

3.0 Bidder Address: _____

_____ Facsimile Number Telephone Number

_____ Email Address

4.0 How many years has Bidder’s organization been in business as a Contractor?

5.0 How many years has Bidder’s organization been in business under its present name? _____

5.1 Under what other or former names has Bidder’s organization operated? _____

6.0 If Bidder’s organization is a corporation, answer the following:

6.1 Date of Incorporation: _____

6.2 State of Incorporation: _____

6.3 President’s Name: _____

6.4 Vice-President’s Name(s): _____

6.5 Secretary’s Name: _____

6.6 Treasurer’s Name: _____



7.0 If an individual or a partnership, answer the following:

7.1 Date of Organization: _____

7.2 Name and address of all partners (state whether general or limited partnership):

8.0 If other than a corporation or partnership, describe organization and name principals:

9.0 List other states in which Bidder's organization is legally qualified to do business.

10.0 What type of work does the Bidder normally perform with its own forces?

11.0 Has Bidder ever failed to complete any work awarded to it? If so, note when, where, and why:

12.0 Within the last five years, has any officer or partner of Bidder's organization ever been an officer or partner of another organization when it failed to complete a contract? If so, attach a separate sheet of explanation:



13.0 List Trade References:

14.0 List Bank References (Bank and Branch Address):

15.0 Name of Bonding Company and Name and Address of Agent:

[REMAINDER OF THIS PAGE INTENTIONALLY LEFT BLANK]



ARTICLE 37. LIST OF CURRENT PROJECTS (BACKLOG)

[**Duplicate Page if needed for listing additional current projects.**]

Project	Description of Bidder's Work	Completion Date	Cost of Bidder's Work



ARTICLE 37. LIST OF COMPLETED PROJECTS – LAST THREE YEARS

[**Duplicate Page if needed for listing additional completed projects.**]

Please include only those projects which are similar enough to demonstrate Bidder's ability to perform the required Work.

Project	Description of Bidder's Work	Completion Date	Cost of Bidder's Work



ARTICLE 38. VERIFICATION AND EXECUTION

These Bid Forms shall be executed only by a duly authorized official of the Bidder:

I declare under penalty of perjury under the laws of the State of California that the foregoing information is true and correct:

Name of Bidder _____

Signature _____

Name _____

Title _____

Date _____



1.5 Non-Collusion Declaration The undersigned declares:

I am the _____ of _____, the party making the foregoing Bid.

The Bid is not made in the interest of, or on behalf of, any undisclosed person, partnership, company, association, organization, or corporation. The Bid is genuine and not collusive or sham. The Bidder has not directly or indirectly induced or solicited any other Bidder to put in a false or sham bid. The Bidder has not directly or indirectly colluded, conspired, connived, or agreed with any Bidder or anyone else to put in a sham bid, or to refrain from bidding. The Bidder has not in any manner, directly or indirectly, sought by agreement, communication, or conference with anyone to fix the Bid Price of the Bidder or any other Bidder, or to fix any overhead, profit, or cost element of the Bid Price, or of that of any other Bidder. All statements contained in the Bid are true. The Bidder has not, directly or indirectly, submitted his or her Bid Price or any breakdown thereof, or the contents thereof, or divulged information or data relative thereto, to any corporation, partnership, company, association, organization, bid depository, or to any member or agent thereof to effectuate a collusive or sham bid, and has not paid, and will not pay, any person or entity for such purpose.

Any person executing this declaration on behalf of a Bidder that is a corporation, partnership, joint venture, limited liability company, limited liability partnership, or any other entity, hereby represents that he or she has full power to execute, and does execute, this declaration on behalf of the Bidder.

I declare under penalty of perjury under the laws of the State of California that the foregoing is true and correct and that this declaration is executed on _____[date], at

_____ [city], _____ [state].

Name

Name of Bidder _____

Title

Signature _____



1.6 Iran Contracting Act Certification.
(Public Contract Code section 2200 et seq.)

As required by California Public Contract Code Section 2204, the Contractor certifies subject to penalty for perjury that the option checked below relating to the Contractor’s status in regard to the Iran Contracting Act of 2010 (Public Contract Code Section 2200 *et seq.*) is true and correct:

The Contractor is not:

- (1) identified on the current list of person and entities engaged in investment activities in Iran prepared by the California Department of General Services in accordance with subdivision (b) of Public Contract Code Section 2203; or
- (2) a financial instruction that extends, for 45 days or more, credit in the amount of \$20,000,000 or more to any other person or entity identified on the current list of persons and entities engaging in investment activities in Iran prepared by the California Department of General Services in accordance with subdivision (b) of Public Contract Code Section 2203, if that person or entity uses or will use the credit to provide goods or services in the energy sector in Iran.

The City has exempted the Contractor from the requirements of the Iran Contracting Act of 2010 after making a public finding that, absent the exemption, the City will be unable to obtain the goods and/or services to be provided pursuant to the Contract.

The amount of the Contract payable to the Contractor for the Project does not exceed \$1,000,000.

Signature:

Signature: _____

Printed Name: _____

Title: _____

Firm Name: _____

Date: _____

Note: In accordance with Public Contract Code Section 2205, false certification of this form shall be reported to the California Attorney General and may result in civil penalties equal to the greater of \$250,000 or twice the Contract amount, termination of the Contract and/or ineligibility to bid on contracts for three years.



1.7 Ukraine Compliance Form

**COMPLIANCE WITH ECONOMIC SANCTIONS
IN RESPONSE TO RUSSIA’S ACTIONS IN UKRAINE**

SAPC Information Notice 22-15

Per Executive Order N-6-22, all contractors and grantees that have agreements valued at \$5 million or more with agencies/departments subject to the California Governor’s authority are directed to report to their contracting or grantor agency or department regarding their compliance with economic sanctions imposed by the U.S. government in response to Russia’s actions in Ukraine, as well as sanctions imposed under state law, if any.

Instructions: Complete Section 1, provide a letter for Section 2 and return both to your CPA.

1) ATTESTATION OF COMPLIANCE:

Having conducted a good faith review, I attest that _____
(agency name) is in compliance with the economic sanctions imposed by the U.S. government in response to Russia’s actions in Ukraine, as well as sanctions imposed under state law, if any.

Contractor/Provider Name (Printed):	Contract Number (s):
By (Authorized Signature):	
Printed name and title of authorized signor:	
Date of Signed Attestation of Compliance:	

2) REPORT OF ACTIONS/STEPS TAKEN:

Attach a brief report to this notice form, on your agency letterhead describing the steps and actions, if any, you have taken in response to Russia’s actions in Ukraine and to ensure compliance with the EO. *Please note that responses may be subject to disclosure under the California Public Records Act. Accordingly, please do not include any confidential information or disclosures that could pose security risks.*



1.8 Public Works Contractor Registration Certification

Pursuant to Labor Code sections 1725.5 and 1771.1, all contractors and subcontractors that wish to bid on, be listed in a bid proposal, or enter into a contract to perform public work must be registered with the Department of Industrial Relations. See [http://www.dir.ca.gov/Public- Works/PublicWorks.html](http://www.dir.ca.gov/Public-Works/PublicWorks.html) for additional information.

No bid will be accepted nor any contract entered into without proof of the contractor’s and subcontractors’ current registration with the Department of Industrial Relations to perform public work.

Bidder hereby certifies that it is aware of the registration requirements set forth in Labor Code sections 1725.5 and 1771.1 and is currently registered as a contractor with the Department of Industrial Relations.¹

Name of Bidder: _____
3333

DIR Registration Number: _____

DIR Registration Expiration: _____

Small Project Exemption: _____ Yes or _____ No

Unless Bidder is exempt pursuant to the small project exemption, Bidder further acknowledges:

1. Bidder shall maintain a current DIR registration for the duration of the project.
2. Bidder shall include the requirements of Labor Code sections 1725.5 and 1771.1 in its contract with subcontractors and ensure that all subcontractors are registered at the time of bid opening and maintain registration status for the duration of the project.
3. Failure to submit this form or comply with any of the above requirements may result in a finding that the bid is non-responsive.

Name of Bidder _____

Signature _____

Name and Title _____

Dated _____

¹ If the Project is exempt from the contractor registration requirements pursuant to the small project exemption under Labor Code Sections 1725.5 and 1771.1, please mark “Yes” in response to “Small Project Exemption.”



1.9 Contractor's Certification Regarding Workers' Compensation

I am aware of the provisions of section 3700 of the Labor Code which require every employer to be insured against liability for workers' compensation or to undertake self-insurance in accordance with the provisions of that code, and I will comply with such provisions before commencing the performance of the work of this Contract.

Name of Bidder _____

Signature _____

Name _____

Title _____

Dated _____



SECTION 00 52 13 – CONTRACT

PUBLIC WORKS CONTRACT BETWEEN THE CITY OF GOLETA AND

This Public Works Contract (herein referred to as “CONTRACT”) is made and entered into by and between the CITY OF GOLETA, a municipal corporation (herein referred to as "CITY"), and _____, a _____ (hereinafter referred to as “CONTRACTOR”).

SECTION A. RECITALS

1. Pursuant to the Notice Inviting Sealed Bids for the _____ Project, bids were received, publicly opened, and declared on the date specified in the notice.
2. On _____, Goleta’s City Council declared CONTRACTOR to be the lowest responsible bidder and accepted the bid of CONTRACTOR and the City Council/City Manager/Department Director and Purchasing Officer, approved this CONTRACT and authorized the City Manager to execute the CONTRACT with CONTRACTOR for furnishing labor, equipment and material for the _____ Project in the City of Goleta.

NOW, THEREFORE, in consideration of the foregoing and the mutual covenants herein contained, it is agreed:

SECTION B. TERMS

1. **GENERAL SCOPE OF WORK: CITY agrees to engage CONTRACTOR and CONTRACTOR** agrees to furnish all necessary labor, tools, materials, appliances, and equipment for and do the work for the Goleta Train Depot Project in the City of Goleta. The work shall be performed in accordance with the Plans and Specifications (and as generally described in the “Notice Inviting Sealed Bids,” attached as Exhibit A) and in accordance with bid prices set forth in CONTRACTOR’S Bid Proposal (attached as Exhibit B) and in accordance with the instructions of the City Engineer, or City’s Manager’s designee.
2. **INCORPORATED DOCUMENTS TO BE CONSIDERED COMPLEMENTARY:** The contract documents for the aforesaid project, a complete set of which is on file with the Goleta City Clerk’s Office, shall consist of the Notice Inviting Bids, Instructions to Bidders, Bid Proposal, Standard Specifications, Special Provisions, and all referenced specifications, details, standard drawings, and appendices; together with this CONTRACT and all required bonds, insurance certificates, permits, notices and affidavits; and also, including any and all addenda or supplemental agreements clarifying, amending, or extending the work contemplated as may be



required to insure its completion in an acceptable manner. All of the provisions of said contract documents are made a part hereof as though fully set forth herein. This contract is intended to require a complete and finished piece of work and anything necessary to complete the work properly and in accordance with the law and lawful governmental regulations shall be performed by CONTRACTOR whether set out specifically in the contract or not. Should it be ascertained that any inconsistency exists between the aforesaid documents and this written CONTRACT, the provisions of this CONTRACT, and the Standard Specifications, in that order, shall control. Collectively, these contract documents constitute the complete CONTRACT between CITY and CONTRACTOR and supersede any previous agreements or understandings.

3. **COMPENSATION:** CONTRACTOR agrees to receive and accept the prices set forth in its Bid Proposal as full compensation for furnishing all materials, performing all work, and fulfilling all obligations hereunder. Said compensation shall cover all expenses, losses, damages, and consequences arising out of the nature of the work during its progress or prior to its acceptance including those for well and faithfully completing the work and the whole thereof in the manner and time specified in the aforesaid contract documents; and also including those arising from actions of the elements, unforeseen difficulties or obstructions encountered in the prosecution of the work, suspension or discontinuance of the work, and all other unknowns or risks of any description connected with the work.
4. **LIQUIDATED DAMAGES:** In the event CONTRACTOR does not complete the work within the time specified, CONTRACTOR agrees that CITY will suffer damages. Inasmuch as the actual damages which would result from such breach by CONTRACTOR under this Agreement are uncertain, and would be impractical or extremely difficult to fix, CONTRACTOR agrees that it shall pay, or CITY shall deduct from CONTRACTOR's fee, the amount of \$3,000.00 per day as liquidated damages, in the event of such delay.
5. **TIME OF PERFORMANCE:** CONTRACTOR agrees to complete the work within the timeframe specified in the Contract Documents from the date of the notice to proceed. By signing this CONTRACT, CONTRACTOR represents to CITY that the contract time is reasonable for completion of the work and that CONTRACTOR will complete such work within the contract time.
6. **PREVAILING WAGES:**
Pursuant to Labor Code Sections §§1720 et seq., including but not limited to sections 1771, 1774 and 1775, and as specified in Title 8, California Code of Regulations, Section 16000 et seq., CONTRACTOR must pay its workers prevailing wages. It is CONTRACTOR's responsibility to interpret and implement any prevailing wage requirements and



CONTRACTOR agrees to pay any penalty or civil damages resulting from a violation of the prevailing wage laws.

The CONTRACTOR must post a copy of the prevailing rate of per diem wages at the job site. Pursuant to California Labor Code Section 1773, the City has ascertained the General Prevailing Rate of Wages in the County in which the work is to be done to be as determined by the Director of Industrial Relations of the State of California. The CONTRACTOR is hereby made aware that information regarding prevailing wage rates may be obtained from the State Department of Industrial Relations and/or the following website address: <https://www.dir.ca.gov/OPRL/2022-2/PWD/Southern.html> The CONTRACTOR is required to post a copy of the applicable wage rates at the job site.

CITY directs CONTRACTOR's attention to Labor Code Sections 1777.5, 1777.6 and 3098 concerning the employment of apprentices by CONTRACTOR or any subcontractor.

Labor Code Section 1777.5 requires CONTRACTOR or subcontractor employing tradesmen in any apprenticeship occupation to apply to the joint apprenticeship committee nearest the site of the public works project and which administers the apprenticeship program in that trade for a certificate of approval. The certificate must also fix the ratio of apprentices to journeymen that will be used in the performance of the contract. The ratio of apprentices to journeymen in such cases will not be less than one to five except:

When employment in the area of coverage by the joint apprenticeship committee has exceeded an average of 15 percent in the 90 days before the request for certificate, or

When the number of apprentices in training in the area exceeds a ratio of one to five, or

When the trade can show that it is replacing at least 1/30 of its membership through apprenticeship training on an annual basis statewide or locally, or

When assignment of an apprentice to any work performed under a public works contract would create a condition that would jeopardize his or her life or the life, safety, or property of fellow employees or the public at large, or the specific task to which the apprentice is to be assigned is of a nature that training cannot be provided by a journeyman.

Pursuant to Labor Code § 1776, CONTRACTOR shall comply with all Department of Industrial Relations registration requirements.

CONTRACTOR is required to make contributions to funds established for the administration of apprenticeship programs if CONTRACTOR employs registered apprentices or



journeymen in any apprentice able trade on such contracts and if other contractors on the public works site are making such contributions.

CONTRACTOR and any subcontractor must comply with Labor Code Sections 1777.5 and 1777.6 in the employment of apprentices.

Information relative to apprenticeship standards, wage schedules and other requirements may be obtained from the Director of Industrial Relations (DIR), ex officio the Administrator of Apprenticeship, San Francisco, California, or from the Division of Apprenticeship Standards and its branch offices.

CONTRACTOR and its subcontractors must keep an accurate certified payroll records showing the name, occupation, and the actual per diem wages paid to each worker employed in connection with this CONTRACT. The record will be kept open at all reasonable hours to the inspection of the body awarding the contract and to the Division of Labor Law Enforcement. If requested by CITY, CONTRACTOR must provide copies of the records at its cost.

7. **LEGAL HOURS OF WORK:** CONTRACTOR agrees to comply with the provisions of California Labor Code Section 1813 concerning penalties for workers who work excess hours. Except as provided by Labor Code Section 1815, the CONTRACTOR shall, as a penalty to the CITY, forfeit twenty five dollars (\$25) for each worker employed in the execution of the Contract by the CONTRACTOR or by any Subcontractor for each calendar day during which such worker is required or permitted to work more than 8 hours in any one calendar day and 40 hours in any one calendar week in violation of the provisions of Division 2, Part 7, Chapter 1, Article 3 (commencing at Section 1810) of the California Labor Code.
8. **TRAVEL AND SUBSISTENCE PAY:** CONTRACTOR agrees to pay travel and subsistence pay to each worker needed to execute the work required by this CONTRACT as such travel and subsistence payments are defined in the applicable collective bargaining agreements filed in accordance with Labor Code Section 1773.8.
9. **CONTRACTOR'S LIABILITY:** The CITY and its officers, agents and employees ("Indemnitees") shall not be answerable or accountable in any manner for any loss or damage that may happen to the work or any part thereof, or for any of the materials or other things used or employed in performing the work; or for injury or damage to any person or persons, either workers or employees of CONTRACTOR, of its subcontractors or the public, or for damage to adjoining or other property from any cause whatsoever arising out of or in connection with the performance of the work. CONTRACTOR shall be responsible for any damage or injury to any person or property resulting from defects or obstructions or from any cause whatsoever.



CONTRACTOR will indemnify Indemnitees against and will hold and save Indemnitees harmless from any and all actions, claims, damages to persons or property, penalties, obligations or liabilities that may be asserted or claimed by any person, firm, entity, corporation, political subdivision, or other organization arising out of or in connection with the work, operation, or activities of CONTRACTOR, its agents, employees, subcontractors or invitees provided for herein, whether or not there is concurrent passive negligence on the part of CITY. In connection therewith:

- a. CONTRACTOR will defend any action or actions filed in connection with any such claims, damages, penalties, obligations or liabilities and will pay all costs and expenses, including attorneys' fees, expert fees and costs incurred in connection therewith.
- b. CONTRACTOR will promptly pay any judgment rendered against CONTRACTOR or Indemnitees covering such claims, damages, penalties, obligations and liabilities arising out of or in connection with such work, operations or activities of CONTRACTOR hereunder, and CONTRACTOR agrees to save and hold the Indemnitees harmless therefrom.
- c. In the event Indemnitees are made a party to any action or proceeding filed or prosecuted against CONTRACTOR for damages or other claims arising out of or in connection with the work, operation or activities hereunder, CONTRACTOR agrees to pay to Indemnitees and any all costs and expenses incurred by Indemnitees in such action or proceeding together with reasonable attorneys' fees.

CONTRACTOR'S obligations under this section apply regardless of whether or not such claim, charge, damage, demand, action, proceeding, loss, stop notice, cost, expense, judgment, civil fine or penalty, or liability was caused in part or contributed to by an Indemnitee. However, without affecting the rights of CITY under any provision of this CONTRACT, Contractor shall not be required to indemnify and hold harmless CITY for liability attributable to the active negligence of CITY, provided such active negligence is determined by agreement between the parties or by the findings of a court of competent jurisdiction. In instances where CITY is shown to have been actively negligent and where CITY active negligence accounts for only a percentage of the liability involved, the obligation of Contractor will be for that entire portion or percentage of liability not attributable to the active negligence of City.

So much of the money due to CONTRACTOR under and by virtue of the contract as shall be considered necessary by CITY may be retained by CITY until disposition has been made of such actions or claims for damages as aforesaid.

It is expressly understood and agreed that the foregoing provisions are intended to be as broad and inclusive as is permitted by the law of the State of California. This indemnity provision



shall survive the termination of the CONTRACT and is in addition to any other rights or remedies which Indemnitees may have under the law.

This indemnity is effective without reference to the existence or applicability of any insurance coverage which may have been required under this CONTRACT or any additional insured endorsements which may extend to Indemnitees.

CONTRACTOR, on behalf of itself and all parties claiming under or through it, hereby waives all rights of subrogation and contribution against the Indemnitees, while acting within the scope of their duties, from all claims, losses and liabilities arising out of or incident to activities or operations performed by or on behalf of the CONTRACTOR regardless of any prior, concurrent, or subsequent passive negligence by the Indemnitees.

- 10. THIRD PARTY CLAIMS:** In accordance with Public Contracts Code Section 9201, CITY will promptly inform CONTRACTOR regarding third-party claims against CONTRACTOR, but in no event later than ten (10) business days after CITY receives such claims. Such notification will be in writing and forwarded in accordance with the “Notice” section of this CONTRACT. As more specifically detailed in the contract documents, CONTRACTOR agrees to indemnify and defend the City against any third-party claim.
- 11. WORKERS COMPENSATION:** In accordance with California Labor Code Sections 1860 and 3700, CONTRACTOR and each of its subcontractors will be required to secure the payment of compensation to its employees. In accordance with the provisions of California Labor Code Section 1861, CONTRACTOR, by signing this contract, certifies as follows: “I am aware of the provisions of Section 3700 of the Labor Code which require every employer to be insured against liability for worker's compensation or to undertake self-insurance in accordance with the provisions of that code, and I will comply with such provisions before commencing the performance of the work of this contract.”
- 12. INSURANCE:** With respect to performance of work under this CONTRACT, CONTRACTOR shall maintain and shall require all of its subcontractors to maintain insurance as required in the Standard Specifications.
- 13. ASSIGNMENT:** This CONTRACT is not assignable nor the performance of either party's duties delegable without the prior written consent of the other party. Any attempted or purported assignment or delegation of any of the rights of obligations of either party without the prior written consent of the other shall be void and of no force and effect.
- 14. INDEPENDENT CONTRACTOR:** CONTRACTOR is and shall at all times remain as to the CITY, a wholly independent contractor. Neither the CITY nor any of its agents shall have control of the conduct of CONTRACTOR or any of CONTRACTOR'S employees, except as herein set



forth. CONTRACTOR shall not at any time or in any manner represent that it or any of its agents or employees are in any manner agents or employees of CITY.

- 15. TAXES:** CONTRACTOR is responsible for paying all retail sales and use, transportation, export, import, special or other taxes and duties applicable to, and assessable against any work, materials, equipment, services, processes and operations incidental to or involved in this contract. CONTRACTOR is responsible for ascertaining and arranging to pay them. The prices established in the contract shall include compensation for any taxes CONTRACTOR is required to pay by laws and regulations in effect at the bid opening date.
- 16. LICENSES:** CONTRACTOR represents and warrants to CITY that it has all licenses, permits, qualifications, insurance, and approvals of whatsoever nature which are legally required of CONTRACTOR to practice its profession. CONTRACTOR represents and warrants to CITY that CONTRACTOR shall, at its sole cost and expense, keep in effect or obtain at all times during the term of this CONTRACT any licenses, permits, insurance, and approvals which are legally required of CONTRACTOR to practice its profession. CONTRACTOR shall maintain a City of Goleta business license, if required under CITY ordinance.
- 17. RECORDS:** CONTRACTOR shall maintain accounts and records, including personnel, property, and financial records, adequate to identify and account for all costs pertaining to this CONTRACT and such other records as may be deemed necessary by CITY or any authorized representative, and will be retained for three years after the expiration of this CONTRACT. All such records shall be made available for inspection or audit by CITY at any time during regular business hours.
- 18. SEVERABILITY:** If any portion of these contract documents are declared by a court of competent jurisdiction to be invalid or unenforceable, then such portion will be deemed modified to the extent necessary in the opinion of the court to render such portion enforceable and, as so modified, such portion and the balance of this CONTRACT will continue in full force and effect provided that it does not frustrate the mutual intent of the parties herein.
- 19. WHOLE AGREEMENT:** This CONTRACT supersedes any and all other agreements either oral or written, between the parties and contains all of the covenants and agreements between the parties pertaining to the work of improvements described herein. Each party to this contract acknowledges that no representations, inducements, promises or agreements, orally or otherwise, have been made by any party, or anyone acting on behalf of any party, which are not embodied herein, and that any other agreement, statements or promise not contained in this contract shall not be valid or binding. Any modifications of this contract will be effective only if signed by the party to be charged.



20. AUTHORITY: CONTRACTOR affirms that the signatures, titles, and seals set forth hereinafter in execution of this CONTRACT represent all individuals, firm members, partners, joint ventures, and/or corporate officers having a principal interest herein. Each party warrants that the individuals who have signed this CONTRACT have the legal power, right, and authority to make this CONTRACT and to bind each respective party. This CONTRACT may be modified by written amendment. CITY’s City Manager may execute any such amendment on CITY’s behalf.

21. NOTICES: All notices permitted or required under this CONTRACT shall be in writing, and shall be deemed made when delivered to the applicable party’s representative as provided in this CONTRACT. Additionally, such notices may be given to the respective parties at the following addresses, or at such other addresses as the parties may provide in writing for this purpose.

Such notices shall be deemed made when personally delivered or when mailed forty-eight (48) hours after deposit in the U.S. mail, first-class postage prepaid, and addressed to the party at its applicable address. Courtesy copies of notices may be sent via electronic mail, provided that the original notice is deposited in the U.S. mail or personally delivered as specified in this Section.

CITY OF GOLETA
130 Cremona Drive, Suite B
Goleta, CA 93117
Attn: City Manager

CONTRACTOR

Non-Waiver. CITY’s failure to respond to a claim from CONTRACTOR within the time periods described in this Section or to otherwise meet the time requirements of this Section shall result in the claim being deemed rejected in its entirety. CITY’s failure to respond shall not waive CITY’s rights to any subsequent procedures for the resolution of disputed claims.

22. NON-DISCRIMINATION: No discrimination shall be made in the employment of persons in the work contemplated by this CONTRACT because of race, religion, color, medical condition, sex, sexual orientation, national origin, political affiliation or opinion, or pregnancy or pregnancy-related condition. A violation of this section exposes CONTRACTOR to the penalties provided for in Labor Code Section 1735.

23. NO THIRD-PARTY BENEFICIARY: This CONTRACT and every provision herein is for the exclusive benefit of CONTRACTOR and CITY and not for the benefit of any other party. There will be no incidental or other beneficiaries of any of the CONTRACTOR’s or the CITY’s obligations under this Contract.



24. TIME IS OF ESSENCE: Time is of the essence for each and every provision of the Contract Documents.

25. ACCEPTANCE OF FACSIMILE OR ELECTRONIC SIGNATURES: The Parties agree that this CONTRACT, agreements ancillary to this CONTRACT, and related documents to be entered into in connection with this CONTRACT will be considered signed when the signature of a party is delivered by facsimile transmission or scanned and delivered via electronic mail. Such facsimile or electronic mail copies will be treated in all respects as having the same effect as an original signature.

26. GOVERNING LAW: This CONTRACT shall be governed by the laws of the State of California, and exclusive venue for any action involving this CONTRACT will be in Santa Barbara County.

27. FEDERAL REQUIREMENTS

FEMA financial assistance will be used to fund all or a portion of this contract.

The Contractor shall comply with all federal requirements including, but not limited to, the following:

1. 2 C.F.R. Part 200 – Uniform Administrative Requirements, Cost Principles, and Audit Requirements for Federal Awards, which is expressly incorporated herein by reference.
2. Federal Contract Provisions attached hereto as Exhibit C and incorporated herein by reference.

Subcontracts, if any, shall contain a provision making them subject to all of the provisions stipulated in the contract, including but not limited to, 2 C.F.R. Part 200 and the Federal Contract Provisions.

With respect to any conflict between such federal requirements and the terms of this contract and/or the provisions of state law and except as otherwise required under federal law or regulation, the more stringent requirement shall control.



IN WITNESS WHEREOF, the parties hereto have executed this CONTRACT with all the formalities required by law on the respective dates set forth opposite their signatures.

This CONTRACT is executed on this _____ day of _____, at Goleta, California, and effective as of _____, 20____.

CITY OF GOLETA:

Robert Nisbet, City Manager

ATTEST:

Deborah Lopez, City Clerk

APPROVED AS TO FORM:
MEGAN GARIBALDI, CITY ATTORNEY

Winnie Cai, Assistant City Attorney

CONTRACTOR:

Name, Title

State of California License No.

Department of Industrial Relations Registration No.

Business Phone No.

CONTRACTOR'S Emergency Phone No. at which contractor can be reached at any time

Name, Title



Notary Acknowledgment

A notary public or other officer completing this certificate verifies only the identity of the individual who signed the document to which this certificate is attached, and not the truthfulness, accuracy, or validity of that document.

STATE OF CALIFORNIA
COUNTY OF _____

On _____, 20____, before me, _____, Notary Public, personally
Date Name And Title Of Officer (e.g. "Jane Doe, Notary Public")
appeared _____, who proved to me on the basis of satisfactory
Name(s) of Signer(s)

evidence to be the person(s) whose name(s) is/are subscribed to the within instrument and acknowledged to me that he/she/they executed the same in his/her/their authorized capacity(ies), and that by his/her/their signature(s) on the instrument the person(s), or the entity upon behalf of which the person(s) acted, executed the instrument.

I certify under PENALTY OF PERJURY under the laws of the State of California that the foregoing paragraph is true and correct.

WITNESS my hand and official seal.

Place Notary Seal Above

Signature of Notary Public

OPTIONAL

Though the information below is not required by law, it may prove valuable to persons relying on the document and could prevent fraudulent removal and reattachment of this form to another document.

CAPACITY CLAIMED BY SIGNER

DESCRIPTION OF ATTACHED DOCUMENT

- Individual
Corporate Officer

Table with 2 columns: CAPACITY CLAIMED BY SIGNER and DESCRIPTION OF ATTACHED DOCUMENT. Includes rows for Partner(s), Attorney-In-Fact, Trustee(s), Guardian/Conservator, and Other.

Signer is representing:
Name Of Person(s) Or Entity(ies)

Signer(s) Other Than Named Above

NOTE: This acknowledgment is to be completed for Contractor/Principal.



SECTION 00 61 13

BOND FORMS

1.1 Performance Bond.

KNOW ALL PERSONS BY THESE PRESENTS:

THAT WHEREAS, the City of Goleta, (hereinafter referred to as “City”) has awarded to _____, (hereinafter referred to as the “Contractor”) an agreement for **Contract No.** _____, (hereinafter referred to as the “Project”).

WHEREAS, the work to be performed by the Contractor is more particularly set forth in the Contract Documents for the Project dated _____, (hereinafter referred to as “Contract Documents”), the terms and conditions of which are expressly incorporated herein by reference; and

WHEREAS, the Contractor is required by said Contract Documents to perform the terms thereof and to furnish a bond for the faithful performance of said Contract Documents.

NOW, THEREFORE, we, _____, the undersigned Contractor and _____ as Surety, a corporation organized and duly authorized to transact business under the laws of the State of California, are held and firmly bound unto the City in the sum of _____ DOLLARS, (\$ _____), said sum being not less than one hundred percent (100%) of the total amount of the Contract, for which amount well and truly to be made, we bind ourselves, our heirs, executors and administrators, successors and assigns, jointly and severally, firmly by these presents.

THE CONDITION OF THIS OBLIGATION IS SUCH, that, if the Contractor, his or its heirs, executors, administrators, successors or assigns, shall in all things stand to and abide by, and well and truly keep and perform the covenants, conditions and agreements in the Contract Documents and any alteration thereof made as therein provided, on its part, to be kept and performed at the time and in the manner therein specified, and in all respects according to their intent and meaning; and shall faithfully fulfill all obligations including the one (1) year guarantee of all materials and workmanship; and shall indemnify and save harmless the City, its officials, officers, employees, and authorized volunteers, as stipulated in said Contract Documents, then this obligation shall become null and void; otherwise it shall be and remain in full force and effect.

As a part of the obligation secured hereby and in addition to the face amount specified therefore, there shall be included costs and reasonable expenses and fees including reasonable attorney’s fees, incurred by City in enforcing such obligation. As a condition precedent to the satisfactory completion of the Contract Documents, unless otherwise provided for in the Contract Documents, the above obligation shall hold good for a period of one (1) year after the acceptance of the work by City, during which time if Contractor shall fail to make full, complete, and satisfactory repair and replacements and totally protect the City from loss or damage resulting from or caused by defective materials or faulty workmanship. The obligations of Surety hereunder shall continue so long as any obligation of Contractor remains. Nothing herein shall limit the City’s rights or the Contractor or Surety’s



obligations under the Contract, law or equity, including, but not limited to, California Code of Civil Procedure Section 337.15.

Whenever Contractor shall be, and is declared by the City to be, in default under the Contract Documents, the Surety shall remedy the default pursuant to the Contract Documents, or shall promptly, at the City's option:

- i. Take over and complete the Project in accordance with all terms and conditions in the Contract Documents; or
- ii. Obtain a bid or bids for completing the Project in accordance with all terms and conditions in the Contract Documents and upon determination by Surety of the lowest responsive and responsible bidder, arrange for a Contract between such bidder, the Surety and the City, and make available as work progresses sufficient funds to pay the cost of completion of the Project, less the balance of the contract price, including other costs and damages for which Surety may be liable. The term "balance of the contract price" as used in this paragraph shall mean the total amount payable to Contractor by the City under the Contract and any modification thereto, less any amount previously paid by the City to the Contractor and any other set offs pursuant to the Contract Documents.
- iii. Permit the City to complete the Project in any manner consistent with California law and make available as work progresses sufficient funds to pay the cost of completion of the Project, less the balance of the contract price, including other costs and damages for which Surety may be liable. The term "balance of the contract price" as used in this paragraph shall mean the total amount payable to Contractor by the City under the Contract and any modification thereto, less any amount previously paid by the City to the Contractor and any other set offs pursuant to the Contract Documents.

Surety expressly agrees that the City may reject any contractor or subcontractor which may be proposed by Surety in fulfillment of its obligations in the event of default by the Contractor.

Surety shall not utilize Contractor in completing the Project nor shall Surety accept a bid from Contractor for completion of the Project if the City, when declaring the Contractor in default, notifies Surety of the City's objection to Contractor's further participation in the completion of the Project.

The Surety, for value received, hereby stipulates and agrees that no change, extension of time, alteration or addition to the terms of the Contract Documents or to the Project to be performed thereunder shall in any way affect its obligations on this bond, and it does hereby waive notice of any such change, extension of time, alteration or addition to the terms of the Contract Documents or to the Project.

By their signatures hereunder, Surety and Contractor hereby confirm under penalty of perjury that surety is an admitted surety insurer authorized to do business in the State of California.

[REMAINDER OF PAGE LEFT INTENTIONALLY BLANK]



IN WITNESS WHEREOF, we have hereunto set our hands and seals this _____ day
of _____, 20_____.

(Corporate Seal)

Contractor/ Principal

By _____

Title _____

(Corporate Seal)

Surety

By _____

Attorney-in-Fact

(Attach Attorney-in-Fact Certificate)

Title _____

The rate of premium on this bond is _____ per thousand. The total amount of
premium charges is \$_____.
(The above must be filled in by corporate attorney.)

THIS IS A REQUIRED FORM

Any claims under this bond may be addressed to:

(Name and Address of Surety)

(Name and Address of Agent or
Representative for service of process
in California, if different from above)

(Telephone number of Surety and
Agent or Representative for service
of process in California)



Notary Acknowledgment

A notary public or other officer completing this certificate verifies only the identity of the individual who signed the document to which this certificate is attached, and not the truthfulness, accuracy, or validity of that document.

STATE OF CALIFORNIA
COUNTY OF _____

On _____, 20____, before me, _____, Notary Public, personally
Date Name And Title Of Officer (e.g. "Jane Doe, Notary Public")
appeared _____, who proved to me on the basis of satisfactory
Name(s) of Signer(s)

evidence to be the person(s) whose name(s) is/are subscribed to the within instrument and acknowledged to me that he/she/they executed the same in his/her/their authorized capacity(ies), and that by his/her/their signature(s) on the instrument the person(s), or the entity upon behalf of which the person(s) acted, executed the instrument.

I certify under PENALTY OF PERJURY under the laws of the State of California that the foregoing paragraph is true and correct.

WITNESS my hand and official seal.

Place Notary Seal Above

Signature of Notary Public

OPTIONAL

Though the information below is not required by law, it may prove valuable to persons relying on the document and could prevent fraudulent removal and reattachment of this form to another document.

CAPACITY CLAIMED BY SIGNER

DESCRIPTION OF ATTACHED DOCUMENT

- Individual
- Corporate Officer

Title(s)		Title or Type of Document
<input type="checkbox"/> Partner(s)	<input type="checkbox"/> Limited <input type="checkbox"/> General	Number of Pages
<input type="checkbox"/> Attorney-In-Fact		Date of Document
<input type="checkbox"/> Trustee(s)		
<input type="checkbox"/> Guardian/Conservator		
<input type="checkbox"/> Other:		

Signer is representing:
Name Of Person(s) Or Entity(ies)

Signer(s) Other Than Named Above

NOTE: This acknowledgment is to be completed for Contractor/Principal.



Notary Acknowledgment

A notary public or other officer completing this certificate verifies only the identity of the individual who signed the document to which this certificate is attached, and not the truthfulness, accuracy, or validity of that document.

STATE OF CALIFORNIA
COUNTY OF _____

On _____, 20____, before me, _____, Notary Public, personally
Date Name And Title Of Officer (e.g. "Jane Doe, Notary Public")
appeared _____, who proved to me on the basis of satisfactory
Name(s) of Signer(s)

evidence to be the person(s) whose name(s) is/are subscribed to the within instrument and acknowledged to me that he/she/they executed the same in his/her/their authorized capacity(ies), and that by his/her/their signature(s) on the instrument the person(s), or the entity upon behalf of which the person(s) acted, executed the instrument.

I certify under PENALTY OF PERJURY under the laws of the State of California that the foregoing paragraph is true and correct.

WITNESS my hand and official seal.

Place Notary Seal Above

Signature of Notary Public

OPTIONAL

Though the information below is not required by law, it may prove valuable to persons relying on the document and could prevent fraudulent removal and reattachment of this form to another document.

CAPACITY CLAIMED BY SIGNER

DESCRIPTION OF ATTACHED DOCUMENT

- Individual
- Corporate Officer

- _____
Title(s)
- Partner(s) Limited
 - General
 - Attorney-In-Fact
 - Trustee(s)
 - Guardian/Conservator
 - Other:

Title or Type of Document

Number of Pages

Date of Document

Signer is representing:
Name Of Person(s) Or Entity(ies)

Signer(s) Other Than Named Above

NOTE: This acknowledgment is to be completed for the Attorney-in-Fact. The Power-of-Attorney to local representatives of the bonding company must also be attached.

END OF PERFORMANCE BOND



1.2 Payment Bond (Labor and Materials).

KNOW ALL MEN BY THESE PRESENTS That

WHEREAS, the City of Goleta (hereinafter designated as the “City”), by action taken or a resolution passed _____, 20____, has awarded to _____ hereinafter designated as the “Principal,” a contract for the work described as follows: **Contract No. ___** (the “Project”); and

WHEREAS, said Principal is required to furnish a bond in connection with said contract; providing that if said Principal or any of its Subcontractors shall fail to pay for any materials, provisions, provender, equipment, or other supplies used in, upon, for or about the performance of the work contracted to be done, or for any work or labor done thereon of any kind, or for amounts due under the Unemployment Insurance Code or for any amounts required to be deducted, withheld, and paid over to the Employment Development Department from the wages of employees of said Principal and its Subcontractors with respect to such work or labor the Surety on this bond will pay for the same to the extent hereinafter set forth.

NOW THEREFORE, we, the Principal and _____ as Surety, are held and firmly bound unto the City in the penal sum of _____ Dollars (\$ _____) lawful money of the United States of America, for the payment of which sum well and truly to be made, we bind ourselves, our heirs, executors, administrators, successors and assigns, jointly and severally, firmly by these presents.

THE CONDITION OF THIS OBLIGATION IS SUCH that if said Principal, his or its subcontractors, heirs, executors, administrators, successors or assigns, shall fail to pay any of the persons named in Civil Code Section 9100, fail to pay for any materials, provisions or other supplies, used in, upon, for or about the performance of the work contracted to be done, or for any work or labor thereon of any kind, or amounts due under the Unemployment Insurance Code with respect to work or labor performed under the contract, or for any amounts required to be deducted, withheld, and paid over to the Employment Development Department or Franchise Tax Board from the wages of employees of the contractor and his subcontractors pursuant to Revenue and Taxation Code Section 18663, with respect to such work and labor the Surety or Sureties will pay for the same, in an amount not exceeding the sum herein above specified, and also, in case suit is brought upon this bond, all litigation expenses incurred by the City in such suit, including reasonable attorneys’ fees, court costs, expert witness fees and investigation expenses.

This bond shall inure to the benefit of any of the persons named in Civil Code Section 9100 so as to give a right of action to such persons or their assigns in any suit brought upon this bond.

It is further stipulated and agreed that the Surety on this bond shall not be exonerated or released from the obligation of this bond by any change, extension of time for performance, addition, alteration or modification in, to, or of any contract, plans, specifications, or agreement pertaining or relating to any scheme or work of improvement herein above described, or pertaining or relating to the furnishing of labor, materials, or equipment therefore, nor by any change or modification of any terms of payment or



extension of the time for any payment pertaining or relating to any scheme or work of improvement herein above described, nor by any rescission or attempted rescission or attempted rescission of the contract, agreement or bond, nor by any conditions precedent or subsequent in the bond attempting to limit the right of recovery of claimants otherwise entitled to recover under any such contract or agreement or under the bond, nor by any fraud practiced by any person other than the claimant seeking to recover on the bond and that this bond be construed most strongly against the Surety and in favor of all persons for whose benefit such bond is given, and under no circumstances shall Surety be released from liability to those for whose benefit such bond has been given, by reason of any breach of contract between the owner or City and original contractor or on the part of any obligee named in such bond, but the sole conditions of recovery shall be that claimant is a person described in Civil Code Section 9100, and has not been paid the full amount of his claim and that Surety does hereby waive notice of any such change, extension of time, addition, alteration or modification herein mentioned, including but not limited to the provisions of sections 2819 and 2845 of the California Civil Code.

By their signatures hereunder, Surety and Principal hereby confirm under penalty of perjury that surety is an admitted surety insurer authorized to do business in the State of California.

IN WITNESS WHEREOF, we have hereunto set our hands and seals this _____ day of _____, 20_____.

(Corporate Seal)

Contractor/ Principal

By _____

Title _____

(Corporate Seal)

Surety

By _____

Attorney-in-Fact

(Attach Attorney-in-Fact Certificate)

Title _____



Notary Acknowledgment

A notary public or other officer completing this certificate verifies only the identity of the individual who signed the document to which this certificate is attached, and not the truthfulness, accuracy, or validity of that document.

STATE OF CALIFORNIA
COUNTY OF _____

On _____, 20____, before me, _____, Notary Public, personally
Date Name And Title Of Officer (e.g. "Jane Doe, Notary Public")
appeared _____, who proved to me on the basis of satisfactory
Name(s) of Signer(s)

evidence to be the person(s) whose name(s) is/are subscribed to the within instrument and acknowledged to me that he/she/they executed the same in his/her/their authorized capacity(ies), and that by his/her/their signature(s) on the instrument the person(s), or the entity upon behalf of which the person(s) acted, executed the instrument.

I certify under PENALTY OF PERJURY under the laws of the State of California that the foregoing paragraph is true and correct.

WITNESS my hand and official seal.

Place Notary Seal Above

Signature of Notary Public

OPTIONAL

Though the information below is not required by law, it may prove valuable to persons relying on the document and could prevent fraudulent removal and reattachment of this form to another document.

CAPACITY CLAIMED BY SIGNER

DESCRIPTION OF ATTACHED DOCUMENT

- Individual
- Corporate Officer

	Title(s)	Title or Type of Document
<input type="checkbox"/> Partner(s)	<input type="checkbox"/> Limited <input type="checkbox"/> General	Number of Pages
<input type="checkbox"/> Attorney-In-Fact		Date of Document
<input type="checkbox"/> Trustee(s)		
<input type="checkbox"/> Guardian/Conservator		
<input type="checkbox"/> Other:		

Signer is representing:
Name Of Person(s) Or Entity(ies)

Signer(s) Other Than Named Above

NOTE: This acknowledgment is to be completed for Contractor/Principal.



Notary Acknowledgment

A notary public or other officer completing this certificate verifies only the identity of the individual who signed the document to which this certificate is attached, and not the truthfulness, accuracy, or validity of that document.

STATE OF CALIFORNIA
COUNTY OF _____

On _____, 20____, before me, _____, Notary Public, personally
appeared _____, who proved to me on the basis of satisfactory
evidence to be the person(s) whose name(s) is/are subscribed to the within instrument and acknowledged to me
that he/she/they executed the same in his/her/their authorized capacity(ies), and that by his/her/their signature(s)
on the instrument the person(s), or the entity upon behalf of which the person(s) acted, executed the instrument.

I certify under PENALTY OF PERJURY under the laws of the State of California that the foregoing paragraph
is true and correct.

WITNESS my hand and official seal.

Place Notary Seal Above

Signature of Notary Public

OPTIONAL

Though the information below is not required by law, it may prove valuable to persons relying on the
document and could prevent fraudulent removal and reattachment of this form to another document.

CAPACITY CLAIMED BY SIGNER

DESCRIPTION OF ATTACHED DOCUMENT

- Individual
Corporate Officer

Title(s)
Partner(s)
Attorney-In-Fact
Trustee(s)
Guardian/Conservator
Other:
Signer is representing:
Name Of Person(s) Or Entity(ies)

Limited
General

Title or Type of Document
Number of Pages
Date of Document
Signer(s) Other Than Named Above

NOTE: This acknowledgment is to be completed for the Attorney-in-Fact. The Power-of-
Attorney to local representatives of the bonding company must also be attached.

END OF PAYMENT BOND



SECTION 00 72 13

GENERAL CONDITIONS

ARTICLE 39. DEFINED TERMS

Whenever used in the Contract Documents and printed with initial capital letters, the terms listed below will have the meanings indicated which are applicable to both the singular and plural thereof. In addition to terms specifically defined below, terms with initial capital letters in the Contract Documents include references to identified articles and paragraphs, and the titles of other documents or forms.

- A. Act of God – An earthquake of magnitude of 3.5 or higher on the Richter scale or a tidal wave.
- B. Addenda -- Written or graphic instruments issued prior to the submission of Bids which clarify, correct, or change the Contract Documents.
- C. Additional Work -- New or unforeseen work will be classified as “Additional Work” when the City’s Representative determines that it is not covered by the Contract.
- D. Applicable Laws -- The laws, statutes, ordinances, rules, codes, regulations, permits, and licenses of any kind, issued by local, state or federal governmental authorities or private authorities with jurisdiction (including utilities), to the extent they apply to the Work.
- E. Bid -- The offer or proposal of a Bidder submitted on the prescribed form setting forth the prices and other terms for the Work to be performed.
- F. Bidder -- The individual or entity who submits a Bid directly to the City.
- G. Caltrans Standards. 2023 Editions of the California Department of Transportation Standard Plans and Specifications.
- H. Change Order (“CO”) -- A document that authorizes an addition, deletion, or revision in the Work or an adjustment in the Contract Price or the Contract Times, issued on or after the Effective Date of the Contract, in accordance with the Contract Documents and in the form contained in the Contract Documents.
- I. Change Order Request (“COR”) -- A request made by the Contractor for an adjustment in the Contract Price and/or Contract Times as the result of a Contractor-claimed change to the Work. This term may also be referred to as a Change Order Proposal (“COP”), or Request for Change (“RFC”).
- J. City -- The City of Goleta.
- K. City’s Representative -- The individual or entity as identified in the Special Conditions to act as the City’s Representative.



- L. Claim -- A demand or assertion by the City or Contractor seeking an adjustment of Contract Price or Contract Times, or both, or other relief with respect to the terms of the Contract. A demand for money or services by a third party is not a Claim.
- M. Contract -- The entire integrated written agreement between the City and Contractor concerning the Work. “Contract” may be used interchangeably with “Agreement” in the Contract Documents. The Contract supersedes prior negotiations, representations, or agreements, whether written or oral, and includes all Contract Documents.
- N. Contract Documents -- The documents listed in Section 00 52 13, Article 5. Some documents provided by the City to the Bidders and Contractor, including but not limited to reports and drawings of subsurface and physical conditions are not Contract Documents.
- O. Contract Price -- Amount to be paid by the City to the Contractor as full compensation for the performance of the Contract and completion of the Work, subject to any additions or deductions as provided in the Contract Documents, and including all applicable taxes and costs.
- P. Contract Times -- The number of days or the dates stated in the Contract Documents to: achieve defined Milestones, if any; and to complete the Work so that it is ready for final payment.
- Q. Contractor -- The individual or entity with which the City has contracted for performance of the Work.
- R. Contractor’s Designated On-Site Representative -- The Contractor’s Designated On- Site Representative will be as identified in Section 00 72 13, Article 3 and shall not be changed without prior written consent of the City.
- S. Daily Rate -- The Daily Rate stipulated in the Contract Documents as full compensation to the Contractor due to the City’s unreasonable delay to the Project that was not contemplated by the parties.
- T. Day -- A calendar day of 24 hours measured from midnight to the next midnight.
- U. Defective Work -- Work that is unsatisfactory, faulty, or deficient; or that does not conform to the Contract Documents; or that does not meet the requirements of any inspection, reference standard, test, or approval referenced in the Contract Documents.
- V. Demobilization -- The complete dismantling and removal by the Contractor of all of the Contractor’s temporary facilities, equipment, and personnel at the Site.
- W. Drawings -- That part of the Contract Documents prepared by of the Architect of Record which graphically shows the scope, extent, and character of the Work to be performed by Contractor. Shop Drawings and other Contractor submittals are not Drawings as so defined.



- X. Effective Date of the Contract -- The date indicated in the Contract on which it becomes effective, but if no such date is indicated, it means the date on which the Contract is signed and delivered by the last of the two parties to sign and deliver.
- Y. Architect, whenever not qualified, shall mean the City Architect of the City, acting either directly or through properly authorized agents, such agents acting severally within the scope of the particular duties entrusted to them. On all questions concerning the acceptance of materials, machinery, the classifications of material, the execution of work, conflicting interest of the contractors performing related work and the determination of costs, the decision of the Architect, duly authorized by the City, shall be binding and final upon both parties.
- Z. Architect of Record -- The individual, partnership, corporation, joint venture, or other legal entity named as such in Section 00 73 13, Article 1.1. or any succeeding entity designated by the City.
- AA. Green Book -- The current edition of the Standard Specifications for Public Works Construction.
- BB. Hazardous Waste -- The term “Hazardous Waste” shall have the meaning provided in Section 104 of the Solid Waste Disposal Act (42 U.S.C. § 6903) as amended from time to time or, as defined in Section 25117 of the Health and Safety Code, that is required to be removed to a class I, class II, or class III disposal site in accordance with provisions of existing law, whichever is more restrictive.
- CC. Holiday – The Holidays occur on:

New Year’s Day - January 1 and January 2
President’s Day – Third Monday in February
Memorial Day - Last Monday in May
Independence Day - July 4
Labor Day - First Monday in September
Veteran’s Day - November 11
Thanksgiving Day - Fourth Thursday in November
Friday after Thanksgiving
Christmas Holiday: December 23-December 31
- DD. Notice of Award -- The written notice by the City to the Successful Bidder stating that upon timely compliance by the Successful Bidder with the conditions precedent listed therein, the City will sign and deliver the Contract.
- EE. Notice of Completion -- The form which may be executed by the City and recorded by the county where the Project is located constituting final acceptance of the Project.
- FF. Notice to Proceed -- A written notice given by the City to Contractor fixing the date on



which the Contractor may proceed with the Work and when Contract Times will commence to run.

- GG. Project -- The total construction of which the Work to be performed under the Contract Documents may be the whole, or a part.
- HH. Recyclable Waste Materials -- Materials removed from the Site which are required to be diverted to a recycling center rather than an area landfill. Recyclable Waste Materials include asphalt, concrete, brick, concrete block, and rock.
- II. Schedule of Submittals -- A schedule, prepared and maintained by Contractor, of required submittals and the time requirements to facilitate scheduled performance of related construction activities.
- JJ. Shop Drawings -- All drawings, diagrams, illustrations, schedules, and other data or information which are specifically prepared or assembled by or for Contractor and submitted by Contractor to illustrate some portion of the Work.
- KK. Specifications -- That part of the Contract Documents consisting of written requirements for materials, equipment, systems, standards and workmanship as applied to the Work, and certain administrative requirements and procedural matters applicable thereto.
- LL. Stop Payment Notice -- A written notice as defined in Civil Code section 8044.
- MM. Subcontractor -- An individual or entity other than a Contractor having a contract with any other entity than the City for performance of any portion of the Work at the Site.
- NN. Submittal -- Written and graphic information and physical samples prepared and supplied by the Contractor demonstrating various portions of the Work.
- OO. Successful Bidder -- The Bidder submitting a responsive Bid to whom the City makes an award.
- PP. Supplier -- A manufacturer, fabricator, supplier, distributor, material man, or vendor having a direct contract with Contractor or with any Subcontractor to furnish materials or equipment used in the performance of the Work or to be incorporated in the Work.
- QQ. Underground Facilities -- All underground pipelines, conduits, ducts, cables, wires, manholes, vaults, tanks, tunnels, or other such facilities or attachments, and any encasements containing such facilities, including those that convey electricity, gases, steam, liquid petroleum products, telephone or other communications, cable television, water, wastewater, storm water, other liquids or chemicals, or traffic or other control systems.
- RR. Unit Price Work -- Work to be paid for on the basis of unit prices as provided by the Contractor in its bid or as adjusted in accordance with the Contract Documents.



- SS. Warranty -- A written guarantee provided to the City by the Contractor that the Work will remain free of defects and suitable for its intended use for the period required by the Contract Documents or the longest period permitted by the law of this State, whichever is longer.
- TT. Work -- The entire construction or the various separately identifiable parts thereof required to be provided under the Contract Documents. Work includes and is the result of performing or providing all labor, services, and documentation necessary to produce such construction, and furnishing, installing, and incorporating all materials and equipment into such construction, all as required by the Contract Documents.

ARTICLE 40. CONTRACT DOCUMENTS

- A. **Contract Documents.** The Contract Documents are complementary, and what is called for by one shall be as binding as if called for by all.
- B. **Interpretations.** The Contract Documents are intended to be fully cooperative and complementary. If the Contractor observes that any documents are in conflict, the Contractor shall promptly notify the Architect in writing. In case of conflicts between the Contract Documents, the order of precedence shall be as follows:
1. Change Orders
 2. Addenda
 3. Special Conditions
 4. Technical Specifications
 5. Plans (Contract Drawings)
 6. Contract
 7. General Conditions
 8. Instructions to Bidders
 9. Notice Inviting Bids
 10. Contractor's Bid Forms
 11. Standard Plans and Specifications - 2023 California Department of Transportation
 12. Applicable Local Agency Standards and Specifications
 13. Standard Drawings
 14. Reference Documents

With reference to the Drawings, the order of precedence shall be as follows:

1. Figures govern over scaled dimensions
2. Detail drawings govern over general drawings
3. Addenda or Change Order drawings govern over Contract Drawings
4. Contract Drawings govern over Standard Drawings
5. Contract Drawings govern over Shop Drawings



- C. **Conflicts in Contract Documents.** Notwithstanding the orders of precedence established above, in the event of conflicts, the higher standard, higher quality, and most expensive shall always apply.
- D. **Organization of Contract Documents.** Organization of the Contract Documents into divisions, sections, and articles, and arrangement of drawings shall not control the Contractor in dividing Project Work among subcontractors or in establishing the extent of Work to be performed by any trade.

ARTICLE 41. PRECONSTRUCTION AND CONSTRUCTION COMMUNICATION

Before any Work at the site is started, a conference attended by the City, Contractor, City's Representative, and others as appropriate will be held to establish a working understanding among the parties as to the Work and to discuss the schedules referred to herein, procedures for handling Shop Drawings and other submittals, processing Applications for Payment, and maintaining required records.

At this conference the City and Contractor each shall designate, in writing, a specific individual to act as its authorized representative with respect to the services and responsibilities under the Contract. Such individuals shall have the authority to transmit instructions, receive information, render decisions relative to the Contract, and otherwise act on behalf of each respective party.

ARTICLE 42. CONTRACT DOCUMENTS: COPIES & MAINTENANCE

Contractor will be furnished, free of charge, one (1) copy of the Contract Documents. Additional copies may be obtained at cost of reproduction.

Contractor shall maintain a clean, undamaged set of Contract Documents, including submittals, at the Project site.

ARTICLE 43. EXAMINATION OF DRAWINGS, SPECIFICATIONS AND SITE OF WORK

- A. **Examination of Contract Documents.** Before commencing any portion of the Work, Contractor shall again carefully examine all applicable Contract Documents, the Project site, and other information given to Contractor as to materials and methods of construction and other Project requirements. Contractor shall immediately notify the Architect of any potential error, inconsistency, ambiguity, conflict, or lack of detail or explanation. If Contractor performs, permits, or causes the performance of any Work which is in error, inconsistent or ambiguous, or not sufficiently detailed or explained, Contractor shall bear any and all resulting costs, including, without limitation, the cost of correction. In no case shall the Contractor or any subcontractor proceed with Work if uncertain as to the applicable requirements.
- B. **Additional Instructions.** After notification of any error, inconsistency, ambiguity, conflict, or lack of detail or explanation, the Architect will provide any required additional instructions, by means of drawings or other written direction, necessary for proper execution of Work.



- C. **Quality of Parts, Construction and Finish.** All parts of the Work shall be of the best quality of their respective kinds and the Contractor must use all diligence to inform itself fully as to the required construction and finish.
- D. **Contractor's Variation from Contract Document Requirements.** If it is found that the Contractor has varied from the requirements of the Contract Documents including the requirement to comply with all applicable laws, ordinances, rules and regulations, the Architect may at any time, before or after completion of the Work, order the improper Work removed, remade or replaced by the Contractor at the Contractor's expense.

ARTICLE 44. MOBILIZATION

- A. When a bid item is included in the Bid Form for mobilization, the costs of Work in advance of construction operations and not directly attributable to any specific bid item will be included in the progress estimate ("Initial Mobilization"). When no bid item is provided for "Initial Mobilization," payment for such costs will be deemed to be included in the other items of the Work.
- B. Payment for Initial Mobilization based on the lump sum provided in the Bid Form, which shall constitute full compensation for all such Work. No payment for Initial Mobilization will be made until all of the listed items have been completed to the satisfaction of the Architect. The scope of the Work included under Initial Mobilization shall include, but shall not be limited to, the following principal items:
 - 1. Obtaining and paying for all bonds, insurance, and permits.
 - 2. Moving on to the Project site of all Contractor's plant and equipment required for the first month's operations.
 - 3. Installing temporary construction power, wiring, and lighting facilities, as applicable.
 - 4. Establishing fire protection system, as applicable.
 - 5. Developing and installing a construction water supply, if applicable.
 - 6. Providing and maintaining the field office trailers for the Contractor, if necessary, and the Architect (if specified), complete, with all specified furnishings and utility services.
 - 7. Providing on-site sanitary facilities and potable water facilities as specified per Cal- OSHA and these Contract Documents.
 - 8. Furnishing, installing, and maintaining all storage buildings or sheds required for



temporary storage of products, equipment, or materials that have not yet been installed in the Work. All such storage shall meet manufacturer's specified storage requirements, and the specific provisions of the specifications, including temperature and humidity control, if recommended by the manufacturer, and for all security.

9. Arranging for and erection of Contractor's work and storage yard.
10. Posting all OSHA required notices and establishment of safety programs per Cal-OSHA.
11. Full-time presence of Contractor's superintendent at the job site as required herein.
12. Submittal of Construction Schedule as required by the Contract Documents.

ARTICLE 45. EXISTENCE OF UTILITIES AT THE WORK SITE

- A. The City has endeavored to determine the existence of utilities at the Project site from the records of the owners of known utilities in the vicinity of the Project. The positions of these utilities as derived from such records are shown on the Plans.
- B. Unless indicated otherwise on the Plans and Specifications, no excavations were made to verify the locations shown for underground utilities. The service connections to these utilities are not shown on the Plans. Water service connections may be shown on the Plans showing general locations of such connections. It shall be the responsibility of the Contractor to determine the exact location of all service connections. The Contractor shall make its own investigations, including exploratory excavations, to determine the locations and type of service connections, prior to commencing Work which could result in damage to such utilities. The Contractor shall immediately notify the City in writing of any utility discovered in a different position than shown on the Plans or which is not shown on the Plans.
- C. If applicable, all water meters, water valves, fire hydrants, electrical utility vaults, telephone vaults, gas utility valves, and other subsurface structures shall be relocated or adjusted to final grade by the Contractor. Locations of existing utilities shown on the Plans are approximate and may not be complete. The Contractor shall be responsible for coordinating its Work with all utility companies during the construction of the Work.
- D. Notwithstanding the above, pursuant to section 4215 of the Government Code, the City has the responsibility to identify, with reasonable accuracy, main or trunkline facilities on the plans and specifications. In the event that main or trunkline utility facilities are not identified with reasonable accuracy in the plans and specifications made a part of the invitation for Bids, the City shall assume the responsibility for their timely removal, relocation, or protection.



- E. Contractor, except in an emergency, shall contact the appropriate regional notification center, **California Underground Service Alert** at 811 or 1-800-227-2600 or on-line at www.digalert.org at least two working days prior to commencing any excavation if the excavation will be performed in an area which is known, or reasonably should be known, to contain subsurface installations other than the underground facilities owned or operated by the City, and obtain an inquiry identification number from that notification center. No excavation shall be commenced or carried out by the Contractor unless such an inquiry identification number has been assigned to the Contractor or any subcontractor of the Contractor and the City has been given the identification number by the Contractor.

ARTICLE 46. SOILS INVESTIGATIONS

- A. Reports and Drawings. The Special Conditions identify:
1. those reports known to the City of explorations and tests of subsurface conditions at or contiguous to the site; and
 2. those drawings known to the City of physical conditions relating to existing surface or subsurface structures at the site (except Underground Facilities).
- B. Limited Reliance by Contractor on Technical Data Authorized. Contractor may rely upon the accuracy of the “technical data” contained in such reports and drawings, which were expressly not created or obtained to evaluate or assist in the evaluation of constructability, and are not Contract Documents. Contractor shall make its own interpretation of the “technical data” and shall be solely responsible for any such interpretations. Except for reliance on the accuracy of such “technical data,” Contractor may not rely upon or make any claim against the City, City’s Representative, or Architect of Record, or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors, with respect to:
1. the completeness of such reports and drawings for Contractor’s purposes, including without limitation any aspects of the means, methods, techniques, sequences, and procedures of construction to be employed by Contractor, and safety precautions and programs incident thereto; or
 2. other data, interpretations, opinions, conclusions and information contained in such reports or shown or indicated in such drawings; or
 3. any Contractor interpretation of or conclusion drawn from any “technical data” or any such other data, interpretations, opinions, or information

ARTICLE 47. CONTRACTOR’S SUPERVISION

Contractor shall continuously keep at the Project site, a competent and experienced full-time Project superintendent acceptable to the City. Superintendent must be able to proficiently speak, read and write



in English and shall have the authority to make decisions on behalf of the Contractor. Contractor shall continuously provide efficient supervision of the Project.

ARTICLE 48. WORKERS

- A. Contractor shall at all times enforce strict discipline and good order among its employees. Contractor shall not employ on the Project any unfit person or any one not skilled in the Work assigned to him or her.
- B. Any person in the employ of the Contractor whom the City may deem incompetent or unfit shall be dismissed from the Work and shall not be employed on this Project.

ARTICLE 49. INDEPENDENT CONTRACTORS

Contractor shall be an independent contractor for the City and not an employee. Contractor understands and agrees that it and all of its employees shall not be considered officers, employees, or agents of City and are not entitled to benefits of any kind normally provided employees of City, including but not limited to, state unemployment compensation or workers' compensation. Contractor assumes full responsibility for the acts and omissions of its employees or agents related to the Work.

ARTICLE 50. SUBCONTRACTS

- A. Contractor agrees to bind every subcontractor to the terms of the Contract Documents as far as such terms are applicable to subcontractor's portion of the Work. Contractor shall be as fully responsible to the City for the acts and omissions of its subcontractors and of persons either directly or indirectly employed by its subcontractors, as Contractor is for acts and omissions of persons directly employed by Contractor. Nothing contained in these Contract Documents shall create any contractual relationship between any subcontractor and the City.
- B. The City reserves the right to accept all subcontractors. The City's acceptance of any subcontractor under this Contract shall not in any way relieve Contractor of its obligations in the Contract Documents.
- C. Prior to substituting any subcontractor listed in the Bid Forms, Contractor must comply with the requirements of the Subletting and Subcontracting Fair Practices Act pursuant to California Public Contract Code section 4100 et seq.

ARTICLE 51. VERIFICATION OF EMPLOYMENT ELIGIBILITY

By executing this Contract, Contractor verifies that it fully complies with all requirements and restrictions of state and federal law respecting the employment of undocumented aliens, including, but not limited to, the Immigration Reform and Control Act of 1986, as may be amended from time to time, and shall require all subcontractors, sub-subcontractors and consultants to comply with the same. Each person executing this Contract on behalf of Contractor verifies that he or she is a duly authorized officer



of Contractor and that any of the following shall be grounds for the City to terminate the Contract for cause: (1) failure of the Contractor or its subcontractors, sub-subcontractors or consultants to meet any of the requirements provided for in this Article; (2) any misrepresentation or material omission concerning compliance with such requirements; or (3) failure to immediately remove from the Work any person found not to be in compliance with such requirements.

ARTICLE 52. REQUESTS FOR SUBSTITUTION

- A. For the purposes of this provision, the term “substitution” shall mean the substitution of any material, method or service substantially equal to or better in every respect to that indicated in the Standard Specifications or otherwise referenced herein.
- B. Pursuant to Public Contract Code section 3400(b), the City may make a finding that is described in the Notice Inviting Bids that designates certain products, things, or services by specific brand or trade name.
- C. Unless specifically designated in the Special Conditions, whenever any material, process, or article is indicated or specified by grade, patent, or proprietary name or by name of manufacturer, such specifications shall be deemed to be used for the purpose of facilitating the description of the material, process, or article desired and shall be deemed to be followed by the words “or equal.” Contractor may, unless otherwise stated, offer for substitution any material, process, or article which may be substantially equal to or better in every respect to that so indicated or specified in the Contract Documents. However, the City has adopted uniform standards for certain materials, processes, and articles.
- D. The Contractor shall submit substitution requests, together with substantiating data, for substitution of any “or equal” material, process, or article during the bidding phase. Refer to the Instruction to Bidders for specific deadlines. . Provisions regarding submission of substitution requests shall not in any way authorize an extension of time for the performance of this Contract. If a substitution request is rejected by the City, the Contractor shall provide the material, method or service specified herein. The City shall not be responsible for any costs incurred by the Contractor associated with substitution requests. The burden of proof as to the equality of any material, process, or article shall rest with the Contractor. The Architect has the complete and sole discretion to determine if a material, process, or article is substantially equal to or better than that specified and to approve or reject all substitution requests.
- E. Substantiating data as described above shall include, at a minimum, the following information:
 - 1. A signed affidavit from the Contractor stating that the material, process, or article proposed as a substitution is substantially equal to or better than that specified in every way except as may be listed on the affidavit.
 - 2. Illustrations, specifications, catalog cut sheets, and any other relevant data required to prove that the material, process, or article is substantially equal to or better than that specified.



3. A statement of the cost implications of the substitution being requested, indicating whether and why the proposed substitution will reduce or increase the amount of the contract.
 4. Information detailing the durability and lifecycle costs of the proposed substitution.
- F. Failure to submit all the required substantiating data detailed above in a timely manner so that the substitution request can be adequately reviewed may result in rejection of the substitution request. The Architect is not obligated to review multiple submittals related the same substitution request resulting from the Contractor's failure to initially submit a complete package.
- G. Time limitations within this Article shall be strictly complied with and in no case will an extension of time for completion of the contract be granted because of Contractor's failure to provide substitution requests at the time and in the manner described herein.
- H. The Contractor shall bear the costs of all City work associated with the review of substitution requests.
- I. If substitution requests approved by the Architect require that Contractor furnish materials, methods or services more expensive than that specified, the increased costs shall be borne by Contractor.

ARTICLE 53. SHOP DRAWINGS

- A. Contractor shall check and verify all field measurements and shall submit with such promptness as to provide adequate time for review and cause no delay in its own Work or in that of any other contractor, subcontractor, or worker on the Project copies of all shop drawings, calculations, schedules, and materials list, and all other provisions required by the Contract Documents. Contractor shall sign all submittals affirming that submittals have been reviewed and approved by Contractor prior to submission to Architect. Each signed submittal shall affirm that the submittal meets all the requirements of the Contract Documents except as specifically and clearly noted and listed on the transmittal letter of the submittal.
- B. Contractor shall make any corrections required by the Architect, and file with the Architect corrected copies each, and furnish such other copies as may be needed for completion of the Work. Architect's acceptance of shop drawings shall not relieve Contractor from responsibility for deviations from the Contract Documents unless Contractor has, in writing, called Architect's attention to such deviations at time of submission and has secured the Architect's written acceptance. Architect's acceptance of shop drawings shall not relieve Contractor from responsibility for errors in shop drawings.



ARTICLE 54. SUBMITTALS

- A. Contractor shall furnish to the Architect for approval, prior to purchasing or commencing any Work, a log of all samples, material lists and certifications, mix designs, schedules, and other submittals, as required in the Contract Documents. The log shall indicate whether samples will be provided in accordance with other provisions of this Contract.
- B. Contractor will provide samples and submittals, together with catalogs and supporting data required by the Architect, to the Architect within a reasonable time period to provide for adequate review and avoid delays in the Work.
- C. These requirements shall not authorize any extension of time for performance of this Contract. Architect will check and approve such samples, but only for conformance with design concept of work and for compliance with information given in the Contract Documents. Work shall be in accordance with approved samples and submittals

ARTICLE 55. MATERIALS

- A. Except as otherwise specifically stated in the Contract Documents, Contractor shall provide and pay for all materials, labor, tools, equipment, lights, power, transportation, superintendence, temporary constructions of every nature, and all other services and facilities of every nature whatsoever necessary to execute and complete this Contract within specified time.
- B. Unless otherwise specified, all materials shall be new and the best of their respective kinds and grades as noted and/or specified, and workmanship shall be of good quality.
- C. Materials shall be furnished in ample quantities and at such times as to ensure uninterrupted progress of the Work and shall be stored properly and protected as required by the Contract Documents. Contractor shall be entirely responsible for damage or loss by weather or other causes to materials or Work.
- D. No materials, supplies, or equipment for Work under this Contract shall be purchased subject to any chattel mortgage or under a conditional sale or other agreement by which an interest therein or in any part thereof is retained by the seller or supplier. Contractor warrants good title to all material, supplies, and equipment installed or incorporated in the Work and agrees upon completion of all work to deliver the Project, to the City free from any claims, liens, or charges.
- E. Materials shall be stored on the Project site in such manner so as not to interfere with any operations of the City or any independent contractor.
- F. Contractor shall verify all measurements, dimensions, elevations, and quantities before ordering any materials or performing any Work, and the City shall not be liable for Contractor's failure to do so. No additional compensation, over and above payment for the actual quantities at the prices set out in the Bid Form, will be allowed because of differences between actual measurements, dimension, elevations and quantities and those



indicated on the Plans and in the Specifications. Any difference therein shall be submitted to the Architect for consideration before proceeding with the Work.

ARTICLE 56. PERMITS AND LICENSES

- A. City will apply and pay for the review of necessary encroachment permits for Work within the public rights-of-way. Contractor shall obtain all other necessary permits and licenses for the construction of the Project, including encroachment permits, and shall pay all fees required by law and shall comply with all laws, ordinances, rules and regulations relating to the Work and to the preservation of public health and safety. Before acceptance of the Project, the Contractor shall submit all licenses, permits, certificates of inspection and required approvals to the City.
- B. The Contractors Bid contains the Contractor's cost of developing traffic control designs and submitting for permits and implantation of traffic control. This cost is specifically intended to account for the costs of traffic control. The City will waive all encroachment permits fees for the Contractor.

ARTICLE 57. TRENCHES

- A. **Trenches Five Feet or More in Depth.** Contractor shall submit to the Architect at the preconstruction meeting, a detailed plan showing the design of shoring, bracing, sloping or other provisions to be made for worker protection from hazards of caving ground during the excavation of any trench or trenches five feet or more in depth. If such plan varies from shoring system standards established by the Construction Safety Orders of the California Code of Regulations, Department of Industrial Relations, the plan shall be prepared by a California registered civil or structural Architect. The plan shall not be less effective than the shoring, bracing, sloping, or other provisions of the Construction Safety Orders, as defined in the California Code of Regulations. The Contractor shall designate in writing the "competent person" as defined in Title 8, California Code of Regulations, who shall be present at the Work Site each day that trenching/excavation is in progress. The "competent person" shall prepare and provide daily trenching/excavation inspection reports to the Architect. Contractor shall also submit a copy of its annual California Occupational Safety and Health Administration (Cal/OSHA) trench/excavation permit.
- B. **Excavations Deeper than Four Feet.** If the Work involves excavating trenches or other excavations that extend deeper than four feet below the surface, Contractor shall promptly, and before the excavation is further disturbed, notify the City in writing of any of the following conditions:
 - 1. Material that the Contractor believes may be material that is hazardous waste, as defined in section 25117 of the Health and Safety Code, that is required to be removed to a Class I, Class II, or Class III disposal site in accordance with provisions of existing law.
 - 2. Subsurface or latent physical conditions at the site differing from those indicated.



3. Unknown physical conditions at the site of any unusual nature, different materially from those ordinarily encountered and generally recognized as inherent in work of the character provided for in the Contract

The City shall promptly investigate the conditions, and if it finds that the conditions do so materially differ, or do involve hazardous waste, and cause a decrease or increase in Contractor's cost of, or the time required for, performance of any part of the Work, shall issue a change order under the procedures described in the Contract Documents.

In the event that a dispute arises between the City and the Contractor as to whether the conditions materially differ, or involve hazardous waste, or cause a decrease or increase in the Contractor's cost of, or time required for, performance of any part of the Work, the Contractor shall not be excused from any scheduled completion date provided for by the Contract, but shall proceed with all Work to be performed under the Contract. Contractor shall retain any and all rights provided either by contract or by law which pertain to the resolution of disputes and protests between the parties.

ARTICLE 58. TRAFFIC CONTROL

- A. Traffic control plan(s) for the Work may be required by the Agency(s) of Jurisdiction. Traffic control plans, if required, shall be prepared at Contractor's expense, and traffic control shall be performed at Contractor's expense in accordance with the requirements of the Agency(s) of Jurisdiction. The Permit and Inspection Allowance included within the Bid Form includes the cost of required traffic control permit(s) and construction inspection by the Agency(s) of Jurisdiction only. The Permit and Inspection Allowance does not include costs for preparation of any required traffic control plans, implementation of any traffic control requirements or for any traffic signal services that may be required. Costs for traffic control plans, implementation of traffic control, or traffic signal services required by the Agency(s) of Jurisdiction shall be included in the Contractor's Bid.
- B. All warning signs and safety devices used by the Contractor to perform the Work shall conform to the requirements contained in the State of California, Department of Transportation's current edition of "Manual of Traffic Controls for Construction and Maintenance Work Zones" or to the requirements of the local agency. The Contractor shall also be responsible for all traffic control required by the agency having jurisdiction over the project on the intersecting streets. Contractor must submit a traffic control plan to the agency having jurisdiction over the project for approval prior to starting work.
- C. The Contractor's representative on the site responsible for traffic control shall produce evidence that he/she has completed training acceptable to the California Department of Transportation for safety through construction zones. All of the streets in which the Work will occur shall remain open to traffic and one lane of traffic maintained at all times



unless otherwise directed by the agency of jurisdiction. Businesses and residences adjacent to the Work shall be notified forty-eight (48) hours in advance of closing of driveways. The Contractor shall make every effort to minimize the amount of public parking temporarily eliminated due to construction in areas fronting businesses. No stockpiles of pipe or other material will be allowed in traveled right-of- ways after working hours unless otherwise approved by the Architect.

ARTICLE 59. DIVERSION OF RECYCLABLE WASTE MATERIALS

In compliance with the City's waste reduction and recycling efforts, including Goleta Municipal Code Chapter 8.10, Contractor shall divert all Recyclable Waste Materials to appropriate recycling centers as required for compliance with the local jurisdiction's waste diversion ordinances. Contractor will be required to submit weight tickets and written proof of diversion with its monthly progress payment requests. Contractor shall complete and execute any certification forms, including, but not limited to, *Post Construction Waste Reduction and Recycling Summary Report (Exhibit A)*, required by City or other applicable agencies to document Contractor's compliance with these diversion requirements. All costs incurred for these waste diversion efforts shall be the responsibility of the Contractor.

ARTICLE 60. REMOVAL OF HAZARDOUS MATERIALS

Should Contractor encounter material reasonably believed to be polychlorinated biphenyl (PCB) or other toxic wastes and hazardous materials which have not been rendered harmless at the Project site, the Contractor shall immediately stop work at the affected Project site and shall report the condition to the City in writing. The City shall contract for any services required to directly remove and/or abate PCBs and other toxic wastes and hazardous materials, if required by the Project site(s), and shall not require the Contractor to subcontract for such services. The Work in the affected area shall not thereafter be resumed except by written agreement of the City and Contractor.

ARTICLE 61. SANITARY FACILITIES

Contractor shall provide sanitary temporary toilet buildings and hand washing facilities for the use of all workers. All toilets and hand washing facilities shall comply with all applicable federal, state and local laws, codes, ordinances, and regulations. Toilets shall be kept supplied with toilet paper and shall have workable door fasteners. Toilets and hand washing facilities shall be serviced no less than once weekly and shall be present in a quantity of not less than as required by Cal/OSHA regulations. The toilets and hand washing facilities shall be maintained in a sanitary condition at all times. Use of toilet and hand washing facilities in the Work under construction shall not be permitted. Any other Sanitary Facilities required by Cal/OSHA shall be the responsibility of the Contractor.

ARTICLE 62. AIR AND WATER POLLUTION CONTROL

Contractor shall comply with all air pollution control rules, regulations, ordinances and statutes. All containers of paint, thinner, curing compound, solvent or liquid asphalt shall be labeled to indicate that the contents fully comply with the applicable material requirements.



ARTICLE 63. LAYOUT AND FIELD ENGINEERING

All field engineering required for laying out the Work and establishing grades for earthwork operations shall be furnished by the Contractor at its expense.

ARTICLE 64. TESTS AND INSPECTIONS

- A. If the Contract Documents, the Architect, or any instructions, laws, ordinances, or public authority requires any part of the Work to be tested or Approved, Contractor shall provide the Architect at least two (2) working days' notice of its readiness for observation or inspection. If inspection is by a public authority other than the City, Contractor shall promptly inform the City of the date fixed for such inspection. Required certificates of inspection (or similar) shall be secured by Contractor. Costs for City testing and City inspection shall be paid by the City. Costs of tests for Work found not to be in compliance shall be paid by the Contractor.
- B. If any Work is done or covered up without the required testing or approval, the Contractor shall uncover or deconstruct the Work, and the Work shall be redone after completion of the testing at the Contractor's cost in compliance with the Contract Documents.
- C. Where inspection and testing are to be conducted by an independent laboratory or agency, materials or samples of materials to be inspected or tested shall be selected by such laboratory or agency, or by the City, and not by Contractor. All tests or inspections of materials shall be made in accordance with the commonly recognized standards of national organizations.
- D. In advance of manufacture of materials to be supplied by Contractor which must be tested or inspected, Contractor shall notify the City so that the City may arrange for testing at the source of supply. Any materials which have not satisfactorily passed such testing and inspection shall not be incorporated into the Work.
- E. If the manufacture of materials to be inspected or tested will occur in a plant or location greater than sixty (60) miles from the City, the Contractor shall pay for any excessive or unusual costs associated with such testing or inspection, including but not limited to excessive travel time, standby time and required lodging.
- F. Reexamination of Work may be ordered by the City. If so ordered, Work must be uncovered or deconstructed by Contractor. If Work is found to be in accordance with the Contract Documents, the City shall pay the costs of reexamination and reconstruction. If such work is found not to be in accordance with the Contract Documents, Contractor shall pay all costs.

ARTICLE 65. PROTECTION OF WORK AND PROPERTY

- A. The Contractor shall be responsible for all damages to persons or property that occurs as a result of the Work. Contractor shall be responsible for the proper care and protection of



all materials delivered and Work performed until completion and final Acceptance by the City. All Work shall be solely at the Contractor's risk. Contractor shall adequately protect adjacent property from settlement or loss of lateral support as necessary. Contractor shall comply with all applicable safety laws and building codes to prevent accidents or injury to persons on, about, or adjacent to the Project site where Work is being performed. Contractor shall erect and properly maintain at all times, as required by field conditions and progress of work, all necessary safeguards, signs, barriers, lights, and watchmen for protection of workers and the public, and shall post danger signs warning against hazards created in the course of construction.

- B. In an emergency affecting safety of life or of work or of adjoining property, Contractor, without special instruction or authorization from the Architect, is hereby permitted to act to prevent such threatened loss or injury; and Contractor shall so act, without appeal, if so authorized or instructed by the Architect or the City. Any compensation claimed by Contractor on account of emergency work shall be determined by and agreed upon by the City and the Contractor.

ARTICLE 66. CONTRACTOR'S MEANS AND METHODS

Contractor is solely responsible for the means and methods utilized to perform the Work. In no case shall the Contractor's means and methods deviate from commonly used industry standards.

ARTICLE 67. AUTHORIZED REPRESENTATIVES

The City shall designate representatives, who shall have the right to be present at the Project site at all times. The City may designate an inspector who shall have the right to observe all of the Contractor's Work. The inspector shall not be responsible for the Contractor's failure to carry out the Work in accordance with the Contract Documents. Contractor shall provide safe and proper facilities for such access.

ARTICLE 68. HOURS OF WORK

- A. As provided in Article 3 (commencing at section 1810), Chapter 1, Part 7, Division 2 of the Labor Code, Contractor stipulates that eight (8) hours of labor shall constitute a legal day's work. The time of service of any worker employed at any time by the Contractor or by any subcontractor on any subcontract under this Contract upon the Work or upon any part of the Work contemplated by this Contract is limited and restricted to eight (8) hours during any one calendar day and 40 hours during any one calendar week, except as hereinafter provided. Notwithstanding the provisions herein above set forth, work performed by employees of Contractor in excess of eight (8) hours per day, and 40 hours during any one week, shall be permitted upon this public work upon compensation for all hours worked in excess of eight (8) hours per day at not less than one and one-half times the basic rate of pay.
- B. The Contractor and every subcontractor shall keep an accurate record showing the name of and actual hours worked each calendar day and each calendar week by each worker



employed in connection with the Work or any part of the Work contemplated by this Contract. The record shall be kept open at all reasonable hours to the inspection of the City and to the Division of Labor Law Enforcement, Department of Industrial Relations of the State of California.

- C. The Contractor shall pay to the City a penalty of twenty-five dollars (\$25.00) for each worker employed in the execution of this Contract by the Contractor or by any subcontractor for each calendar day during which such worker is required or permitted to work more than eight (8) hours in any calendar day and 40 hours in any one calendar week in violation of the provisions of Article 3 (commencing at section 1810), Chapter 1, Part 7, Division 2 of the Labor Code.
- D. Any work necessary to be performed after regular working hours, or on Saturdays and Sundays or other holidays, shall be performed without additional expense to the City.
- E. City will provide inspection during normal working hours from 8:00 a.m. to 3:30 p.m. Monday through Thursday. Inspection before or after this time will be charged to the Contractor as reimbursable inspection time. Inspections on weekends requires two days' notice for review and approval. Upon written request and approval, the 8.5 hour working day may be changed to other limits subject to city/county ordinance.
- F. It shall be unlawful for any person to operate, permit, use, or cause to operate any of the following at the Project site, other than between the hours of 7:00 a.m. to 5:00 p.m., Monday through Friday, with no Work allowed on the City-observed holidays, unless otherwise approved by the City:
 - 1. Powered Vehicles
 - 2. Construction Equipment
 - 3. Loading and Unloading Vehicles
 - 4. Domestic Power Tools

ARTICLE 69. PAYROLL RECORDS; LABOR COMPLIANCE

- A. Pursuant to Labor Code section 1776, Contractor and all subcontractors shall maintain weekly certified payroll records, showing the names, addresses, Social Security numbers, work classifications, straight time and overtime hours worked each day and week, and the actual per diem wages paid to each journeyman, apprentice, worker, or other employee employed by them in connection with the Work under this Contract. Contractor shall certify under penalty of perjury that records maintained and submitted by Contractor are true and accurate. Contractor shall also require subcontractor(s) to certify weekly payroll records under penalty of perjury.



- B. In accordance with Labor Code section 1771.4, the Contractor and each subcontractor shall furnish the certified payroll records directly to the Department of Industrial Relations (“DIR”) on the specified interval and format prescribed by the DIR, which may include electronic submission. Contractor shall comply with all requirements and regulations from the DIR relating to labor compliance monitoring and enforcement. The requirement to submit certified payroll records directly to the Labor Commissioner under Labor Code section 1771.4 shall not apply to work performed on a public works project that is exempt pursuant to the small project exemption specified in Labor Code Section 1771.4.
- C. Any stop orders issued by the Department of Industrial Relations against Contractor or any subcontractor that affect Contractor’s performance of Work, including any delay, shall be Contractor’s sole responsibility. Any delay arising out of or resulting from such stop orders shall be considered Contractor caused delay subject to any applicable liquidated damages and shall not be compensable by the City. Contractor shall defend, indemnify and hold the City, its officials, officers, employees and agents free and harmless from any claim or liability arising out of stop orders issued by the Department of Industrial Relations against Contractor or any subcontractor.
- D. The payroll records described herein shall be certified and submitted by the Contractor at a time designated by the City. The Contractor shall also provide the following:
1. A certified copy of the employee’s payroll records shall be made available for inspection or furnished to such employee or his or her authorized representative on request.
 2. A certified copy of all payroll records described herein shall be made available for inspection or furnished upon request of the DIR.
- E. Unless submitted electronically, the certified payroll records shall be on forms provided by the Division of Labor Standards Enforcement (“DLSE”) of the DIR or shall contain the same information as the forms provided by the DLSE.
- F. Any copy of records made available for inspection as copies and furnished upon request to the public or any public agency, the City, the Division of Apprenticeship Standards or the Division of Labor Standards Enforcement shall be marked or obliterated in such a manner as to prevent disclosure of an individual’s name, address and social security number. The name and address of the Contractor awarded the Contract or performing the contract shall not be marked or obliterated.
- G. In the event of noncompliance with the requirements of this Article, the Contractor shall have ten (10) calendar days in which to comply subsequent to receipt of written notice specifying in what respects the Contractor must comply with this Article. Should noncompliance still be evident after such 10-day period, the Contractor shall pay a penalty of one hundred dollars (\$100.00) to the City for each calendar day, or portion thereof, for each worker, until strict compliance is effectuated. Upon the request of the Division of Apprenticeship Standards or the Division of Labor Standards Enforcement, such penalties shall be withheld from progress payment then due.



- H. The responsibility for compliance with this Article shall rest upon the Contractor.

ARTICLE 70. PREVAILING RATES OF WAGES

- A. The Contractor is aware of the requirements of Labor Code sections 1720 *et seq.* and 1770 *et seq.*, as well as California Code of Regulations, Title 8, Section 16000 *et seq.* (“Prevailing Wage Laws”), which require the payment of prevailing wage rates and the performance of other requirements on certain “public works” and “maintenance” projects. Since this Project involves an applicable “public works” or “maintenance” project, as defined by the Prevailing Wage Laws, and since the total compensation is \$1,000 or more, Contractor agrees to fully comply with such Prevailing Wage Laws. The Contractor shall obtain a copy of the prevailing rates of per diem wages at the commencement of this Contract from the website of the Division of Labor Statistics and Research of the Department of Industrial Relations located at www.dir.ca.gov. In the alternative, the Contractor may view a copy of the prevailing rate of per diem wages which are on file at the City’s Administration Office and shall be made available to interested parties upon request. Contractor shall make copies of the prevailing rates of per diem wages for each craft, classification, or type of worker needed to perform work on the Project available to interested parties upon request, and shall post copies at the Contractor’s principal place of business and at the Project site. Contractor shall defend, indemnify and hold the City, its officials, officers, employees and authorized volunteers free and harmless from any claims, liabilities, costs, penalties or interest arising out of any failure or alleged failure to comply with the Prevailing Wage Laws. The Contractor shall forfeit as a penalty to the City not more than Two Hundred Dollars (\$200.00), pursuant to Labor Code section 1775, for each calendar day, or portion thereof, for each worker paid less than the prevailing wage rate as determined by the Director of the Department of Industrial Relations for such work or craft in which such worker is employed for any public work done under the Contract by it or by any subcontractor under it. The difference between such prevailing wage rate and the amount paid to each worker for each calendar day or portion thereof, for which each worker was paid less than the prevailing wage rate, shall be paid to each worker by the Contractor.
- B. Contractor shall post, at appropriate conspicuous points on the Project site, a schedule showing all determined general prevailing wage rates and all authorized deductions, if any, from unpaid wages actually earned.

ARTICLE 71. PUBLIC WORKS CONTRACTOR REGISTRATION

Pursuant to Labor Code sections 1725.5 and 1771.1, the Contractor and its subcontractors must be registered with the Department of Industrial Relations prior to the execution of a contract to perform public works. By entering into this Contract, Contractor represents that it is aware of the registration requirement and is currently registered with the DIR. Contractor shall maintain a current registration for the duration of the Project. Contractor shall further include the requirements of Labor Code sections 1725.5 and 1771.1 in any subcontract and ensure that all subcontractors are registered at the time this Contract is entered into and maintain registration for the duration of the Project. Notwithstanding the



foregoing, the contractor registration requirements mandated by Labor Code Sections 1725.5 and 1771.1 shall not apply to work performed on a public works project that is exempt pursuant to the small project exemption specified in Labor Code Sections 1725.5 and 1771.1.

ARTICLE 72. EMPLOYMENT OF APPRENTICES

- A. Contractor and all subcontractors shall comply with the requirements of Labor Code sections 1777.5 and 1777.6 in the employment of apprentices.
- B. Information relative to apprenticeship standards, wage schedules, and other requirements may be obtained from the Director of Industrial Relations, ex officio the Administrator of Apprenticeship, San Francisco, California, or from the Division of Apprenticeship Standards and its branch offices.
- C. Knowing violations of Labor Code section 1777.5 will result in forfeiture not to exceed one hundred dollars (\$100.00) for each calendar day of non-compliance pursuant to Labor Code section 1777.7.
- D. The responsibility for compliance with this Article shall rest upon the Contractor.

ARTICLE 73. NONDISCRIMINATION/EQUAL EMPLOYMENT OPPORTUNITY

Pursuant to Labor Code section 1735 and other applicable provisions of law, the Contractor and its subcontractors shall not discriminate against any employee or applicant for employment because of race, religious creed, color, national origin, ancestry, physical disability, mental disability, medical condition, marital status, sex, age, sexual orientation, or any other classifications protected by law on this Project. The Contractor will take affirmative action to insure that employees are treated during employment or training without regard to their race, religious creed, color, national origin, ancestry, physical disability, mental disability, medical condition, marital status, sex, age, sexual orientation, or any other classifications protected by law.

Employment Eligibility; Contractor. By executing this Contract, Contractor verifies that it fully complies with all requirements and restrictions of state and federal law respecting the employment of undocumented aliens, including, but not limited to, the Immigration Reform and Control Act of 1986, as may be amended from time to time. Such requirements and restrictions include, but are not limited to, examination and retention of documentation confirming the identity and immigration status of each employee of the Contractor. Contractor also verifies that it has not committed a violation of any such law within the five (5) years immediately preceding the date of execution of this Contract, and shall not violate any such law at any time during the term of the Contract. Contractor shall avoid any violation of any such law during the term of this Contract by participating in an electronic verification of work authorization program operated by the United States Department of Homeland Security, by participating in an equivalent federal work authorization program operated by the United States Department of Homeland Security to verify information of newly hired employees, or by some other legally acceptable method. Contractor shall maintain records of each such verification, and shall make them available to the City or its representatives for inspection and copy at any time during normal business hours. The City shall not be responsible for any costs or expenses related to Contractor's compliance with the



requirements provided for or referred to herein.

Employment Eligibility; Subcontractors, Sub-subcontractors and Consultants. To the same extent and under the same conditions as Contractor, Contractor shall require all of its subcontractors, sub-subcontractors and consultants performing any part of the Work or of this Contract to make the same verifications and comply with all requirements and restrictions provided for herein.

Employment Eligibility; Failure to Comply. Each person executing this Contract on behalf of Contractor verifies that he or she is a duly authorized officer of Contractor, and understands that any of the following shall be grounds for the City to terminate the Contract for cause: (1) failure of Contractor or its subcontractors, sub-subcontractors or consultants to meet any of the requirements provided for herein; (2) any misrepresentation or material omission concerning compliance with such requirements; or (3) failure to immediately remove from the Work any person found not to be in compliance with such requirements.

ARTICLE 74. DEBARMENT OF CONTRACTORS AND SUBCONTRACTORS

Contractors or subcontractors may not perform work on a public works project with a subcontractor who is ineligible to perform work on a public project pursuant to Labor Code section 1777.1 or 1777.7. Any contract on a public works project entered into between a contractor and a debarred subcontractor is void as a matter of law. A debarred subcontractor may not receive any public money for performing work as a subcontractor on a public works contract. Any public money that is paid, or may have been paid to a debarred subcontractor by a contractor on the project shall be returned to the City. The Contractor shall be responsible for the payment of wages to workers of a debarred subcontractor who has been allowed to work on the project.

ARTICLE 75. LABOR/EMPLOYMENT SAFETY

The Contractor shall comply with all applicable laws and regulations of the federal, state, and local government, including Cal/OSHA requirements and requirements for verification of employees' legal right to work in the United States.

The Contractor shall maintain emergency first aid treatment for his employees which complies with the Federal Occupational Safety and Health Act of 1970 (29 U.S.C. § 651 *et seq.*), and California Code of Regulations, Title 8, Industrial Relations Division 1, Department of Industrial Relations, Chapter 4. The Contractor shall ensure the availability of emergency medical services for its employees in accordance with California Code of Regulations, Title 8, Section 1512.

The Contractor shall submit the Illness and Injury Prevention Program and a Project site specific safety program to the City prior to beginning Work at the Project site. Contractor shall maintain a confined space program that meets or exceeds the City Standards. Contractor shall adhere to the City's lock out tag out program.

ARTICLE 76. INSURANCE

The Contractor shall obtain, and at all times during performance of the Work of Contract, maintain all



of the insurance described in this Article. Contractor shall not commence Work under this Contract until it has provided evidence satisfactory to the City that it has secured all insurance required hereunder. Contractor shall not allow any subcontractor to commence work on any subcontract until it has provided evidence satisfactory to the City that the subcontractor has secured all insurance required under this Article. Failure to provide and maintain all required insurance shall be grounds for the City to terminate this Contract for cause. Contractor shall furnish City with original certificates of insurance and endorsements effective coverage required by this Contract on forms satisfactory to the City. The certificates and endorsements for each insurance policy shall be signed by a person authorized by that insurer to bind coverage on its behalf, and shall be on forms acceptable to the City. All certificates and endorsements must be received and approved by the City before Work commences.

- A. **Additional Insureds; Waiver of Subrogation.** The City, its officials, officers, employees, agents and authorized volunteers shall be named as Additional Insureds on Contractor's All Risk policy and on Contractor's and its subcontractors' policies of Commercial General Liability and Automobile Liability insurance using, for Contractor's policy/ies of Commercial General Liability insurance, ISO CG forms 20 10 and 20 37 (or endorsements providing the exact same coverage, including completed operations), and, for subcontractors' policies of Commercial General Liability insurance, ISO CG form 20 38 (or endorsements providing the exact same coverage). Notwithstanding the minimum limits set forth in this Contract for any type of insurance coverage, all available insurance proceeds in excess of the specified minimum limits of coverage shall be available to the parties required to be named as Additional Insureds hereunder. Contractor and its insurance carriers shall provide a Waiver of Subrogation in favor of those parties.
- B. **Workers' Compensation Insurance.** The Contractor shall provide workers' compensation insurance for all of the employees engaged in Work under this Contract, on or at the Site, and, in case of any sublet Work, the Contractor shall require the subcontractor similarly to provide workers' compensation insurance for all the latter's employees as prescribed by State law. Any class of employee or employees not covered by a subcontractor's insurance shall be covered by the Contractor's insurance. In case any class of employees engaged in work under this Contract, on or at the Site, is not protected under the Workers' Compensation Statutes, the Contractor shall provide or shall cause a subcontractor to provide, adequate insurance coverage for the protection of such employees not otherwise protected. The Contractor is required to secure payment of compensation to his employees in accordance with the provisions of section 3700 of the Labor Code. The Contractor shall file with the City certificates of his insurance protecting workers. Company or companies providing insurance coverage shall be acceptable to the City, if in the form and coverage as set forth in the Contract Documents.
- C. **Employer's Liability Insurance.** Contractor shall provide Employer's Liability Insurance, including Occupational Disease, in the amount of at least one million dollars (\$1,000,000.00) per person per accident. Contractor shall provide City with a certificate of Employer's Liability Insurance. Such insurance shall comply with the provisions of the Contract Documents. The policy shall be endorsed, if applicable, to provide a Borrowed Servant/Alternate Employer Endorsement and contain a Waiver of



Subrogation in favor of the City.

- D. **Commercial General Liability Insurance.** Contractor shall provide “occurrence” form Commercial General Liability insurance coverage at least as broad as the most current ISO CGL Form 00 01, including but not limited to, premises liability, contractual liability, products/completed operations, personal and advertising injury which may arise from or out of Contractor’s operations, use, and management of the Site, or the performance of its obligations hereunder. The policy shall not contain any exclusion contrary to this Contract including but not limited to endorsements or provisions limiting coverage for (1) contractual liability (including but not limited to ISO CG 24 26 or 21 39); or (2) cross-liability for claims or suits against one insured against another. Policy limits shall not be less than \$3,000,000 per occurrence for bodily injury, personal injury and property damage, \$6,000,000 aggregate. If Commercial General Liability Insurance or other form with a general aggregate limit is used, either the general aggregate limit shall apply separately to this project/location or the general aggregate limit shall be twice the required occurrence limit. Defense costs shall be paid in addition to the limits.
1. Such policy shall comply with all the requirements of this Article. The limits set forth herein shall apply separately to each insured against whom claims are made or suits are brought, except with respect to the limits of liability. Further the limits set forth herein shall not be construed to relieve the Contractor from liability in excess of such coverage, nor shall it limit Contractor’s indemnification obligations to the City, and shall not preclude the City from taking such other actions available to the City under other provisions of the Contract Documents or law.
 2. All general liability policies provided pursuant to the provisions of this Article shall comply with the provisions of the Contract Documents.
 3. All general liability policies shall be written to apply to all bodily injury, including death, property damage, personal injury, owned and non-owned equipment, blanket contractual liability, completed operations liability, explosion, collapse, under-ground excavation, removal of lateral support, and other covered loss, however occasioned, occurring during the policy term, and shall specifically insure the performance by Contractor of that part of the indemnification contained in these General Conditions relating to liability for injury to or death of persons and damage to property.
 4. If the coverage contains one or more aggregate limits, a minimum of 50% of any such aggregate limit must remain available at all times; if over 50% of any aggregate limit has been paid or reserved, the City may require additional coverage to be purchased by Contractor to restore the required limits. Contractor may combine primary, umbrella, and as broad as possible excess liability coverage to achieve the total limits indicated above. Any umbrella or excess liability policy shall include the additional insured endorsement described in the Contract Documents.



5. All policies of general liability insurance shall permit and Contractor does hereby waive any right of subrogation which any insurer of Contractor may acquire from Contractor by virtue of the payment of any loss.
- E. **Automobile Liability Insurance.** Contractor shall provide “occurrence” form Automobile Liability Insurance at least as broad as ISO CA 00 01 (Any Auto) in the amount of, at least, one million dollars (\$1,000,000) per accident for bodily injury and property damage. Such insurance shall provide coverage with respect to the ownership, operation, maintenance, use, loading or unloading of any auto owned, leased, hired or borrowed by Contractor or for which Contractor is responsible, in a form and with insurance companies acceptable to the City. All policies of automobile insurance shall permit and Contractor does hereby waive any right of subrogation which any insurer of Contractor may acquire from Contractor by virtue of the payment of any loss.
- F. **Builder’s Risk [“All Risk”]**
1. If required by City, It is the Contractor’s responsibility to maintain or cause to be maintained Builder’s Risk [“All Risk”] extended coverage insurance on all work, material, equipment, appliances, tools, and structures that are or will become part of the Work and subject to loss or damage by fire, and vandalism and malicious mischief, in an amount to cover 100% of the replacement cost. The City accepts no responsibility for the Work until the Work is formally accepted by the City. The Contractor shall provide a certificate evidencing this coverage before commencing performance of the Work.
 2. The named insureds shall be Contractor, all Subcontractors of any tier (excluding those solely responsible for design work), suppliers, and City, its elected officials, officers, employees, agents and authorized volunteers, as their interests may appear. Contractor shall not be required to maintain property insurance for any portion of the Work following acceptance by City.
 3. Policy shall be provided for replacement value on an “all risk” basis. There shall be no coinsurance penalty provision in any such policy. Policy must include: (1) coverage for any ensuing loss from faulty workmanship, nonconforming work, omission or deficiency in design or specifications; (2) coverage against machinery accidents and operational testing; (3) coverage for removal of debris, and insuring the buildings, structures, machinery, equipment, materials, facilities, fixtures and all other properties constituting a part of the Project; (4) transit coverage, including ocean marine coverage (unless insured by the supplier), with sub-limits sufficient to insure the full replacement value of any key equipment item; and (5) coverage with sub-limits sufficient to insure the full replacement value of any property or equipment stored either on or off the Site. Such insurance shall be on a form acceptable to City to ensure adequacy and sublimit.
 4. In addition, the policy shall meet the following requirements:



- a. Insurance policies shall be so conditioned as to cover the performance of any extra work performed under the Contract.
 - b. Coverage shall include all materials stored on site and in transit.
 - c. Coverage shall include Contractor's tools and equipment.
 - d. Insurance shall include boiler, machinery and material hoist coverage.
- G. **Contractor's Pollution Liability Coverage.** Contractor shall provide pollution liability insurance in an amount not less than \$3,000,000 per occurrence and \$6,000,000 aggregate.
- H. Contractor shall require all tiers of sub-contractors working under this Contract to provide the insurance required under this Article unless otherwise agreed to in writing by City. Contractor shall make certain that any and all subcontractors hired by Contractor are insured in accordance with this Contract. If any subcontractor's coverage does not comply with the foregoing provisions, Contractor shall indemnify and hold the City harmless from any damage, loss, cost, or expense, including attorneys' fees, incurred by the City as a result thereof.

ARTICLE 77. FORM AND PROOF OF CARRIAGE OF INSURANCE

- A. Any insurance carrier providing insurance coverage required by the Contract Documents shall be admitted to and authorized to do business in the State of California unless waived, in writing, by the City's Risk Manager. Carrier(s) shall have an A.M. Best rating of not less than an A:VII. Insurance deductibles or self-insured retentions must be declared by the Contractor. At the election of the City the Contractor shall either 1) reduce or eliminate such deductibles or self-insured retentions, or 2) procure a bond which guarantees payment of losses and related investigations, claims administration, and defense costs and expenses. If umbrella or excess liability coverage is used to meet any required limit(s) specified herein, the Contractor shall provide a "follow form" endorsement satisfactory to the City indicating that such coverage is subject to the same terms and conditions as the underlying liability policy.
- B. Each insurance policy required by this Contract shall be endorsed to state that: (1) coverage shall not be suspended, voided, reduced or cancelled except after thirty (30) days prior written notice by certified mail, return receipt requested, has been given to the City; and (2) any failure to comply with reporting or other provisions of the policies, including breaches of warranties, shall not affect coverage provided to the City, its officials, officers, agents, employees, and volunteers.
- C. The Certificates(s) and policies of insurance shall contain or shall be endorsed to contain the covenant of the insurance carrier(s) that it shall provide no less than thirty (30) days written notice be given to the City prior to any material modification or cancellation of such insurance. In the event of a material modification or cancellation of coverage, the



City may terminate the Contract or stop the Work in accordance with the Contract Documents, unless the City receives, prior to such effective date, another properly executed original Certificate of Insurance and original copies of endorsements or certified original policies, including all endorsements and attachments thereto evidencing coverage's set forth herein and the insurance required herein is in full force and effect. Contractor shall not take possession, or use the Site, or commence operations under this Contract until the City has been furnished original Certificate(s) of Insurance and certified original copies of endorsements or policies of insurance including all endorsements and any and all other attachments as required in this Article. The original endorsements for each policy and the Certificate of Insurance shall be signed by an individual authorized by the insurance carrier to do so on its behalf.

- D. The Certificate(s) of Insurance, policies and endorsements shall so covenant and shall be construed as primary, and the City's insurance and/or deductibles and/or self-insured retentions or self-insured programs shall not be construed as contributory.
- E. City reserves the right to adjust the monetary limits of insurance coverages during the term of this Contract including any extension thereof if, in the City's reasonable judgment, the amount or type of insurance carried by the Contractor becomes inadequate.
- F. Contractor shall report to the City, in addition to the Contractor's insurer, any and all insurance claims submitted by the Contractor in connection with the Work under this Contract.

ARTICLE 78. TIME FOR COMPLETION AND LIQUIDATED DAMAGES

- A. **Time for Completion/Liquidated Damages.** Time is of the essence in the completion of the Work. Work shall be commenced within ten (10) Days of the date stated in the City's Notice to Proceed and shall be completed by Contractor in the time specified in the Contract Documents. The City is under no obligation to consider early completion of the Project; and the Contract completion date shall not be amended by the City's receipt or acceptance of the Contractor's proposed earlier completion date. Furthermore, Contractor shall not, under any circumstances, receive additional compensation from the City (including but not limited to indirect, general, administrative or other forms of overhead costs) for the period between the time of earlier completion proposed by the Contractor and the Contract completion date. If the Work is not completed as stated in the Contract Documents, it is understood that the City will suffer damage. In accordance with Government Code section 53069.85, being impractical and infeasible to determine the amount of actual damage, it is agreed that Contractor shall pay to the City as fixed and liquidated damages, and not as a penalty, the sum stipulated in the Contract for each calendar day of delay until the Work is fully completed. Contractor and its surety shall be liable for any liquidated damages. Any money due or to become due the Contractor may be retained to cover liquidated damages.

- B. **Inclement Weather.** Contractor shall abide by the Architect's determination of what



constitutes inclement weather. Time extensions for inclement weather shall only be granted when the Work stopped during inclement weather is on the critical path of the Project schedule. Refer to Section 01 32 13 for additional information.

- C. **Extension of Time.** Contractor shall not be charged liquidated damages because of any delays in completion of the Work due to unforeseeable causes beyond the control and without the fault or negligence of Contractor (or its subcontractors or suppliers). Contractor shall within five (5) Days of identifying any such delay notify the City in writing of causes of delay. The City shall ascertain the facts and extent of delay and grant extension of time for completing the Work when, in its judgment, the facts justify such an extension. Time extensions to the Project shall be requested by the Contractor as they occur and without delay. No delay claims shall be permitted unless the event or occurrence delays the completion of the Project beyond the Contract completion date.
- D. **No Damages for Reasonable Delay.** The City's liability to Contractor for delays for which the City is responsible shall be limited to only an extension of time unless such delays were unreasonable under the circumstances. In no case shall the City be liable for any costs which are borne by the Contractor in the regular course of business, including, but not limited to, home office overhead and other ongoing costs. Damages caused by unreasonable City delay, including delays caused by items that are the responsibility of the City pursuant to Government Code section 4215, shall be based on actual costs only, no proportions or formulas shall be used to calculate any delay damages.

ARTICLE 79. COST BREAKDOWN AND PERIODIC ESTIMATES FOR SOUTH LA PATERA LANE WORK

Contractor shall furnish on forms Approved by the City:

- A. Within ten (10) Days of Notice to Proceed with the Contract, a detailed estimate giving a complete breakdown of the Contract price, if the Contract amount is a lump sum.
- B. A monthly itemized estimate of Work done for the purpose of making progress payments. In order for the City to consider and evaluate each progress payment application, the Contractor shall submit a detailed measurement of Work performed and a progress estimate of the value thereof before the tenth (10th) Day of the following month.
- C. Contractor shall submit, with each of its payment requests, an adjusted list of actual quantities, verified by the Architect, for unit price items listed, if any, in the Bid Form.
- D. Following the City's Acceptance of the Work, the Contractor shall submit to the City a written statement of the final quantities of unit price items for inclusion in the final payment request.
- E. The City shall have the right to adjust any estimate of quantity and to subsequently correct any error made in any estimate for payment.



Contractor shall certify under penalty of perjury, that all cost breakdowns and periodic estimates accurately reflect the Work on the Project.

ARTICLE 80. PROGRESS ESTIMATES AND PAYMENT

- A. By the tenth (10th) Day of the following calendar month, Contractor shall submit to Architect a payment request on Forms CC1: Progress Payment Request and substantiated on Form CC2 – Progress Payment Request - Detail, which shall set forth in detail the value of the Work done for the period beginning with the date work was first commenced and ending on the end of the calendar month for which the payment request is prepared. Contractor shall include any amount earned for authorized extra work and shall submit Form CC3 – Quantity Change Verification Form, where there is quantity changes authorized as part of the progress or final payment. From the total thus computed, a deduction shall be made in the amount of five percent (5%) for retention, except where the City has adopted a finding that the Work done under the Contract is substantially complex, and then the amount withheld as retention shall be the percentage specified in the Notice Inviting Bids. From the remainder a further deduction may be made in accordance with Section B below. The amount computed, less the amount withheld for retention and any amounts withheld as set forth below, shall be the amount of the Contractor’s payment request.
- B. The City may withhold a sufficient amount or amounts of any payment or payments otherwise due to Contractor, as in his judgment may be necessary to cover:
1. Payments which may be past due and payable for just claims against Contractor or any subcontractors for labor or materials furnished in and about the performance of work on the Project under this Contract.
 2. Defective work not remedied.
 3. Failure of Contractor to make proper payments to his subcontractor or for material or labor.
 4. Completion of the Contract if there is a reasonable doubt that the Work can be completed for balance then unpaid.
 5. Damage to another contractor or a third party.
 6. Amounts which may be due the City for claims against Contractor.
 7. Failure of Contractor to keep the record (“as-built”) drawings up to date.
 8. Failure to provide update on construction schedule as required herein.



9. Site cleanup.
 10. Failure to comply with Contract Documents.
 11. Liquidated damages.
 12. Legally permitted penalties.
- C. The City may apply such withheld amount or amounts to payment of such claims or obligations at its discretion with the exception of subsections (B)(1), (3), and (5) of this Article, which must be retained or applied in accordance with applicable law. In so doing, the City shall be deemed the agent of Contractor and any payment so made by the City shall be considered as a payment made under contract by the City to Contractor and the City shall not be liable to Contractor for such payments made in good faith. Such payments may be made without prior judicial determination of claim or obligations. The City will render Contractor a proper accounting of such funds disbursed on behalf of Contractor.
- D. Upon receipt, the Architect shall review the payment request to determine whether it is undisputed and suitable for payment. If the payment request is determined to be unsuitable for payment, it shall be returned to Contractor as soon as practicable but not later than seven (7) Days after receipt, accompanied by a document setting forth in writing the reasons why the payment request is not proper. The City shall make the progress payment within 30 calendar days after the receipt of an undisputed and properly submitted payment request from Contractor, provided that a release of liens and claims has been received from the Contractor pursuant to Civil Code section 8132. The number of days available to the City to make a payment without incurring interest pursuant to this paragraph shall be reduced by the number of days by which the Architect exceeds the seven (7) Day requirement.
- E. A payment request shall be considered properly executed if funds are available for payment of the payment request and payment is not delayed due to an audit inquiry by the financial officer of the City.

ARTICLE 81. SECURITIES FOR MONEY WITHHELD

Pursuant to section 22300 of the Public Contract Code of the State of California, Contractor may request the City to make retention payments directly to an escrow agent or may substitute securities for any money withheld by the City to ensure performance under the contract. At the request and expense of Contractor, securities equivalent to the amount withheld shall be deposited with the City or with a state or federally chartered bank as the escrow agent who shall return such securities to Contractor upon satisfactory completion of the contract. Deposit of securities with an escrow agent shall be subject to a written agreement substantially in the form provided in section 22300 of the Public Contract Code.

ARTICLE 82. CHANGES AND EXTRA WORK.



A. Contract Change Orders.

1. The City, without invalidating the Contract, may order changes in the Work consisting of additions, deletions or other revisions, and the Contract Price and Contract Time shall be adjusted accordingly. Except as otherwise provided herein, all such changes in the Work shall be authorized by Change Order, and shall be performed under the applicable conditions of the Contract Documents. A Change Order signed by the Contractor indicates the Contractor's agreement therewith, including any adjustment in the Contract Price or the Contract Time, and the full and final settlement of all costs (direct, indirect and overhead) related to the Work authorized by the Change Order.
2. Contractor shall promptly execute changes in the Work as directed in writing by the City even when the parties have not reached agreement on whether the change increases the scope of Work or affects the Contract Price or Contract Time. All claims for additional compensation to the Contractor shall be presented in writing. No claim will be considered after the Work in question has been done unless a written Change Order has been issued or a timely written notice of claim has been made by Contractor.
3. Whenever any change is made as provided for herein, such change shall be considered and treated as though originally included in the Contract, and shall be subject to all terms, conditions, and provisions of the original Contract.
4. Contractor shall not be entitled to claim or bring suit for damages, whether for loss of profits or otherwise, on account of any decrease or omission of any item or portion of Work to be done.
5. No dispute, disagreement, or failure of the parties to reach agreement on the terms of the Change Order shall relieve the Contractor from the obligation to proceed with performance of the work, including Additional Work, promptly and expeditiously.
6. Contractor shall make available to the City any of the Contractor's documents related to the Project immediately upon request of the City, as set forth in Article 52.
7. Any alterations, extensions of time, Additional Work, or any other changes may be made without securing consent of the Contractor's surety or sureties.

B. Contract Price Change.

1. Process for Determining Adjustments in Contract Price.
 - a. Owner Initiated Change. The Contractor must submit a complete cost proposal, including any change in the Contract Price or Contract Time, within



seven (7) Days after receipt of a scope of a proposed change order initiated by the City, unless the City requests that proposals be submitted in less than seven (7) Days.

- b. Contractor Initiated Change. The Contractor must give written notice of a proposed change order required for compliance with the Contract Documents within seven (7) Days of discovery of the facts giving rise to the proposed change order.
- c. Whenever possible, any changes to the Contract amount shall be in a lump sum mutually agreed to by the Contractor and the City.
- d. Price quotations from the Contractor shall be accompanied by sufficiently detailed supporting documentation to permit verification by the City, including but not limited to estimates and quotations from subcontractors or material suppliers, as the City may reasonably request. Contractor shall certify the accuracy of all Change Order Requests under penalty of perjury.
- e. If the Contractor fails to submit a complete cost proposal within the seven (7) Day period (or as requested), the City has the right to order the Contractor in writing to commence the Work immediately on a time and materials basis and/or issue a lump sum change to the Contract Price and/or Contract Time in accordance with the City's estimate. If the change is issued based on the City's estimate, the Contractor will waive its right to dispute the action unless within fifteen (15) Days following completion of the added/deleted work, the Contractor presents written proof that the City's estimate was in error.

2. Unit Price Change Orders.

- a. When the actual quantity of a Unit Price item varies from the Bid Form, compensation for the change in quantity will be calculated by multiplying the actual quantity by the Unit Price. This calculation may result in either an additive or deductive Final Change Order pursuant to the Contract Documents.
- b. No Mark up for Overhead and Profit. Because the Contract Unit Prices provided in the Bid Form include Overhead and Profit as determined by Contractor at the time of Bid submission, no mark up or deduction for Overhead and Profit will be included in Unit Price Change Orders.
- c. Bid items included on the Bid Form may be deducted from the Work in their entirety without any negotiated extra costs.
- d. Contractor acknowledges that unit quantities are estimates and agrees that the estimated unit quantities listed on the Bid Form will be adjusted to reflect the actual unit quantities which may result in an adjustment to the Contract Unit Prices. Such an adjustment will be made by execution of a final additive or



deductive Change Order following Contractor's completion of the Work. Upon notification, Contractor's failure to respond within seven (7) Days will result in City's issuance of a unit quantity adjustment to the Contract Unit Prices and/or Contract Time in accordance with the Contract Documents.

e. The City or Contractor may make a Claim for an adjustment in the Unit Price in accordance with the Contract Documents if:

i. the quantity of any item of Unit Price Work performed by Contractor differs by twenty-five percent (25%) or more from the estimated quantity of such item indicated in the Contract; and

ii. there is no corresponding adjustment with respect to any other item of Work; and

iii. Contractor believes that Contractor is entitled to an increase in Unit Price as a result of having incurred additional expense or the City believes that the City is entitled to a decrease in Unit Price and the parties are unable to agree as to the amount of any such increase or decrease.

3. Contractor shall incorporate the provisions of this Section into all agreements with Subcontractors. Compensation for Lump Sum Change Orders shall be limited to expenditures necessitated specifically by the Additional Work, and shall be according to the following:

a. Overview. The Contractor will submit a properly itemized Lump Sum Change Order Proposal covering the Additional Work and/or the work to be deleted. This proposal will be itemized for the various components of the Additional Work and segregated by labor, material, and equipment in a detailed format satisfactory to the City. The City will require itemized change orders on all change order proposals from the Contractor, subcontractors, and sub-subcontractors regardless of tier. Details to be submitted will include detailed line item estimates showing detailed materials quantity take-offs, material prices by item and related labor hour pricing information and extensions (by line item or by drawing as applicable).

b. Labor. The costs of labor will be the actual cost for wages prevailing locally for each craft or type of worker at the time the Additional Work is done, plus employer payments of payroll taxes and insurance, health and welfare, pension, vacation, apprenticeship funds, and other direct costs resulting from Federal, State or local laws, as well as assessment or benefits required by lawful collective bargaining agreements. The use of a labor classification which would increase the Additional Work cost will not be permitted unless the Contractor establishes the necessity for such new classifications. Labor costs for equipment operators and helpers shall be reported only when such costs are not included in the invoice for equipment rental.



Estimated labor hours must only include hours for those workmen and working foremen directly involved in performing the change order work. Supervision above the level of working foremen (such as general foremen, superintendent, project manager, etc.) is considered to be included in the markup percentages as outlined below. Note that no separate allowances for warranty expense will be allowed as a direct cost of a change order. Costs attributed to warranty expenses will be considered to be covered by the markup.

- c. Labor Burden. Labor burden allowable in change orders shall be defined as employer's net actual cost of payroll taxes (FICA, Medicare, SUTA, FUTA), net actual cost for employer's cost of union benefits (or other usual and customary fringe benefits if the employees are not union employees), and net actual cost to employer for worker's compensation insurance taking into consideration adjustments for experience modifiers, premium discounts, dividends, rebates, expense constants, assigned risk pool costs, net cost reductions due to policies with deductibles for self-insured losses, assigned risk rebates, etc. Contractor shall reduce their standard payroll tax percentages to properly reflect the effective cost reduction due to the estimated impact of the annual maximum wages subject to payroll taxes. An estimated percentage for labor burden may be used for pricing change orders. However, the percentage used for labor burden to price change orders will be examined at the conclusion of the Project and an adjustment to the approved change orders will be processed if it is determined that the actual labor burden percentage should have been more or less than the estimated percentage used.
- d. Materials. The cost of materials reported shall be at invoice or lowest current price at which such materials are locally available in the quantities involved, plus sales tax, freight, and delivery. Materials costs shall be based upon supplier or manufacturer's invoice. If invoices or other satisfactory evidence of cost are not furnished within fifteen (15) Days of delivery, then the City shall determine the materials cost, at its sole discretion. Estimated material change order costs shall reflect the Contractor's reasonably anticipated net actual cost for the purchase of the material needed for the change order work. Estimated material costs shall reflect cost reductions available to the Contractor due to "non-cash" discounts, trade discounts, free material credits, and/or volume rebates. "Cash" discounts (i.e., prompt payment discounts of 2% or less) available on material purchased for change order work shall be credited to the City if the Contractor is provided the City funds in time for Contractor to take advantage of any such "cash" discounts. The portion of any "cash" discounts greater than 2% will not be considered "non-cash" discount for purposes of this provision. Price quotations from material suppliers must be itemized with unit prices for each specific item to be purchased. "Lot pricing" quotations will not be considered sufficient substantiating detail.



- e. Tool and Equipment Use. Costs for the use of small tools, which are tools that have a replacement value of \$1,000 or less, shall be considered included in the Overhead and Profit mark-ups established below. Allowable change order estimated costs may include appropriate amounts for rental of major equipment specifically needed to perform the change order work (defined as tools and equipment with an individual purchase cost of more than \$750). For Contractor owned equipment, the "bare" equipment rental rates allowed to be used for pricing change order proposals shall be 75% of the monthly rate listed in the most current publication of The AED Green Book divided by 176 to arrive at a maximum hourly rate to be applied to the hours the equipment is used performing the change order work. Further, for Contractor owned equipment, the aggregate equipment rent charges for any single piece of equipment used in all change order work shall be limited to 50% of the fair market value of the piece of equipment when the first change order is priced involving usage of the piece of equipment. Fuel necessary to operate the equipment will be considered as a separate direct cost associated with the change order work.

- f. Maximum Markup Percentage Allowable on Self-Performed Work. With respect to pricing change orders, the maximum markup percentage to be paid to any Contractor or subcontractor (regardless of tier) on self-performed work shall be a single markup percentage not-to-exceed fifteen percent (15%) of the net direct cost of (1) direct labor and allowable labor burden costs applicable to the change in the Work; (2) the net cost of material and installed equipment incorporated into the change in the Work, and (3) net rental cost of major equipment and related fuel costs necessary to complete the change in the Work. The markup computed using the above formula shall be considered to be allocated 2/3 to cover applicable overhead costs directly attributable to the field overhead costs related to processing, supervising and performing, the change order work, and the remaining 1/3 to cover home office overhead costs and profit.

- g. Maximum Markup Percentages Allowable on Work Performed by Lower Tier Subcontractors. With respect to pricing the portion of change order proposals involving Work performed by lower tier contractors, the maximum markup percentage allowable to the Contractor or subcontractor supervising the lower tier subcontractor's work shall not exceed five percent (5%) of the net of all approved change order work performed by all subcontractors combined for any particular change order proposal. The markup computed using the above formula shall be considered to be allocated 2/3 to cover applicable overhead costs directly attributable to the field overhead costs related to processing, supervising and performing the change order work, and the remaining 1/3 to cover home office overhead costs and profit.

- h. No Markup on Bonds and Liability Insurance Costs. Change order cost adjustments due to increases or decreases in bond or insurance costs (if



applicable) shall not be subject to any markup.

- i. Direct and Indirect Costs Covered by Markup Percentages. As a further clarification, the agreed upon markup percentage set forth above is intended to cover the Contractor's profit and all indirect costs associated with the change order work. Items intended to be covered by the markup percentage include, but are not limited to: home office expenses, branch office and field office overhead expense of any kind, project management, superintendents, general foremen, estimating, engineering, coordinating, expediting, purchasing, detailing, legal, accounting, data processing or other administrative expenses, shop drawings, permits, auto insurance and umbrella insurance, pick-up truck costs, and warranty expense costs. The cost for the use of small tools is also to be considered covered by the markup percentage established above. Small tools shall be defined as tools and equipment (power or non-power) with an individual purchase cost of less than \$750.
- j. Deduct Change Orders and Net Deduct Changes. The application of the markup percentages referenced above will apply to both additive and deductive change orders. In the case of a deductive change order, the credit will be computed by applying the sliding scale percentages as outlined above so that a deductive change order would be computed in the same manner as an additive change order. In those instances where a change involves both additive and deductive work, the additions and deductions will be netted and the markup percentage adjustments will be applied to the net amount.
- k. Contingency. In no event will any lump sum or percentage amounts for "contingency" be allowed to be added as a separate line item in change order estimates. Unknowns attributable to labor hours will be accounted for when estimating labor hours anticipated performing the work. Unknowns attributable to material scrap and waste will be estimated as part of material costs.
- l. Insurance and Bonds. In the event the Contractor has been required to furnish insurance and/or bonds as part of the base contract price, a final contract change order will be processed to account for the Contractor's net increase or decrease in insurance costs and/or bond premium costs associated with change orders to Contractor's base Contract Price.

4. Time and Materials Change Orders.

- a. General. The term Time and Materials means the sum of all costs reasonably and necessarily incurred and paid by Contractor for labor, materials, and equipment in the proper performance of Additional Work. Except as otherwise may be agreed to in writing by the City, such costs shall be in amounts no higher than those prevailing in the locality of the Project, and shall include only the following items.



b. Timely and Final Documentation.

- i. T&M Daily Sheets. Contractor must submit timesheets, materials invoices, records of equipment hours, and records of rental equipment hours to the City's Representative for an approval signature **each day** Additional Work is performed. Failure to get the City's Representative's approval signature each Day shall result in a waiver of Contractor's right to claim these costs. The City's Representative's signature on time sheets only serves as verification that the Work was performed and is not indicative of City's agreement to Contractor's entitlement to the cost.
- ii. T&M Daily Summary Sheets. All documentation of incurred costs ("T&M Daily Summary Sheets") shall be submitted by Contractor within **three (3) Days** of incurring the cost for labor, material, equipment, and special services as Additional Work is performed. Contractor's actual costs shall be presented in a summary table in an electronic spreadsheet file by labor, material, equipment, and special services. Each T&M Daily Summary Sheet shall include Contractor's actual costs incurred for the Additional Work performed that day and a cumulative total of Contractor's actual costs incurred for the Additional Work. Contractor's failure to provide a T&M Daily Summary Sheet showing a total cost summary within three (3) Days but within five (5) Days of performance of the Work will result in the Contractor's otherwise allowable overhead and profit being reduced by 50% for that portion of Additional Work which was not documented in a timely manner. Contractor's failure to submit the T&M Daily Summary Sheet within five (5) Days of performance of the Work will result in a total waiver of Contractor's right to claim these costs.
- iii. T&M Total Cost Summary Sheet. Contractor shall submit a T&M Total Cost Summary Sheet, which shall include total actual costs, within **seven (7) Days** following completion of City approved Additional Work. Contractor's total actual cost shall be presented in a summary table in an electronic spreadsheet file by labor, material, equipment, and special services. Contractor's failure to submit the T&M Total Cost Summary Sheet within seven (7) Days of completion of the Additional Work will result in

Contractor's waiver for any reimbursement of any costs associated with the T&M Summary Sheets or the performance of the Additional Work.

- c. Labor. The Contractor will be paid the cost of labor for the workers used in the actual and direct performance of the Work. The cost of labor will be the sum of the actual wages paid (which shall include any employer payments to or on behalf of the workers for health and welfare, pension, vacation, and similar purposes) substantiated by timesheets and certified payroll for wages prevailing for each craft or type of workers performing the Additional Work at the time the Additional Work is done, and the labor surcharge set forth in



the Department of Transportation publication entitled *Labor Surcharge and Equipment Rental Rates*, which is in effect on the date upon which the Work is accomplished and which is a part of the Contract. The labor surcharge shall constitute full compensation for all payments imposed by Federal, State, or local laws and for all other payments made to, or on behalf of, the workers, other than actual wages.

- i. Equipment Operator Exception. Labor costs for equipment operators and helpers shall be paid only when such costs are not included in the invoice for equipment rental.
 - ii. Foreman Exception. The labor costs for foremen shall be proportioned to all of their assigned work and only that applicable to the Additional Work shall be paid. Indirect labor costs, including, without limitation, the superintendent, project manager, and other labor identified in the Contract Documents will be considered Overhead.
- d. Materials. The cost of materials reported shall be itemized at invoice or lowest current price at which materials are locally available and delivered to the Project site in the quantities involved, plus the cost of sales tax, freight, delivery, and storage.
- i. Trade discounts available to the purchaser shall be credited to the City notwithstanding the fact that such discounts may not have been taken by Contractor.
 - ii. For materials secured by other than a direct purchase and direct billing to the purchaser, the cost shall be deemed to be the price paid to the actual supplier as determined by the City's Representative.
 - iii. Payment for materials from sources owned wholly or in part by the purchaser shall not exceed the price paid by the purchaser for similar materials from said sources on Additional Work items or the current wholesale price for such materials delivered to the Project site, whichever price is lower.
 - iv. If, in the opinion of the City's Representative, the cost of materials is excessive, or Contractor does not furnish satisfactory evidence of the cost of such materials, then the cost shall be deemed to be the lowest current wholesale price for the total quantity concerned delivered to the Project site less trade discounts.
 - v. The City reserves the right to furnish materials for the Additional Work and no Claim shall be allowed by Contractor for costs of such materials or Indirect Costs or profit on City furnished materials.



e. Equipment.

i. Rental Time. The rental time to be paid for equipment on the Project site shall be the time the equipment is in productive operation on the Additional Work being performed and, in addition, shall include the time required to move the equipment to the location of the Additional Work and return it to the original location or to another location requiring no more time than that required to return it to its original location; except that moving time will not be paid if the equipment is used on other than the Additional Work, even though located at the site of the Additional Work.

(a) Rental Time Not Allowed. Rental time will not be allowed while equipment is inoperative due to breakdowns.

(b) Computation Method. The following shall be used in computing the rental time of equipment on the Project site.

(i) When hourly rates are paid, any part of an hour less than 30 minutes of operation shall be considered to be 1/2-hour of operation, and any part of an hour in excess of 30 minutes will be considered one hour of operation.

(ii) When daily rates are paid, any part of a day less than 4 hours operation shall be considered to be 1/2-day of operation, and any part of an hour in excess of 4 hours will be considered one day of operation.

ii. Rental Rates. Contractor will be paid for the use of equipment at the lesser of (i) the actual rental rate, or (ii) the rental rate listed for that equipment in the California Department of Transportation publication entitled *Labor Surcharge and Equipment Rental Rates*, which is in effect on the date upon which the Contract was executed. Such rental rates will be used to compute payments for equipment whether the equipment is under Contractor's control through direct ownership, leasing, renting, or another method of acquisition. The rental rate to be applied for use of each item of equipment shall be the rate (i.e., daily, monthly) resulting in the least total cost to the City for the total period of use. If it is deemed necessary by Contractor to use equipment not listed in the publication, an equitable rental rate for the equipment will be established by the City's Representative. Contractor may furnish cost data which might assist the City's Representative in the establishment of the rental rate.

iii. Contractor-Owned Equipment.

(a) For Contractor-owned equipment, the allowed equipment rental rate will be limited to the monthly equipment rental rate using a utilization



rate of 173 hours per month.

- (b) For Contractor-owned equipment, the rental time to be paid for equipment on the Site shall be the time the equipment is in productive operation, unless, in the instance of standby time, the equipment could be actively used by Contractor on another project, then City shall pay for the entirety of the time the equipment is on Site. It shall be Contractor's burden to demonstrate to the City that the equipment could be actively used on another project.
- iv. All equipment shall, in the opinion of the City's Representative, be in good working condition and suitable for the purpose for which the equipment is to be used.
- v. Before construction equipment is used on the Additional Work, Contractor shall plainly stencil or stamp an identifying number thereon at a conspicuous location, and shall furnish to the City's Representative, in duplicate, a description of the equipment and its identifying number and the scheduled Additional Work activities planned.
- vi. Unless otherwise specified, manufacturer's rating and manufacturer approved modifications shall be used to classify equipment for the determination of applicable rental rates. Equipment which has no direct power unit shall be powered by a unit of at least the minimum rating recommended by the manufacturer.
- f. Special Services. Special work or services are defined as that Additional Work characterized by extraordinary complexity, sophistication, or innovation or a combination of the foregoing attributes which are unique to the construction industry.
 - i. Invoices for Special Services. When the City's Representative and Contractor determine that a special service is required which cannot be performed by the forces of Contractor or those of any of its Subcontractors, the special service may be performed by an entity especially skilled in the Additional Work. Invoices for special services based upon the current fair market value thereof may be accepted without complete itemization of labor, material, and equipment rental costs, after validation of market values by the City's Representative.
 - ii. Discount and Allowance. All invoices for special services will be adjusted by deducting all trade discounts offered or available, whether the discounts were taken or not. In lieu of Overhead and Profit specified herein, a total allowance not to exceed fifteen percent (15%) for Overhead and Profit will be added to invoices for Special Services.



- iii. When the City determines, in its sole discretion, that competitive bidding is necessary for certain special services, Contractor shall solicit competitive bids for those special services.
- g. Excluded Costs. The term Time and Material shall not include any of the following costs or any other home or field office overhead costs, all of which are to be considered administrative costs covered by Contractor's allowance for Overhead and Profit.
- i. Overhead Cost. Payroll costs and other compensation of Contractor's officers, executives, principals, general managers, engineers, architects, estimators, attorneys, auditors, accountants, purchasing and contracting agents, timekeepers, clerks, and other personnel employed by Contractor whether at the Site or in Contractor's principal office or any branch office, material yard, or shop for general administration of the Additional Work;
 - ii. Office Expenses. Expenses of Contractor's principal and branch offices;
 - iii. Capital Expenses. Any part of Contractor's capital expenses, including interest on Contractor's capital employed for the Additional Work and charges against Contractor for delinquent payments;
 - iv. Negligence. Costs due to the negligence of Contractor or any Subcontractor or Supplier, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable, including without limitation the correction of Defective Work, disposal of materials or equipment wrongly supplied, and making good any damage to property;
 - v. Other. Other overhead or general expense costs of any kind and the cost of any item not specifically and expressly included in the Contract Documents;
 - vi. Small Tools. Cost of small tools valued at less than \$1,000 and that remain the property of Contractor;
 - vii. Administrative Costs. Costs associated with the preparation of Change Orders (whether or not ultimately authorized), cost estimates, or the preparation or filing of Claims;
 - viii. Anticipated Lost Profits. Expenses of Contractor associated with anticipated lost profits or lost revenues, lost income or earnings, lost interest on earnings, or unpaid retention;
 - ix. Home Office Overhead. Costs derived from the computation of a "home



- office overhead” rate by application of the *Eichleay, Allegheny*, burden fluctuation, or other similar methods;
- x. Special Consultants and Attorneys. Costs of special consultants or attorneys, whether or not in the direct employ of Contractor, employed for services specifically related to the resolution of a Claim, dispute, or other matter arising out of or relating to the performance of the Additional Work.
 - h. Overhead, Profit and Other Charges. The mark-up for overhead (including supervision) and profit on work added to the Contract shall be according to the following:
 - i. “Net Cost” is defined as consisting of costs of labor, materials, and tools and equipment only excluding overhead and profit. The costs of applicable insurance and bond premium will be reimbursed to the Contractor and subcontractors at cost only, without mark-up. Contractor shall provide City with documentation of the costs, including, but not limited to, payroll records, invoices, and such other information as City may reasonably request.
 - ii. For Work performed by the Contractor’s forces, the added cost for overhead and profit shall not exceed fifteen percent (15%) of the Net Cost of the Work.
 - iii. For Work performed by a subcontractor, the added cost for overhead and profit shall not exceed fifteen percent (15%) of the subcontractor’s Net Cost of the Work to which the Contractor may add five percent (5%) of the subcontractor’s Net Cost.
 - iv. For Work performed by a sub-subcontractor, the added cost for overhead and profit shall not exceed fifteen percent (15%) of the sub-subcontractor’s Net Cost for Work to which the subcontractor and general contractor may each add an additional five percent (5%) of the Net Cost of the lower tier subcontractor.
 - v. No additional mark-up will be allowed for lower tier subcontractors, and in no case shall the added cost for overhead and profit payable by City exceed twenty-five percent (25%) of the Net Cost as defined herein, of the party that performs the Work.
 - 5. All of the following costs are included in the markups for overhead and profit described above, and Contractor shall not receive any additional compensation for: Submittals, drawings, field drawings, Shop Drawings, including submissions of drawings; field inspection; General Superintendence; General administration and preparation of cost proposals, schedule analysis, Change Orders, and other supporting documentation; computer services; reproduction services; Salaries of



project Architect, superintendent, timekeeper, storekeeper, and secretaries; Janitorial services; Small tools, incidentals and consumables; Temporary On-Site facilities (Offices, Telephones, High Speed Internet Access, Plumbing, Electrical Power, Lighting; Platforms, Fencing, Water), Jobsite and Home office overhead or other expenses; vehicles and fuel used for work otherwise included in the Contract Documents; Surveying; Estimating; Protection of Work; Handling and disposal fees; Final Cleanup; Other Incidental Work; Related Warranties; insurance and bond premiums.

6. For added or deducted Work by subcontractors, the Contractor shall furnish to the City the subcontractor's signed detailed record of the cost of labor, material and equipment, including the subcontractor markup for overhead and profit. The same requirement shall apply to sub-subcontractors
7. For added or deducted work furnished by a vendor or supplier, the Contractor shall furnish to the City a detailed record of the cost to the Contractor, signed by such vendor or supplier.
8. Any change in the Work involving both additions and deletions shall indicate a net total cost, including subcontracts and materials. Allowance for overhead and profit, as specified herein, shall be applied if the net total cost is an increase in the Contract Price; overhead and profit allowances shall not be applied if the net total cost is a deduction to the Contract Price. The estimated cost of deductions shall be based on labor and material prices on the date the Contract was executed.
9. Contractor shall not reserve a right to assert impact costs, extended job site costs, extended overhead, constructive acceleration and/or actual acceleration beyond what is stated in the Change Order for Work. No claims shall be allowed for impact, extended overhead costs, constructive acceleration and/or actual acceleration due to a multiplicity of changes and/or clarifications. The Contractor may not change or modify the City's change order form in an attempt to reserve additional rights.
10. If the City disagrees with the proposal submitted by Contractor, it will notify the Contractor and the City will provide its opinion of the appropriate price and/or time extension. If the Contractor agrees with the City, a Change Order will be issued by the City. If no agreement can be reached, the City shall have the right to issue a unilateral Change Order setting forth its determination of the reasonable additions or savings in costs and time attributable to the extra or deleted work. Such determination shall become final and binding if the Contractor fails to submit a claim in writing to the City within fifteen (15) Days of the issuance of the unilateral Change Order, disputing the terms of the unilateral Change Order, and providing such supporting documentation for its position as the City may require.

C. Change of Contract Times.

1. The Contract Times may only be changed by a Change Order.



2. All changes in the Contract Price and/or adjustments to the Contract Times related to each change shall be included in Contractor's COR pursuant to this Article. No cost or time will be allowed for cumulative effects of multiple changes. All Change Orders must state that the Contract Time is not changed or is either increased or decreased by a specific number of days. Failure to include a change to time shall waive any change to the time unless the parties mutually agree in writing to postpone a determination of the change to time resulting from the Change Order.
3. Notice of the amount of the request for adjustment in the Contract Times with supporting data shall be delivered within seven (7) Days after such start of occurrence. No extension of time or additional compensation shall be given for a delay if the Contractor failed to give notice in the manner and within the time prescribed.
4. City may elect, at City's sole discretion, to grant an extension in Contract Times, without Contractor's request, because of delays or other factors.
5. Use of Float and Critical Path.
 - a. Float is for the benefit of the Project. Float shall not be considered for the exclusive use or benefit of either the City or the Contractor.
 - b. Any difference in time between the Contractor's early completion and the Contract Time shall be considered a part of the Project float. Contractor shall not be entitled to compensation, and City will not compensate Contractor, for delays which impact early completion.
6. Contractor's entitlement to an extension of the Contract Times is limited to a City-caused extension of the critical path, reduced by the Contractor's concurrent delays, and established by a proper time impact analysis. No time extension shall be allowed unless, and then only to the extent that, the City-caused delay extends the critical path beyond the previously approved Contract Time.
 - a. Contractor shall not be entitled to an adjustment in the Contract Price or Contract Times for delays within the control of Contractor. Delays attributable to and within the control of a Subcontractor or Supplier shall be deemed to be delays within the control of Contractor.
 - b. If Contractor is delayed in the performance or progress of the Work by fire, flood, epidemic, abnormal weather conditions (as determined by the City), Acts of God, acts or failures to act of utility owners not under the control of City, or other causes not the fault of and beyond control of City and Contractor, then Contractor shall be entitled to an time extension when the Work stopped is on the critical path. Such a non-compensable adjustment



shall be Contractor's sole and exclusive remedy for such delays. Contractor must submit a timely request in accordance with the requirements of this Article.

c. Utility-Related Delays.

- i. Contractor shall immediately notify in writing the utility owner and City's Representative of its construction schedule and any subsequent changes in the construction schedule which will affect the time available for protection, removal, or relocation of utilities. Requests for extensions of time arising out of utility relocation or repair delays shall be filed in accordance with this Article.
- ii. Contractor shall not be entitled to damages or additional payment for delays attributable to utility relocations or alterations if correctly located, as noted in the Contract Documents or by the Underground Service Alert survey.

7. Content for Requests for Contract Extension. Contractor's justification for entitlement shall be clear and complete citing specific Contract Document references and reasons on which Contractor's entitlement is based. At a minimum, each request for a time extension must include:

- a. Each request for an extension of Contract Time must identify the impacting event, in narrative form, providing a description of the delay event and sufficient justification as to why the Contractor is entitled to a time extension. Contractor must demonstrate that the delay arises from unforeseeable causes beyond the control and without the fault or negligence of both Contractor and any Subcontractors or Suppliers, or any other persons or organizations employed by any of them or for whose acts any of them may be liable, and that such causes in fact lead to performance or completion of the Work, or specified part in question, beyond the corresponding Contract Times, despite Contractor's reasonable and diligent actions to guard against those effects.
- b. Each request for an extension of Contract Time must include a time impact analysis in CPM format, using the Contemporaneous Impacted As-Planned Schedule Analysis to calculate the impact of the delay event.

8. No Damages for Reasonable Delay.

- a. City's liability to Contractor for delays for which City is responsible shall be limited to only an extension of time unless such delays were unreasonable under the circumstances. In no case shall City be liable for any costs which are borne by the Contractor in the regular course of business, including, but not limited to, home office overhead and other ongoing costs.



- b. Damages caused by unreasonable City delay that impact the critical path, including delays caused by items that are the responsibility of the City pursuant to Government Code section 4215, shall be compensated at the Daily Rate established in the Special Conditions. No other calculations, proportions or formulas shall be used to calculate any delay damages.
 - c. City and City's Representative, and the officers, members, partners, employees, agents, consultants, or subcontractors of each of them, shall not be liable to Contractor for any claims, costs, losses, or damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) sustained by Contractor on or in connection with any other project or anticipated project.
9. Contractor's failure, neglect, or refusal to comply with the requirements of the Contract Documents, or any portion thereof, shall bar Contractor's request for extensions of the Contract Times. Such failure, neglect, or refusal prejudices City's and City's Representative's ability to recognize and mitigate delay, and such failure, neglect, or refusal prevent the timely analysis of requests for extensions of Contract Times, and whether such extensions may be warranted. Contractor hereby waives all rights to extensions of Contract Times due to delays or accelerations that result from or occur during periods of time for which Contractor fails, neglects, or refuses to fully comply with the requirements of this Article.

ARTICLE 83. FINAL ACCEPTANCE AND PAYMENT

- A. The acceptance of the Work on behalf of the City will be made by the Architect. Such acceptance by the City shall not constitute a waiver of defects. When the Work has been accepted there shall be paid to Contractor a sum equal to the contract price less any amounts previously paid Contractor and less any amounts withheld by the City from Contractor under the terms of the contract. The final five percent (5%), or the percentage specified in the notice inviting bids where the City has adopted a finding of substantially complete, shall not become due and payable until five (5) calendar days shall have elapsed after the expiration of the period within which all claims may be filed under the provisions of Civil Code section 9356. If the Contractor has placed securities with the City as described herein, the Contractor shall be paid a sum equal to one hundred percent (100%) of the contract price less any amounts due the City under the terms of the Contract.
- B. Unless Contractor advises the City in writing prior to acceptance of the final five percent (5%) or the percentage specified in the notice inviting bids where the City has adopted a finding of substantially complete, or the return of securities held as described herein, said acceptance shall operate as a release to the City of all claims and all liability to Contractor for all things done or furnished in connection with this work and for every act of negligence of the City and for all other claims relating to or arising out of this work. If Contractor advises the City in writing prior to acceptance of final payment or return of the securities



that there is a dispute regarding the amount due the Contractor, the City may pay the undisputed amount contingent upon the Contractor furnishing a release of all undisputed claims against the City with the disputed claims in stated amounts being specifically excluded by Contractor from the operation of the release. No payments, however, final or otherwise, shall operate to release Contractor or its sureties from the Faithful Performance Bond, Labor and Material Payment Bond, or from any other obligation under this contract.

- C. In case of suspension of the contract any unpaid balance shall be and become the sole and absolute property of the City to the extent necessary to repay the City any excess in the cost of the Work above the contract price.
- D. Final payment shall be made no later than 60 days after the date of acceptance of the Work by the City or the date of occupation, beneficial use and enjoyment of the Work by the City including any operation only for testing, start-up or commissioning accompanied by cessation of labor on the Work, provided that a release of liens and claims has been received from the Contractor pursuant to Civil Code section 8136. In the event of a dispute between the City and the Contractor, the City may withhold from the final payment an amount not to exceed 150% of the disputed amount.

As it relates to the South La Patera Lane work, Contractor shall sign and submit Form CC4 – Final Release Form, with its final payment request.

- E. Within ten (10) calendar days from the time that all or any portion of the retention proceeds are received by Contractor, Contractor shall pay each of its subcontractors from whom retention has been withheld each subcontractor's share of the retention received. However, if a retention payment received by Contractor is specifically designated for a particular subcontractor, payment of the retention shall be made to the designated subcontractor if the payment is consistent with the terms of the subcontract.

ARTICLE 84. OCCUPANCY

The City reserves the right to occupy or utilize any portion of the Work at any time before completion, and such occupancy or use shall not constitute acceptance of any part of Work covered by this Contract. This use shall not relieve the Contractor of its responsibilities under the Contract.

ARTICLE 85. INDEMNIFICATION

To the fullest extent permitted by law, Contractor shall immediately defend (with counsel of the City's choosing), indemnify and hold harmless the City, officials, officers, agents, employees, and representatives, and each of them from and against:

- A. Any and all claims, demands, causes of action, costs, expenses, injuries, losses or liabilities, in law or in equity, of every kind or nature whatsoever, but not limited to, injury to or death, including wrongful death, of any person, and damages to or destruction



of property of any person, arising out of, related to, or in any manner directly or indirectly connected with the Work or this Contract, including claims made by subcontractors for nonpayment, including without limitation the payment of all consequential damages and attorney's fees and other related costs and expenses, however caused, regardless of whether the allegations are false, fraudulent, or groundless, and regardless of any negligence of the City or its officers, employees, or authorized volunteers (including passive negligence), except the sole negligence or willful misconduct or active negligence of the City or its officials, officers, employees, or authorized volunteers.

- B. Contractor's defense and indemnity obligation herein includes, but is not limited to damages, fines, penalties, attorney's fees and costs arising from claims under the Americans with Disabilities Act (ADA) or other federal or state disability access or discrimination laws arising from Contractor's Work during the course of construction of the improvements or after the Work is complete, as the result of defects or negligence in Contractor's construction of the improvements.
- C. Any and all actions, proceedings, damages, costs, expenses, fines, penalties or liabilities, in law or equity, of every kind or nature whatsoever, arising out of, resulting from, or on account of the violation of any governmental law or regulation, compliance with which is the responsibility of Contractor;
- D. Any and all losses, expenses, damages (including damages to the Work itself), attorney's fees, and other costs, including all costs of defense which any of them may incur with respect to the failure, neglect, or refusal of Contractor to faithfully perform the Work and all of Contractor's obligations under the agreement. Such costs, expenses, and damages shall include all costs, including attorney's fees, incurred by the indemnified parties in any lawsuit to which they are a party.

Contractor shall immediately defend, at Contractor's own cost, expense and risk, any and all such aforesaid suits, actions or other legal proceedings of every kind that may be brought or instituted against the City, its officials, officers, agents, employees and representatives. Contractor shall pay and satisfy any judgment, award or decree that may be rendered against the City, its officials, officers, employees, agents, employees and representatives, in any such suit, action or other legal proceeding. Contractor shall reimburse the City, its officials, officers, agents, employees and representatives for any and all legal expenses and costs incurred by each of them in connection therewith or in enforcing the indemnity herein provided. The only limitations on this provision shall be those imposed by Civil Code section 2782.

ARTICLE 86. PROCEDURE FOR RESOLVING DISPUTES

Contractor shall timely comply with all notices and requests for changes to the Contract Time or Contract Price, including but not limited to all requirements of Article 44, Changes and Extra Work, as a prerequisite to filing any claim governed by this Article. The failure to timely submit a notice of delay or notice of change, or to timely request a change to the Contract Price or Contract Time, or to timely provide any other notice or request required herein shall constitute a waiver of the right to further pursue the claim under the Contract or at law.



- A. **Intent.** Effective January 1, 1991, Section 20104 et seq., of the California Public Contract Code prescribes a process utilizing informal conferences, non-binding judicial supervised mediation, and judicial arbitration to resolve disputes on construction claims of \$375,000 or less. Effective January 1, 2017, Section 9204 of the Public Contract Code prescribes a process for negotiation and mediation to resolve disputes on construction claims. The intent of this Article is to implement Sections 20104 et seq. and Section 9204 of the California Public Contract Code. This Article shall be construed to be consistent with said statutes.
- B. **Claims.** For purposes of this Article, “Claim” means a separate demand by the Contractor, after a change order duly requested in accordance with Article 44 “Changes and Extra Work” has been denied by the City, for (A) a time extension, (B) payment of money or damages arising from Work done by or on behalf of the Contractor pursuant to the Contract, or (C) an amount the payment of which is disputed by the City. A “Claim” does not include any demand for payment for which the Contractor has failed to provide notice, request a change order, or otherwise failed to follow any procedures contained in the Contract Documents. Claims governed by this Article may not be filed unless and until the Contractor completes all procedures for giving notice of delay or change and for the requesting of a time extension or change order, including but not necessarily limited to the procedures contained in Article 44, Changes and Extra Work, and Contractor’s request for a change has been denied in whole or in part. Claims governed by this Article must be filed no later than fourteen (14) days after a request for change has been denied in whole or in part or after any other event giving rise to the Claim. The Claim shall be submitted in writing to the City and shall include on its first page the following in 16 point capital font: “THIS IS A CLAIM.” Furthermore, the claim shall include the documents necessary to substantiate the claim. Nothing herein is intended to extend the time limit or supersede notice requirements otherwise provided by contract for the filing of claims, including all requirements pertaining to compensation or payment for extra Work, disputed Work, and/or changed conditions. Failure to follow such contractual requirements shall bar any claims or subsequent lawsuits for compensation or payment thereon.
- C. **Supporting Documentation.** The Contractor shall submit all claims in the following format:
1. Summary of claim merit and price, reference Contract Document provisions pursuant to which the claim is made
 2. List of documents relating to claim:
 - a. Specifications
 - b. Drawings
 - c. Clarifications (Requests for Information)
 - d. Schedules



- e. Other
 3. Chronology of events and correspondence
 4. Analysis of claim merit
 5. Analysis of claim cost
 6. Time impact analysis in CPM format
 7. If Contractor's claim is based in whole or in part on an allegation of errors or omissions in the Drawings or Specifications for the Project, Contractor shall provide a summary of the percentage of the claim subject to design errors or omissions and shall obtain a certificate of merit in support of the claim of design errors and omissions.
 8. Cover letter and certification of validity of the claim, including any claims from subcontractors of any tier, in accordance with Government Code section 12650 *et seq.*
- D. **City's Response.** Upon receipt of a claim pursuant to this Article, City shall conduct a reasonable review of the claim and, within a period not to exceed 45 Days, shall provide the Contractor a written statement identifying what portion of the claim is disputed and what portion is undisputed. Any payment due on an undisputed portion of the claim will be processed and made within 60 Days after the City issues its written statement.
1. If the City needs approval from its governing body to provide the Contractor a written statement identifying the disputed portion and the undisputed portion of the claim, and the City's governing body does not meet within the 45 Days or within the mutually agreed to extension of time following receipt of a claim sent by registered mail or certified mail, return receipt requested, the City shall have up to three Days following the next duly publicly noticed meeting of the City's governing body after the 45-Day period, or extension, expires to provide the Contractor a written statement identifying the disputed portion and the undisputed portion.
 2. Within 30 Days of receipt of a claim, the City may request in writing additional documentation supporting the claim or relating to defenses or claims the City may have against the Contractor. If additional information is thereafter required, it shall be requested and provided pursuant to this subdivision, upon mutual agreement of City and the Contractor. The City's written response to the claim, as further documented, shall be submitted to the Contractor within 30 Days (if the claim is less than \$15,000, within 15 Days) after receipt of the further documentation, or within a period of time no greater than that taken by the Contractor in producing the additional information or requested documentation,



whichever is greater.

- E. **Meet and Confer.** If the Contractor disputes the City's written response, or the City fails to respond within the time prescribed, the Contractor may so notify the City, in writing, either within 15 Days of receipt of the City's response or within 15 Days of the City's failure to respond within the time prescribed, respectively, and demand in writing an informal conference to meet and confer for settlement of the issues in dispute. Upon receipt of a demand, the City shall schedule a meet and confer conference within 30 Days for settlement of the dispute.
- F. **Mediation.** Within 10 business Days following the conclusion of the meet and confer conference, if the claim or any portion of the claim remains in dispute, the City shall provide the Contractor a written statement identifying the portion of the claim that remains in dispute and the portion that is undisputed. Any payment due on an undisputed portion of the claim shall be processed and made within 60 Days after the City issues its written statement. Any disputed portion of the claim, as identified by the Contractor in writing, shall be submitted to nonbinding mediation, with the City and the Contractor sharing the associated costs equally. The City and Contractor shall mutually agree to a mediator within 10 business Days after the disputed portion of the claim has been identified in writing, unless the parties agree to select a mediator at a later time.
1. If the parties cannot agree upon a mediator, each party shall select a mediator and those mediators shall select a qualified neutral third party to mediate with regard to the disputed portion of the claim. Each party shall bear the fees and costs charged by its respective mediator in connection with the selection of the neutral mediator.
 2. For purposes of this section, mediation includes any nonbinding process, including, but not limited to, neutral evaluation or a dispute review board, in which an independent third party or board assists the parties in dispute resolution through negotiation or by issuance of an evaluation. Any mediation utilized shall conform to the timeframes in this section.
 3. Unless otherwise agreed to by the City and the Contractor in writing, the mediation conducted pursuant to this section shall excuse any further obligation under Public Contract Code Section 20104.4 to mediate after litigation has been commenced.
 4. The mediation shall be held no earlier than the date the Contractor completes the Work or the date that the Contractor last performs Work, whichever is earlier. All unresolved claims shall be considered jointly in a single mediation, unless a new unrelated claim arises after mediation is completed.
- G. **Procedures After Mediation.** If following the mediation, the claim or any portion remains in dispute, the Contractor must file a claim pursuant to Chapter 1 (commencing with Section 900) and Chapter 2 (commencing with Section 910) of Part 3 of Division 3.6 of Title 1 of the Government Code prior to initiating litigation. For purposes of those provisions, the running of the period of time within which a claim must be filed shall be



tolled from the time the Contractor submits his or her written claim pursuant to subdivision (a) until the time the claim is denied, including any period of time utilized by the meet and confer conference.

H. **Civil Actions.** The following procedures are established for all civil actions filed to resolve claims of \$375,000 or less:

1. Within 60 Days, but no earlier than 30 Days, following the filing or responsive pleadings, the court shall submit the matter to non-binding mediation unless waived by mutual stipulation of both parties or unless mediation was held prior to commencement of the action in accordance with Public Contract Code section 9204 and the terms of this Contract. The mediation process shall provide for the selection within 15 Days by both parties of a disinterested third person as mediator, shall be commenced within 30 Days of the submittal, and shall be concluded within 15 Days from the commencement of the mediation unless a time requirement is extended upon a good cause showing to the court.

2. If the matter remains in dispute, the case shall be submitted to judicial arbitration pursuant to Chapter 2.5 (commencing with Section 1141.10) of Title 3 of Part 3 of the Code of Civil Procedure, notwithstanding Section 1114.11 of that code. The Civil Discovery Act of 1986 (Article 3 (commencing with Section 2016) of Chapter 3 of Title 3 of Part 4 of the Code of Civil Procedure) shall apply to any proceeding brought under this subdivision consistent with the rules pertaining to judicial arbitration. In addition to Chapter 2.5 (commencing with Section 1141.10) of Title 3 of Part 3 of the Code of Civil Procedure, (A) arbitrators shall, when possible, be experienced in construction law, and (B) any party appealing an arbitration award who does not obtain a more favorable judgment shall, in addition to payment of costs and fees under that chapter, also pay the attorney's fees on appeal of the other party.

I. **Government Code Claims.** In addition to any and all contract requirements pertaining to notices of and requests for compensation or payment for extra Work, disputed Work, construction claims and/or changed conditions, the Contractor must comply with the claim procedures set forth in Government Code Sections 900, et seq. prior to filing any lawsuit against the City. Such Government Code claims and any subsequent lawsuit based upon the Government Code claims shall be limited to those matters that remain unresolved after all procedures pertaining to extra Work, disputed Work, construction claims, and/or changed conditions have been followed by Contractor. If no such Government Code claim is submitted, or if the prerequisite contractual requirements are not satisfied, no action against the City may be filed. **A Government Code claim must be filed no earlier than the date the Work is completed or the date the Contractor last performs Work on the Project, whichever occurs first. A Government Code claim shall be inclusive of all unresolved claims unless a new unrelated claim arises**



after the Government Code claim is submitted

- J. **Non-Waiver.** The City's failure to respond to a claim from the Contractor within the time periods described in this Article or to otherwise meet the time requirements of this Article shall result in the claim being deemed rejected in its entirety.

ARTICLE 87. CITY'S RIGHT TO TERMINATE CONTRACT

A. Termination for Cause by the City:

1. In the sole estimation of the City, if the Contractor refuses or fails to prosecute the Work or any separable part thereof with such diligence as will insure its completion within the time specified by the Contract Documents, or any extension thereof, or fails to complete such Work within such time, or if the Contractor should be adjudged a bankrupt, or if it should make a general assignment for the benefit of its creditors, or if a receiver should be appointed on account of its insolvency, or the Contractor or any of its subcontractors should violate any of the provisions of this Contract, the City may serve written notice upon the Contractor and its Surety of the City's intention to terminate this Contract. This notice of intent to terminate shall contain the reasons for such intention to terminate this Contract, and a statement to the effect that the Contractor's right to perform this Contract shall cease and terminate upon the expiration of ten (10) calendar days unless such violations have ceased and arrangements satisfactory to the City have been made for correction of said violations.
2. In the event that the City serves such written notice of termination upon the Contractor and the Surety, the Surety shall have the right to take over and perform the Contract. If the Surety does not: (1) give the City written notice of Surety's intention to take over and commence performance of the Contract within 15 calendar days of the City's service of said notice of intent to terminate upon Surety; and (2) actually commence performance of the Contract within 30 calendar days of the City's service of said notice upon Surety; then the City may take over the Work and prosecute the same to completion by separate contract or by any other method it may deem advisable for the account and at the expense of the Contractor.
3. In the event that the City elects to obtain an alternative performance of the Contract as specified above: (1) the City may, without liability for so doing, take possession of and utilize in completion of the Work such materials, appliances, plants and other property belonging to the Contractor that are on the site and reasonably necessary for such completion (A special lien to secure the claims of the City in the event of such suspension is hereby created against any property of Contractor taken into the possession of the City under the terms hereof and such lien may be enforced by sale of such property under the direction of the City without notice to Contractor. The proceeds of the sale after deducting all expenses thereof and connected therewith shall be credited to Contractor. If the net credits shall be in



excess of the claims of the City against Contractor, the balance will be paid to Contractor or Contractor's legal representatives.); and (2) Surety shall be liable to the City for any cost or other damage to the City necessitated by the City securing an alternate performance pursuant to this Article.

B. Termination for Convenience by the City:

1. The City may terminate performance of the Work called for by the Contract Documents in whole or, from time to time, in part, if the City determines that a termination is in the City's interest.
2. The Contractor shall terminate all or any part of the Work upon delivery to the Contractor of a Notice of Termination specifying that the termination is for the convenience of the City, the extent of termination, and the Effective Date of such termination.
3. After receipt of Notice of Termination, and except as directed by the City's Representative, the Contractor shall, regardless of any delay in determining or adjusting any amounts due under this Termination for Convenience clause, immediately proceed with the following obligations:
 - a. Stop Work as specified in the Notice.
 - b. Complete any Work specified in the Notice of Termination in a least cost/shortest time manner while still maintaining the quality called for under the Contract Documents.
 - c. Leave the property upon which the Contractor was working and upon which the facility (or facilities) forming the basis of the Contract Document is situated in a safe and sanitary manner such that it does not pose any threat to the public health or safety.
 - d. Terminate all subcontracts to the extent that they relate to the portions of the Work terminated.
 - e. Place no further subcontracts or orders, except as necessary to complete the continued portion of the Contract.
 - f. Submit to the City's Representative, within ten (10) calendar days from the Effective Date of the Notice of Termination, all of the usual documentation called for by the Contract Documents to substantiate all costs incurred by the Contractor for labor, materials and equipment through the Effective Date of the Notice of Termination. Any documentation substantiating costs incurred by the Contractor solely as a result of the City's exercise of its right to terminate this Contract pursuant to this clause, which costs the contractor is



authorized under the Contract documents to incur, shall: (1) be submitted to and received by the Architect no later than 30 calendar days after the Effective Date of the Notice of Termination; (2) describe the costs incurred with particularity; and (3) be conspicuously identified as “Termination Costs occasioned by the City's Termination for Convenience.”

4. Termination of the Contract shall not relieve Surety of its obligation for any just claims arising out of or relating to the Work performed.
5. In the event that the City exercises its right to terminate this Contract pursuant to this clause, the City shall pay the Contractor, upon the Contractor's submission of the documentation required by this clause and other applicable provisions of the Contract Documents, the following amounts:
 - a. All actual reimbursable costs incurred according to the provisions of this Contract.
 - b. A reasonable allowance for profit on the cost of the Work performed, provided Contractor establishes to the satisfaction of the City's Representative that it is reasonably probable that Contractor would have made a profit had the Contract been completed and provided further, that the profit allowed shall in no event exceed fifteen (15%) percent of the costs.
 - c. A reasonable allowance for Contractor's administrative costs in determining the amount payable due to termination of the Contract under this Article.
- C. Notwithstanding any other provision of this Article, when immediate action is necessary to protect life and safety or to reduce significant exposure or liability, the City may immediately order Contractor to cease Work on the Project until such safety or liability issues are addressed to the satisfaction of the City or the Contract is terminated.

ARTICLE 88. WARRANTY AND GUARANTEE OF WORK

- A. Contractor hereby warrants that materials and Work shall be completed in conformance with the Contract Documents and that the materials and Work provided will fulfill the requirements of this Warranty. Contractor hereby agrees to repair or replace, at the discretion of the City, any or all Work that may prove to be defective in its workmanship, materials furnished, methods of installation or fail to conform to the Contract Document requirements together with any other Work which may be damaged or displaced by such defect(s) within a period of one (1) year from the date of the Notice of Completion of the Project without any expense whatever to the City, ordinary wear and tear and unusual abuse and neglect excepted. Contractor shall be required to promptly repair or replace defective equipment or materials, at Contractor's option. All costs associated with such corrective actions and testing, including the removal, replacement, and reinstatement of equipment and materials necessary to gain access, shall be the sole responsibility of the Contractor.



- B. For any Work so corrected, Contractor's obligation hereunder to correct defective Work shall be reinstated for an additional one (1) year period, commencing with the date of acceptance of such corrected Work. The reinstatement of the one (1) year warranty shall apply only to that portion of work that was corrected. Contractor shall perform such tests as City may require to verify that any corrective actions, including, without limitation, redesign, repairs, and replacements comply with the requirements of the Contract. In the event of Contractor's failure to comply with the above-mentioned conditions within ten (10) calendar days after being notified in writing of required repairs, to the reasonable satisfaction of the City, the City shall have the right to correct and replace any defective or non-conforming Work and any work damaged by such work or the replacement or correction thereof at Contractor's sole expense. Contractor shall be obligated to fully reimburse the City for any expenses incurred hereunder immediately upon demand.
- C. In addition to the warranty set forth in this Article, Contractor shall obtain for City all warranties that would be given in normal commercial practice and assign to City any and all manufacturer's or installer's warranties for equipment or materials not manufactured by Contractor and provided as part of the Work, to the extent that such third-party warranties are assignable and extend beyond the warranty period set forth in this Article. Contractor shall furnish the City with all warranty and guarantee documents prior to final Acceptance of the Project by the City as required.
- D. When specifically indicated in the Contract Documents or when directed by the Architect, the City may furnish materials or products to the Contractor for installation. In the event any act or failure to act by Contractor shall cause a warranty applicable to any materials or products purchased by the City for installation by the Contractor to be voided or reduced, Contractor shall indemnify City from and against any cost, expense, or other liability arising therefrom, and shall be responsible to the City for the cost of any repairs, replacement or other costs that would have been covered by the warranty but for such act or failure to act by Contractor.
- E. The Contractor shall remedy at its expense any damage to City-owned or controlled real or personal property.
- F. The City shall notify the Contractor, in writing, within a reasonable time after the discovery of any failure, defect, or damage. The Contractor shall within ten (10) calendar days after being notified commence and perform with due diligence all necessary Work. If the Contractor fails to promptly remedy any defect, or damage; the City shall have the right to replace, repair or otherwise remedy the defect, or damage at the Contractor's expense.
- G. In the event of any emergency constituting an immediate hazard to health, safety, property, or licensees, when caused by Work of the Contractor not in accordance with the Contract requirements, the City may undertake at Contractor's expense, and without prior notice, all Work necessary to correct such condition.



H. Acceptance of Defective Work.

1. If, instead of requiring correction or removal and replacement of Defective Work, the City prefers to accept it, City may do so. Contractor shall pay all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) attributable to City's evaluation of and determination to accept such Defective Work and for the diminished value of the Work.
2. If any acceptance of defective work occurs prior to release of the Project Retention, a Change Order will be issued incorporating the necessary revisions in the Contract Documents with respect to the Work, and City shall be entitled to an appropriate decrease in the Contract Price, reflecting the diminished value of Work and all costs incurred by City.
3. If the Project Retention is held in an escrow account as permitted by the Contract Documents, Contractor will promptly alert the escrow holder, in writing, of the amount of Retention to be paid to City.
4. If the acceptance of Defective Work occurs after release of the Project Retention, an appropriate amount will be paid by Contractor to City.

I. City May Correct Defective Work.

1. If Contractor fails within a reasonable time after written notice from City's Representative to correct Defective Work, or to remove and replace rejected Work as required by City, or if Contractor fails to perform the Work in accordance with the Contract Documents, or if Contractor fails to comply with any other provision of the Contract Documents, City may, after seven (7) Days' written notice to Contractor, correct, or remedy any such deficiency.
2. In connection with such corrective or remedial action, City may exclude Contractor from all or part of the Site, take possession of all or part of the Work and suspend Contractor's services related thereto, take possession of Contractor's tools, appliances, construction equipment and machinery at the Site, and incorporate in the Work all materials and equipment stored at the Site or for which City has paid Contractor but which are stored elsewhere. Contractor shall allow City and City's Representative, and the agents, employees, other contractors, and consultants of each of them, access to the Site to enable City to exercise the rights and remedies to correct the Defective Work.
3. All claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) incurred or sustained by City correcting the Defective Work will be charged against Contractor, and a Change



Order will be issued incorporating the necessary revisions into the Contract Documents with respect to the Work; and City shall be entitled to an appropriate decrease in the Contract Price.

4. Such claims, costs, losses and damages will include, but not be limited to, all costs of repair, or replacement of work of others destroyed or damaged by correction, removal, or replacement of Defective Work.
 5. If the Change Order is executed after all payments under the Contract have been paid by City and the Project Retention is held in an escrow account as permitted by the Contract Documents, Contractor will promptly alert the escrow holder, in writing, of the amount of Retention to be paid to City.
 6. If the Change Order is executed after release of the Project Retention, an appropriate amount will be paid by Contractor to City.
 7. Contractor shall not be allowed an extension of the Contract Times because of any delay in the performance of the Work attributable to City correcting Defective work.
- J. Nothing in the Warranty or in the Contract Documents shall be construed to limit the rights and remedies available to City at law or in equity, including, but not limited to, Code of Civil Procedure section 337.15.

ARTICLE 89. DOCUMENT RETENTION & EXAMINATION

- A. In accordance with Government Code section 8546.7, records of both the City and the Contractor shall be subject to examination and audit by the State Auditor General for a period of three (3) years after final payment.
- B. Contractor shall make available to the City any of the Contractor's other documents related to the Project immediately upon request of the City.
- C. In addition to the State Auditor rights above, the City shall have the right to examine and audit all books, estimates, records, contracts, documents, bid documents, subcontracts, and other data of the Contractor (including computations and projections) related to negotiating, pricing, or performing the modification in order to evaluate the accuracy and completeness of the cost or pricing data at no additional cost to the City, for a period of four (4) years after final payment.

ARTICLE 90. SEPARATE CONTRACTS

- A. The City reserves the right to let other contracts in connection with this Work or on the Project site. Contractor shall permit other contractors reasonable access and storage of their materials and execution of their work and shall properly connect and coordinate its



Work with theirs.

- B. To ensure proper execution of its subsequent Work, Contractor shall immediately inspect work already in place and shall at once report to the Architect any problems with the Work in place or discrepancies with the Contract Documents.
- C. Contractor shall ascertain to its own satisfaction the scope of the Project and nature of any other contracts that have been or may be awarded by the City in prosecution of the Project to the end that Contractor may perform this Contract in the light of such other contracts, if any. Nothing herein contained shall be interpreted as granting to Contractor exclusive occupancy at site of the Project. Contractor shall not cause any unnecessary hindrance or delay to any other contractor working on the Project. If simultaneous execution of any contract for the Project is likely to cause interference with performance of some other contract or contracts, the Architect shall decide which Contractor shall cease Work temporarily and which contractor shall continue or whether work can be coordinated so that contractors may proceed simultaneously. The City shall not be responsible for any damages suffered or for extra costs incurred by Contractor resulting directly or indirectly from award, performance, or attempted performance of any other contract or contracts on the Project site.

ARTICLE 91. NOTICE AND SERVICE THEREOF

All notices shall be in writing and either served by personal delivery or mailed to the other party as designated in the Bid Forms. Written notice to the Contractor shall be addressed to Contractor's principal place of business unless Contractor designates another address in writing for service of notice. Notice to City shall be addressed to the City as designated in the Notice Inviting Bids unless City designates another address in writing for service of notice. Notice shall be effective upon receipt or five (5) calendar days after being sent by first class mail, whichever is earlier. Notice given by facsimile shall not be effective unless acknowledged in writing by the receiving party.

ARTICLE 92. NOTICE OF THIRD-PARTY CLAIMS

Pursuant to Public Contract Code section 9201, the City shall provide the Contractor with timely notification of the receipt of any third-party claims relating to the Contract. The City is entitled to recover reasonable costs incurred in providing such notification.

ARTICLE 93. STATE LICENSE BOARD NOTICE

Contractors are required by law to be licensed and regulated by the Contractors' State License Board which has jurisdiction to investigate complaints against contractors if a complaint regarding a patent act or omission is filed within four (4) years of the date of the alleged violation. A complaint regarding a latent act or omission pertaining to structural defects must be filed within ten (10) years of the date of the alleged violation. Any questions concerning a contractor may be referred to the Registrar, Contractors' State License Board, P.O. Box 26000, Sacramento, California 95826.

ARTICLE 94. INTEGRATION



- A. **Oral Modifications Ineffective.** No oral order, objection, direction, claim or notice by any party or person shall affect or modify any of the terms or obligations contained in the Contract Documents.
- B. **Contract Documents Represent Entire Contract.** The Contract Documents represent the entire agreement of the City and Contractor.

ARTICLE 95. ASSIGNMENT OF CONTRACT

Contractor shall not assign, transfer, convey, sublet or otherwise dispose of the rights or title of interest of any or all of this contract without the prior written consent of the City. Any assignment or change of Contractor's name of legal entity without the written consent of the City shall be void. Any assignment of money due or to become due under this Contract shall be subject to a prior lien for services rendered or Material supplied for performance of Work called for under the Contract Documents in favor of all persons, firms, or corporations rendering such services or supplying such Materials to the extent that claims are filed pursuant to the Civil Code, the Code of Civil Procedure or the Government Code.

ARTICLE 96. CHANGE IN NAME AND NATURE OF CONTRACTOR'S LEGAL ENTITY

Should a change be contemplated in the name or nature of the Contractor's legal entity, the Contractor shall first notify the City in order that proper steps may be taken to have the change reflected on the Contract and all related documents. No change of Contractor's name or nature will affect City's rights under the Contract, including but not limited to the bonds.

ARTICLE 97. ASSIGNMENT OF ANTITRUST ACTIONS

Pursuant to Public Contract Code section 7103.5, in entering into a public works contract or subcontract to supply goods, services, or materials pursuant to a public works contract, Contractor or subcontractor offers and agrees to assign to the City all rights, title, and interest in and to all causes of action it may have under Section 4 of the Clayton Act (15 USC, Section 15) or under the Cartwright Act (Chapter 2 (commencing with Section 16700) of Part 2 of Division 7 of the Business and Professions Code), arising from the purchase of goods, services, or materials pursuant to this contract or any subcontract. This assignment shall be made and become effective at the time the City tenders final payment to the Contractor, without further acknowledgment by the parties.

ARTICLE 98. PROHIBITED INTERESTS

No City official or representative who is authorized in such capacity and on behalf of the City to negotiate, supervise, make, accept, or approve, or to take part in negotiating, supervising, making, accepting or approving any engineering, inspection, construction or material supply contract or any subcontract in connection with construction of the project, shall be or become directly or indirectly interested financially in the Contract.

ARTICLE 99. CONTROLLING LAW



Notwithstanding any subcontract or other contract with any subcontractor, supplier, or other person or organization performing any part of the Work, this Contract shall be governed by the law of the State of California excluding any choice of law provisions.

ARTICLE 100. JURISDICTION; VENUE

Contractor and any subcontractor, supplier, or other person or organization performing any part of the Work agrees that any action or suits at law or in equity arising out of or related to the bidding, award, or performance of the Work shall be maintained in the Superior Court of Santa Barbara County, California, and expressly consent to the jurisdiction of said court, regardless of residence or domicile, and agree that said court shall be a proper venue for any such action.

ARTICLE 101. LAWS AND REGULATIONS

- A. Contractor shall give all notices and comply with all laws, ordinances, rules and regulations bearing on conduct of work as indicated and specified. If Contractor observes that drawings and specifications are at variance therewith, it shall promptly notify the Architect in writing and any necessary changes shall be adjusted as provided for in this Contract for changes in work. If Contractor performs any work knowing it to be contrary to such laws, ordinances, rules and regulations, and without such notice to the Architect, it shall bear all costs arising therefrom.
- B. Contractor shall be responsible for familiarity with the Americans with Disabilities Act (“ADA”) (42 U.S.C. § 12101 et seq.). The Work will be performed in compliance with ADA regulations.

ARTICLE 102. PATENTS

Contractor shall hold and save the City, officials, officers, employees, and authorized volunteers harmless from liability of any nature or kind of claim therefrom including costs and expenses for or on account of any patented or unpatented invention, article or appliance manufactured, furnished or used by Contractor in the performance of this contract.

ARTICLE 103. OWNERSHIP OF CONTRACT DOCUMENTS

All Contract Documents furnished by the City are City property. They are not to be used by Contractor or any subcontractor on other work nor shall Contractor claim any right to such documents. With exception of one complete set of Contract Documents, all documents shall be returned to the City on request at completion of the Work.

ARTICLE 104. NOTICE OF TAXABLE POSSESSORY INTEREST

In accordance with Revenue and Taxation Code section 107.6, the Contract Documents may create a possessory interest subject to personal property taxation for which Contractor will be responsible.



ARTICLE 105. SURVIVAL OF OBLIGATIONS

All representations, indemnifications, warranties, and guarantees made in, required by, or given in accordance with the Contract Documents, as well as all continuing obligations indicated in the Contract Documents, will survive final payment, completion, and acceptance of the Work or termination or completion of the Contract or termination of the services of Contractor.

END OF GENERAL CONDITION – 00 7213



SECTION 00 73 13

SPECIAL CONDITIONS

1.1 Architect of Record.

- A. For purposes of this Project, the Architect of Record or Architect for Anil Verma and Associates, is Anil Verma, FAIA.

1.2 Location of the Project.

- A. The Project is located at 27 South La Patera Lane, Goleta CA 93117.

1.3 Status of the Project Area and Rights-of-Way.

- A. City, at its expense, will provide all rights-of-way or permits, or both, covering the crossing of private property and public and private rights-of-way necessary for the permanent Work; provided, however, Contractor shall, at its expense, obtain any bonds or insurance policies or pay any fees and enter into any agreements required by a controlling authority, *e.g.*, Caltrans or Union Pacific Railroad Company, AMTRAK before Contractor enters upon any property or right-of-way under the jurisdiction of any such controlling authority for the purpose of performing Work.
- B. City has acquired or is negotiating to acquire any rights-of-way, or both, necessary for the permanent Work.
- C. If such permits are required, all operations of Contractor shall conform to the restrictions, regulations, and requirements set forth in said permits, copies of which will be included in the Contract Documents.
- D. Contractor may be required, as a condition for receiving final payment, to obtain, and provide City's Representative with copies of, executed damage releases from the owners of public and private property whose property has been damaged by the Work. The damage releases will be on a form provided by City.
- E. Contractor shall, also, as a condition for receiving final payment, obtain, and provide City's Representative with copies of, executed damage releases from the owners of certain public and private property or areas which have been crossed by the Work or otherwise affected by the Work. The damage releases will be on a form provided by City.

1.4 Site Data.

- A. The data provided herein is for the information of Contractor and is subject to all limitations and conditions set forth in the Contract Documents.
 - 1. Subsurface Exploration Data. The following data are included in EXHIBITS B & G.
- B. Other Site Data. The following data are included within the additional EXHIBITS.



1.5 Designation of City's Representative.

- A. Unless otherwise modified by City, City's Representative shall be Jaime Valdez, Neighborhood Services Director.

1.6 Modification of Hours of Work.

Pursuant to Chapter 17.39 of the Goleta Municipal Code, construction hours are limited to 8:00 a.m. to 5:00 p.m. Monday through Friday. CONTRACTOR may request a modification to construction hours from the City.

1.7 Project Retention

In accordance with Public Contract Code § 7201, City will withhold 5% of each progress payment as retention on the Project.

1.8 Reverse Liquidated Damages Due to Unreasonable City Delay.

- A. In compliance with the provisions of California Public Contract Code § 7102, the Contractor will be compensated for damages incurred due to delays in completing the Work due solely to the fault of the City, where such delay is unreasonable under the circumstances and not contemplated by the parties and such delay is not the result of Additional Work. The Contractor and City agree that determining actual damages is impracticable and extremely difficult. As such, the Contractor shall be entitled to the appropriate time extension and to payment of liquidated damages in the sum of \$1,200 per Day of delay in excess of the time specified for the Completion of the Work. Such amount shall constitute the only payment allowed and shall necessarily include all overhead (direct or indirect), all profit, all administrative costs, all bond costs, all labor, materials, equipment and rental costs, and any other costs, expenses and fees incurred or sustained as a result of such delay. The Contractor expressly agrees to be limited solely to the liquidated damages for all such delays as defined in this subsection.

1.9 Liquidated Damages Due to Contractor Delay.

- A. Time is of the essence. Should Contractor fail to complete all or any part of the Work within the time specified IN THE Contract Documents, City will suffer damage, the amount of which is difficult, if not impossible, to ascertain and, pursuant to the authority of Government Code section 53069.85, City shall therefore be entitled to **\$3,000 per Day** as liquidated damages for each Day or part thereof that actual completion extends beyond the time specified.
- B. Liquidated damages may be deducted from progress payments due Contractor, Project retention or may be collected directly from Contractor, or from Contractor's surety. These provisions for liquidated damages shall not prevent City, in case of Contractor's default, from terminating the Contractor.



1.10 Utility Outages – Notices to Residents.

- A. Should Contractor’s operations require interruption of any utility service, Contractor shall notify City at least ten (10) Days prior to the scheduled outage. Contractor will notify all impacted residents on a form provided by City at least seven (7) Days prior to the scheduled outage.
- B. Contractor shall be responsible for providing, at its cost, any temporary utility or facilities necessitated by the utility outage.

1.11 Schedule Constraints.

- A. The access ways to the east and west of the site are used daily by AMTRAK customers, Union Pacific Railroad personnel, and AMTRAK personnel, accessing and departing from the existing AMTRAK platform and associated maintenance facilities. **CONTRACTOR must maintain safe ingress and egress to the site for these many users.**
- B. City has considered these Schedule Constraints when determining the Contract Times and no additional time or compensation will be added to the Contract due to these Constraints.

1.12 Noise Restrictions

- A. Contractor shall comply with noise restrictions set forth in Chapter 17.39 of the Goleta Municipal Code.
- B. Contractor shall use only such equipment on the Work and in such state of repair so that the emission of sound therefrom is within the noise tolerance level of that equipment as established by Cal/OSHA.
- C. Contractor shall comply with the most restrictive of the following: (1) local sound control and noise level rules, regulations and ordinances and (2) the requirements contained in these Contract Documents, including hours of operation requirements
- D. No internal combustion engine shall be operated on the Project without a muffler of the type recommended by the manufacturer. Should any muffler or other control device sustain damage or be determined to be ineffective or defective, the Contractor shall promptly remove the equipment and shall not return said equipment to the job until the device is repaired or replaced. Said noise and vibration level requirements shall apply to all equipment on the job or related to the job, including but not limited to, trucks, transit mixers or transit equipment that may or may not be owned by the Contractor.

1.13 Safety Programs.

[NOT USED.]



1.14 Coordination with Other Contractors.

NOT USED.

END OF SPECIAL CONDITIONS – 00 7313

LIST OF EXHIBITS ATTACHED

- EXHIBIT “A” Change Order Forms
- EXHIBIT “B” Geotechnical Exploration Report prepared by ENGEO dated March 23, 2020
- EXHIBIT “C” Storm Water Pollution Prevention Program (SWPPP) prepared by ENGEO dated October 26, 2023
- EXHIBIT “D” Water Pollution Control Plan (WPCP) prepared by ENGEO dated December 11, 2023
- EXHIBIT “E” Contractor Insurance Requirements for UPRR and for AMTRAK
- EXHIBIT “F” Easement Agreement (Amtrak at Lumberyard) dated August 18, 2009 and Goleta MOU Agreement with Amtrak dated July 22, 2009.
- EXHIBIT “G” Limited Phase II Investigation Work Plan prepared by All Phase Environmental, Inc. dated December 19, 2023
- EXHIBIT “H” Limited Phase II Investigation prepared by All Phase Environmental, Inc. dated December 9, 2023
- EXHIBIT “I” Asbestos Survey and Hazardous Material Inspection Report prepared by All Phase Environmental, Inc. dated December 6, 2023
- EXHIBIT “J” Lead-Based Paint Survey Report prepared by All Phase Environmental, Inc. dated December 11, 2023
- EXHIBIT “K” Amtrak Encroachment Exhibit prepared by RailPros dated January, 2024
- EXHIBIT “L” Environmental Impact Report (EIR) for Train Depot and Categorical Exemption (CE) for South La Patera Lane Improvements
- EXHIBIT “M” Concrete Pavement Preservation Recommendations for Goleta Transit Center
- EXHIBIT “N” Substitution Request Form



Department of Neighborhood Services and Public Safety
GOLETA TRAIN DEPOT PROJECT

EXHIBIT A

CHANGE ORDER FORMS

CHANGE ORDER FORM

City of Goleta

*130 Cremona Dr # B, Goleta, CA
93117*

Contract Change Order #

Project:	Change Order No.:
Contract No.:	Orig. Contract Amt.: \$ _____ Days
Contractor:	Prev. Approved. Changes: \$ _____ Days
Owner: City of Goleta	This Change: \$ _____ Days
	Revised Contract Amt.: \$ _____ Days

This Change Order covers changes to the subject contract as described herein. The Contractor shall construct, furnish equipment and materials, and perform all work as necessary or required to complete the Change Order items for a lump sum price agreed upon between the Contractor and City of Goleta, otherwise referred to as Owner.

Item No.	Description of Changes	Increase/ (Decrease) in Contract Amount	Contract Time Extension, Calendar Days
1			
2			
	Totals	\$	

This Contract Change Order consists of **2 pages** and any exhibits attached to this Contract Change Order shall not be part of the Contract Change Order unless specifically initiated by or on behalf of both the Contractor and the City of Goleta.

Contract Change Order # _____ Page 1 of 2

The amount of the contract will be increased by the sum of \$ _____ and the contract time shall be extended by ___ calendar days. The undersigned Contractor approves the foregoing Change Order # ___ as to the changes, if any, in the contract price specified for each item including any and all supervision costs and other miscellaneous costs relating to the change in work, and as to the extension of time allowed, if any, for completion of the entire work on account of said Change Order # _____. The Contractor agrees to furnish all labor and materials and perform all other necessary work, inclusive of the directly or indirectly related to the approved time extension, required to complete the Change order items. This document will become a supplement of the contract and all provisions will apply hereto. It is understood that the Change Order shall be effective when approved by the Owner.

Contractor accepts the terms and conditions stated above as full and final settlement of any and all claims arising out of or related to the subject of this Change Order and acknowledges that the compensation (time and cost) set forth herein comprises the total compensation due for the work or change defined in the Change Order, including all impact on any unchanged work. By signing this Change Order, the Contractor acknowledges and agrees that the stipulated compensation includes payment for all Work contained in the Change Order, plus all payment for any acceleration or interruption of schedules, extended overhead costs, delay, and all impact or cumulative impact on all Work under this Contract. The signing of this Change Order acknowledges full mutual accord and satisfaction for the change and that the stated time and/or cost constitute the total equitable adjustment owed the Contractor as a result of the change. The Contractor hereby releases and agrees to waive all rights, without exception or reservation of any kind whatsoever, to file any further claim or request for equitable adjustment of any type, for any reasonably foreseeable cause that shall arise out of, or as a result of, this Change Order and/or its impact on the remainder of the Work under the Contract.

Accepted:

(Signature) Contractor's Authorized Representative

_____ Date

Recommended: _____

(Signature) Construction Manager

_____ Date

Approved: _____

(Signature) City Project Manager

_____ Date

Approved: _____

(Signature), Jaime Valdez, Neighborhood Services Director

_____ Date

Item No.	Justification for Change(s)
1	
2	

This Contract Change Order consists of **2 pages** and any exhibits attached to this Contract Change Order shall not be part of the Contract Change Order unless specifically initialed by or on behalf of both the Contractor and the City of Goleta.
Contract Change Order #

CITY OF GOLETA, CA
 Neighborhood Services Department
 Construction Contract
Form CC1 (South La Patera Lane Work Only) - Progress Payment Request

From: _____ Date: _____
 Contractor _____ Contract No.: _____
 _____ Payment Request No.: _____
 Address _____

To: CITY OF GOLETA Project Name:
 130 Cremona Drive, Suite B Goleta,
 California 93117

Original Contract Amount:	\$
Approved Change Orders through #: _____	\$
Quantity Changes:	\$
(Requires Project Architect verification)	
Total Contract Amount to Date:	\$

Value of Work Completed to Date:	\$
Less Retention:	\$
Less Liquidated Damages:	\$
Subtotal:	\$
Less Previous Payments Approved:	\$
Progress Payment Requested:	\$

The undersigned Contractor or Contractor's Authorized Representative certifies that to the best of his or her knowledge, information and belief, the work covered in this application for payment has been completed in accordance with the contract documents and the costs shown are true and correct.

Signature _____

 Title

Print Name _____

 Date

CITY OF GOLETA, CA
Neighborhood Services Department

Construction Contract
Form CC2 (South La Patera Lane Work Only) - Progress

Payment Request - Detail

Date: _____ Payment Request No: _____ Contract No.: _____

Contractor: _____

Project Name: _____

ITEM NO.	DESCRIPTION	UNIT	BID QUANTITY	UNIT/FIRM PRICE	INPLACE THIS PERIOD		INPLACE TOTAL	
					QTY. OR %	EXTN.	QTY. OR %	EXTN.
1								
2								
3								
4								
5								
6								
7								
8								
9								
10								
11								
12								
13								
14								
15								
16								
17								

Contractor Signature

Date

Inspector Signature

Date

CITY OF GOLETA, CA

Form CC3 (South La Patera Lane Work Only) - Quantity Change Verification Form

Date:

Contract No.:

Contractor:

Project Name:

INSTRUCTIONS

This form is to accompany progress payments where there is quantity changes (variations in quantities authorized as part of the progress or final payment.

The quantity changes in amount of \$_____ accompanying Progress Payment #_____ have been reviewed and actual quantities verified.

Project Architect Signature

Date

Bid Item #	Item Description	Variance	Total

ATTACH ADDITIONAL SHEETS IF NECESSARY

Contractor Signature

Inspector Signature

Date

Date

CITY OF GOLETA, CA
Construction Contract
Form CC4 (South La Patera Lane Only) - Final Release Payment

From: _____
Contractor

Address

Date: _____
Contract No. _____
Payment Request No. _____

Project Name:

To: CITY OF GOLETA, CA
130 Cremona Drive, Suite B
Goleta, California 93117

Upon settlement of final quantities and approval of a Notice of Completion for the project by the Goleta City Council, including any approved changes, this document shall be effective to release any and all further rights of the Contractor to security for payment, including any worker's, mechanic's or material supplier's lien, stop notice claim or right to bond that the undersigned may have for the work furnished for the project. This document is offered as evidence for settlement of final payment and to induce the City Council to approve such final payment for Contractor in connection with the PROJECT NAME. This release covers the final payment to the undersigned for all labor, services, equipment and material furnished on the job, including the work of all subcontractors and all materials furnished for all suppliers, and other agents acting on behalf of the undersigned on this work. There are no disputed claims for additional work.

Contractor Signature:

Print Name:

Title:

Date:

NOTICE: A signed final release is required with submittal of request for payment.

Post-Construction Waste Reduction & Recycling Summary Report

Diversion Requirement: Reduce quantity of materials disposed at landfills by 65% or more.

- Column A: List estimated quantities of waste for each material type (in tons). To convert material quantities to tons, use the Materials Conversion Worksheet provided in your packet.
- Columns B, C, D: List estimated quantities reused, recycled, or disposed.
- Column E: State the name of all vendors or facilities to be used to reuse, recycle or dispose of material listed. See example below for cases where more than one facility will be used for a particular material type.
- Column Totals: Add up all quantities listed in Column A. Do the same for Columns B, C and D.

Waste Reduction & Recycling Summary REPORT (WRRS Report)

Material Handling Methods - Indicate quantities (in tons only) for each material listed.					
Material Type	<u>A</u> Total Tons Generated (A=B+C+D)	<u>B</u> Quantity Salvaged or Reused	<u>C</u> Recycling	<u>D</u> Estimated Disposal	<u>E</u> Anticipated Material Destination(s) (R): Recycled; (D): Disposal
Example: Cardboard	2 tons		1.5	.5	(R) MarBorg (D) Tajiguas Landfill
Asphalt & Concrete					
Brick/Masonry/Tile					
Building Materials (doors, windows, fixtures, etc.)					
Carpet					
Carpet padding/Foam					
Cardboard					
Ceiling tile (acoustic)					
Dirt					
Drywall (used)					
Drywall (new, unpainted sheets or scrap)					
Landscape Debris (brush, trees, stumps, etc.)					
Scrap metal					
Unpainted Wood and Pallets					
Garbage/Trash					
Other					
Recycled mixed debris					
Column Totals					

1. To determine if the required 65% project waste reduction will be met, complete the following with the column totals: $B \text{ _____} + C \text{ _____} \div A \text{ _____} = \text{_____} \times 100 = \text{_____} \%$

2. Is the percentage listed in #7 greater than or equal to 65%? YES NO - If "NO" please explain why:

3. Print Name: _____ Signature: _____ Date: ____/____/____

ACKNOWLEDGEMENT OF FINAL CLOSEOUT AND RELEASE OF CLAIMS

THIS ACKNOWLEDGEMENT OF FINAL CLOSEOUT AND RELEASE OF CLAIMS

(Acknowledgement) is made in Goleta, California, this _____ day of _____, _____, by and between the City of Goleta, (Owner), and _____ (Contractor).

KNOW ALL PERSONS BY THESE PRESENTS:

1. That the undersigned, as the authorized representative of Contractor, and for each of its successors, **a s s i g n s** and partners, for and in consideration of _____ (\$ _____), for the original Contract amount, and the sum of _____ (\$ _____) for Contract Change Orders Nos.(1) through _____ (____), receipt of which is acknowledged, does release and forever discharge Owner, and each of its successors, assigns, council members, officers, agents, servants, volunteers and employees, from any and all rights, claims, causes of action, demands, debts, obligations, liabilities, actions, damages, costs and expenses (including but not limited to attorneys', paralegal and experts' fees, costs and expenses) and other claims, which may be asserted against Owner by reason of any matter or thing which was the subject matter of or basis for:
 - A. The performance of all terms and conditions of the Public Works Contract agreement dated _____, for Owner project described as GOLETA TRAIN DEPOT PROJECT(CIP NO. 9079)
 - B. Change Orders Nos. one (1) through _____ (____), as approved by the parties, pertaining to Purchase Order No. _____
2. Nothing contained in this Acknowledgement shall waive or alter the rights, privileges, and powers of Owner or the duties, liabilities and obligations of Contractor and its surety(ies) in respect to any portion of the Contract.
3. Owner has received the following claims from Contractor _____. cept as expressly provided in this section, Owner has received no other claims from Contractor.
4. Upon execution of this Acknowledgement, Owner agrees to promptly initiate the process for City Council to approve the Notice of Completion (NOC) and record the NOC with the Santa Barbara County Recorder.
5. Contractor and Owner agree that the total adjusted Contract Price and time of performance after the execution of change orders, is as follows:

Original Contract Price	\$ _____
Original Calendar Days	_____ days

Adjusted Contract Price with Change Orders	\$ _____
Adjusted Calendar Days	_____ days
Final Contract Price Per Actual Work Completed	\$ _____
Final Retention Amount	\$ _____

6. The retention will be released to Contractor within thirty-five (35) days after acceptance of the work by the City Council and the filing of a Notice of Completion.
7. It is understood and agreed by Contractor that the facts with respect to which the release provided pursuant to this Acknowledgement is given may turn out to be other than or different from the facts as now known or believed to be, and Contractor expressly assumes the risk of the facts turning out to be different than they now appear, and agrees that the release provided pursuant to this Acknowledgement shall be, in all respects, effective and not subject to termination or rescission by any such difference in facts and Contractor expressly waives any and all rights it has or may have under California Civil Code Section 1542, which provides as follows:

"A general release does not extend to claims which the creditor does not know or suspect to exist in his favor at the time of executing the Release which if known by him must have materially affected his settlement with the debtor."
8. The release made by Contractor is not to be construed as an admission or admissions of liability and Contractor denies any such liability. Contractor agrees that it will forever refrain and forebear from commencing, instituting or prosecuting any lawsuit, action or other proceeding against Owner based on, arising out of, or in any way connected with the subject matter of this release.
9. Except as specifically provided in this Acknowledgement, the Contractor releases Owner from all claims, including but not limited to those of its Subcontractors for all delay and impact costs, if any.
10. The Contractor represents and warrants to Owner that Contractor has not assigned or transferred or purported to assign or transfer to any person, firm, corporation, association or entity any of the rights, claims, warranties, demands, debts, obligations, liabilities, actions, causes of action, damages, costs, expenses and other claims and Contractor agrees to indemnify and hold harmless Owner, its successors, assigns, council members, officers, agents, servants, volunteers and employees, from and against, without limitation, any and all rights, claims, warranties, demands, debts, obligations, liabilities, actions, causes of action, damages, costs, expenses and other claims, including but not limited to attorneys', paralegal and experts' fees, costs and expenses arising out of or connected with any such assignment or transfer or purported assignment or transfer.
11. The parties acknowledge that they have been represented by counsel of their own choice in connection with the preparation and execution of this Acknowledgement. The parties acknowledge and represent that they understand and voluntarily consent and agree to each and every provision contained in this Acknowledgement.

- 12. The persons executing this Acknowledgement represent and warrant to the other party that the execution and performance of the terms of this Acknowledgement have been duly authorized by all individual, corporate, partnership, or other entity requirements and that such persons have the right, power, legal capacity and authority to execute and enter into this Acknowledgement.
- 13. The parties further acknowledge and represent that no promise, inducement or agreement, not expressed in this Acknowledgement, have been made and that, with respect to the matters considered, this Acknowledgement contains the entire agreement among the parties and that the terms of the Acknowledgement are contractual and not a mere recital.

CITY OF GOLETA

CONTRACTOR

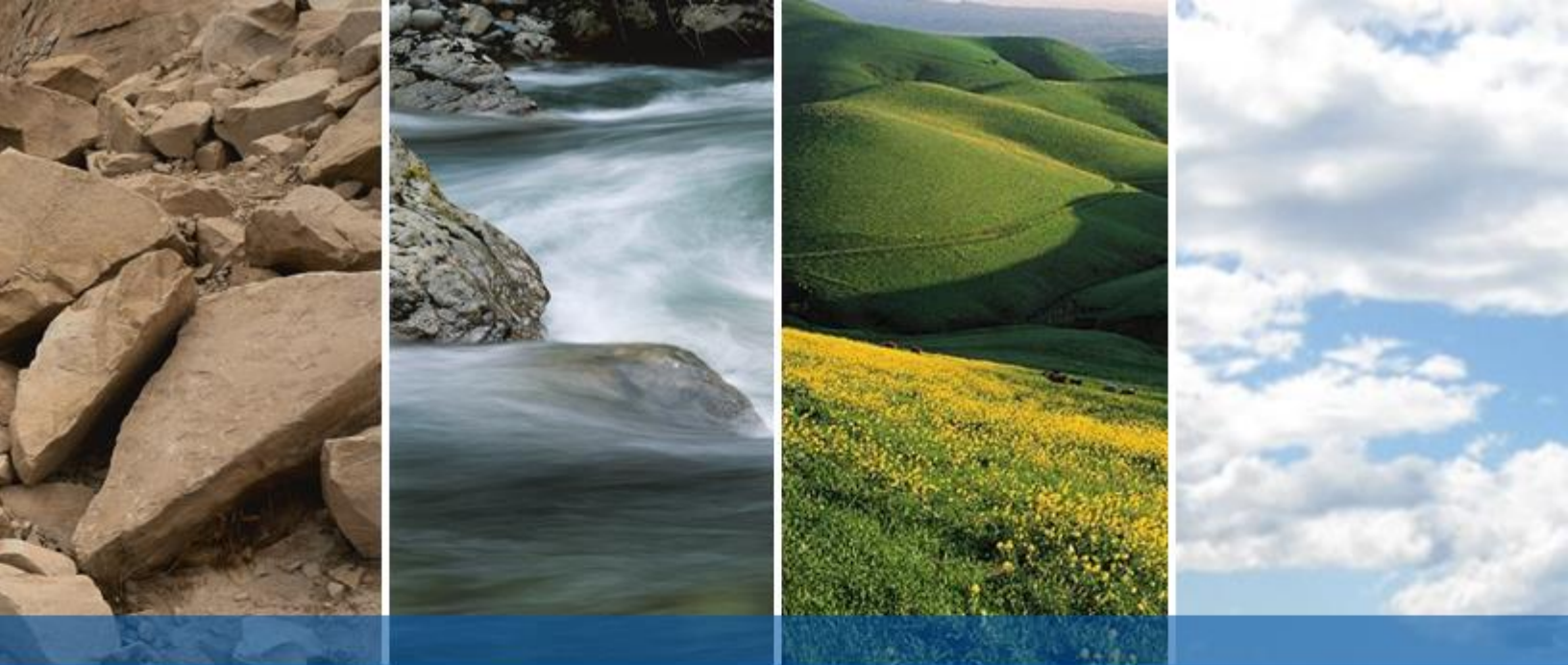
By/Title

Date By/Title Date

EXHIBIT B

GEOTECHNICAL EXPLORATION REPORT

PREPARED BY ENGEO, INC.



GOLETA TRAIN DEPOT PROJECT GOLETA, CALIFORNIA

GEOTECHNICAL EXPLORATION

SUBMITTED TO
Jim Keenan
Anil Verma Associates, Inc.
444 South Flower Street
Suite 1688
Los Angeles, CA 90071

PREPARED BY
ENGEO Incorporated

March 23, 2020

PROJECT NO.
16370.000.000

EXHIBIT "B" (Geotechnical Exploration)

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ENGEO
— Expect Excellence —

Project No.
16370.000.000

March 23, 2020

Mr. Jim Keenan
Anil Verma Associates, Inc.
444 South Flower Street, Suite 1688
Los Angeles, CA 90071

Subject: Goleta Train Depot Project
La Patera Lane
Goleta, California

GEOTECHNICAL EXPLORATION

Dear Mr. Keenan:

ENGEO prepared this geotechnical report for the Goleta Train Depot Project as outlined in our agreement dated June 19, 2019. We characterized the subsurface conditions at the site to provide the enclosed geotechnical recommendations for design.

Our experience and that of our profession clearly indicate that the risk of costly design, construction, and maintenance problems can be significantly lowered by retaining the design geotechnical engineering firm to review the project plans and specifications and provide geotechnical observation and testing services during construction. Please let us know when working drawings are nearing completion, and we will be glad to discuss these additional services with you.

If you have any questions or comments regarding this report, please call and we will be glad to discuss them with you.

Sincerely,

ENGEO Incorporated



Randy Hildebrant, GE
rh/rhb/dt



Robert H. Boeche, CEG

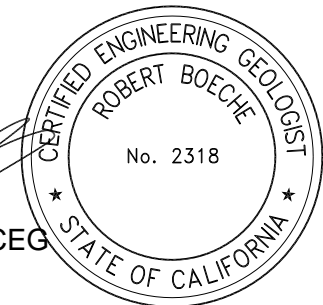


EXHIBIT "B" (Geotechnical Exploration)

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APPENDIX C – Percolation Test Data

EXHIBIT "B" (Geotechnical Exploration)

1.0 INTRODUCTION

1.1 PURPOSE AND SCOPE

ENGEO prepared this geotechnical report for design of a train depot in Goleta, California. We prepared this report as outlined in our agreement dated June 19, 2019. Anil Verma Associates, Inc. authorized ENGEO to conduct the following scope of services.

- Site reconnaissance, review of available geologic maps, and review of available on-line or in-house aerial photographs and historical topographs.
- Drilling five auger borings at accessible areas of the site to a maximum depth of 50 feet and four percolation test holes.
- Sampling and laboratory testing of select samples.
- Data analysis and conclusions.
- Report preparation.

For our use, we received the Request for Proposal for Professional Design Services for The Goleta Train Depot Project dated January 17, 2019, by the City of Goleta.

This report was prepared for the exclusive use of our client and their consultants for design of this project. In the event that any changes are made in the character, design, or layout of the development, we must be contacted to review the conclusions and recommendations contained in this report to evaluate whether modifications are recommended. This document may not be reproduced in whole or in part by any means whatsoever, nor may it be quoted or excerpted without our express written consent.

EXHIBIT 1.1-1



EXHIBIT "B" (Geotechnical Exploration)

1.2 PROJECT LOCATION

Figure 1 displays a Vicinity Map. The proposed Train Depot site is located at 27 South La Patera Lane, in Goleta, California. The project also consists of improvement for South La Patera Lane from the train station and extending south to Hollister Avenue.

Figure 2 shows site boundaries and our exploratory locations. The site is bordered on the north by land owned by Union Pacific Railroad, which includes the existing train station platform. The lot south of the proposed train station depot site includes multiple buildings and their associated parking lots. The train depot site is bonded by an existing warehouse to the west and South La Patera Lane to the east. Improvements are also proposed for South La Patera Lane from the existing train station extending to Hollister Avenue.

Currently, a warehouse, loading platforms, and parking lots occupy the property. The warehouse occupies roughly half the train depot project area and is located in the northern middle of the project area. There is an approximately 4-foot grade change from exterior grades to the top of the loading platforms. Existing fuel tanks associated with an onsite power generator are located adjacent to the southwest corner of the existing warehouse and the approximate location is noted on Figure 2.

EXHIBIT 1.2-1



1.3 PROJECT DESCRIPTION

Based on our discussions with you and review of the information provided, we understand that the following site improvements are proposed:

1. Earthwork is assumed to be composed only of minor grading.

2. Demolition of the existing warehouse and construction of an 8,000-square-foot single-story train depot of light-framed construction.
3. Paved access ways and parking.
4. Utilities and other infrastructure improvements such as improvements to the north end of South La Patera Lane.
5. Concrete flatwork.
6. Post-construction stormwater treatment.

The depot building and parking will be located on land owned by the City of Goleta, located immediately adjacent to the existing platform. The train depot building will include a lobby, ticketing area, waiting room, café, community room, restrooms/shower/changing facilities, bike storage, and baggage lockers. The proposed project will not be modifying the existing platform and it is assumed new improvements will be outside of Railroad Right-of-Way. The project will also include access improvements along South La Patera Lane between Hollister Avenue and the proposed depot.

2.0 FINDINGS

2.1 SITE HISTORY

We reviewed available historical aerial photographs on www.historicaerials.com. The 1947 photograph shows the project site covered with orchards. The 1953 photograph shows the project site cleared of the orchards with the existing warehouse structure shown in the 1967 photograph.

2.2 GEOLOGY AND SEISMICITY

2.2.1 Geology

According to the United States Geologic Survey (USGS) (Minor et al. 2007, Figure 3), the train depot project area and the majority of South La Patera Lane is mapped as an area with upper Pleistocene-aged intermediate alluvial deposits consisting of weakly consolidated, stratified silt, sand, and gravel that form low, rounded, moderately dissected terraces and piedmont alluvial fans that rest at higher elevations compared to the younger than the younger Holocene- and upper Pleistocene-aged coastal piedmont alluvium and colluvium at lower elevations. The area near the intersection of South La Patera Lane with Hollister Avenue is mapped as Holocene- and upper Pleistocene-aged alluvium and colluvium consisting of poorly consolidated silt, sand, and gravel deposits of modern drainages and piedmont alluvial fans and floodplains.

2.2.2 Seismicity

The Santa Barbara County area contains numerous active earthquake faults. An active fault is defined by the State Mining and Geology Board as one that has had surface displacement within Holocene time (about the last 11,000 years) (Bryant and Hart, 2007).

EXHIBIT "B" (Geotechnical Exploration)

The site is not located within a currently designated Alquist-Priolo Earthquake Fault Zone and no known surface expression of active faults is believed to exist within the site. Fault rupture through the site, therefore, is not anticipated.

The site does lie within a seismically active region. According to a search using the 2008 National Seismic Hazard Maps spatial search feature, the nearest active fault is the Mission Ridge-Arroyo Parida-Santa Ana fault, which is mapped approximately 0.6 mile from the site. This fault is considered capable of a moment magnitude earthquake of 6.9. Other active faults in the region are summarized in the table below.

TABLE 2.2.2-1: Active Faults Capable of Producing Significant Ground Shaking at the Site

FAULT NAME	DISTANCE FROM SITE (MILES)	MAXIMUM MOMENT MAGNITUDE
Mission Ridge-Arroyo Parida-Santa Ana	0.6	6.9
Red Mountain	4.0	7.4
North Channel	6.2	6.8
Pitas Point Connected	7.0	7.3
Santa Ynez Connected	7.8	7.4
Oak Ridge Connected	15.8	7.4

The regional seismicity of the Central California Coast was recently evaluated by the Working Group on Southern California / Los Angeles Region. Their UCERF3 model estimates a greater increase in the likelihood of larger earthquakes in the region compared to most of California, because the region has more faults that can host multi-fault ruptures. The UCERF3 model concurs with previous studies that consider the Southern San Andreas Fault, located approximately 43 miles northeast of the site, the most likely to host a large earthquake.

According to UCERF2 & 3, the 30-year probability for a Magnitude 6.7 or greater earthquake along the Mission Ridge-Arroyo Parida-Santa Ana, Subsection 1, nearest to the site, is 0.30%. The 30-year probability for a Magnitude 6.7 or greater earthquake on the Red Mountain Fault, Subsection 6, is 2.84% and 3.20% on Subsection 5 of that same fault. Estimates for the Pitas Point fault is about 1.1%. Santa Ynez Fault Zone Subsection 13 estimates are about 1.76 % and 2.34% for the Oak Ridge fault (Onshore), Subsection 0. UCERF3 shows the Channel Islands Western Deep Ramp fault, Subsection 0, located 11.4 miles south of the site, with a 0.47% probability of a >6.7M earthquake within the next 30 years.

Based on the historic seismicity, the proximity of known active faults, and the estimated earthquake probabilities for the Central California area as a whole, it should be expected that the site will experience strong seismic ground shaking during the lifetime of the proposed improvements. The ground shaking hazard levels at the site are similar to those for most of the Central Coast.

2.3 FIELD EXPLORATION

Our field exploration included an initial hand auger exploration and placement of a shallow piezometer, drilling five borings, and performing four percolation tests. We performed our field exploration between August 12 and August 14, 2019, and completed the preliminary hand auger on July 1, 2019. The deepest boring terminated at 51½ feet below the ground surface.

EXHIBIT "B" (Geotechnical Exploration)

The location and elevations of our explorations are approximate and were estimated by pacing from features shown on Figure 2; they should be considered accurate only to the degree implied by the method used.

2.3.1 Hand Auger

We performed a hand auger boring near the intersection of South La Patera Lane and Hollister Avenue to a maximum depth of 13½ feet below the ground surface. Following the boring, we placed a PVC pipe with perforations in the lower approximately 2 feet and backfilled the annulus with pea gravel. The location of the hand auger boring is shown on Figure 2 and the boring log is included in Appendix A.

2.3.2 Borings

We observed drilling of five borings at the locations shown on the Site Plan, Figure 2. An ENGEO Engineer observed the drilling and logged the subsurface conditions at each location. We retained a CME 75 – Rubber Track Mounted Drill Rig and crew to advance the borings using 8-inch-diameter hollow-stem auger methods. The borings were advanced to depths ranging from 11½ to 51½ feet below existing grade.

We obtained bulk soil samples from drill cuttings and retrieved disturbed soil samples at various intervals in the borings using both a Standard Penetration Test split spoon sampler and 3-inch outer diameter (O.D.) split-spoon sampler outfitter with 2.5-inch diameter stainless steel liners.

The blow counts were obtained by using a 140-pound auto-hammer with a 30-inch free fall. The samplers were driven 18 inches and the number of blows were recorded for each 6 inches of penetration. Unless otherwise indicated, the blows per foot recorded on the boring log represent the accumulated number of blows to drive the last 1 foot of penetration; the blow counts have not been converted using any correction factors. When sampler driving was difficult, penetration was recorded only as inches penetrated for 50 hammer blows. We used the field logs to develop the boring logs presented in Appendix A.

The boring logs graphically depict the subsurface conditions encountered at the time of exploration, and describe the soil type, color, consistency, and visual classification in general accordance with the United Soil Classification System (USCS). Subsurface conditions at other locations may differ from conditions occurring at these boring locations, and the passage of time may result in altered subsurface conditions. In addition, stratification lines represent the approximate boundaries between soil types, and the transitions may be gradual.

EXHIBIT "B" (Geotechnical Exploration)

PHOTO 2.3.2-1: Boring Inside Existing Warehouse



2.3.3 Percolation Tests

Percolation testing was performed using the borehole method as generally described in The Guidelines for Geotechnical Investigation and Reporting Low Impact Development Stormwater Infiltration dated June 30, 2017, by the County of Los Angeles Department of Public Works Geotechnical and Materials Engineering Division. Percolation Test Holes P1 through P3 were drilled with a 6-inch solid-stem auger while Percolation Test Hole P4 was drilled with an 8-inch hollow-stem auger. All locations were generally performed to an approximate depth of 4½ feet. The bottom 1 to 2 inches was covered with pea gravel, a 4-inch perforated pipe was inserted, and annulus filled with 1-inch minus river rock. All test locations were filled with water to the ground surface a minimum of the day prior to running the test to obtain a near saturated condition. Prior to running the test procedure, water was either added or removed to provide the initial 12 inches of water, measured from the top of the pea gravel. The water level was measured in frequent intervals over the course of 8 hours with a final measurement taken the following day prior to backfilling of the test holes. A bulk soil sample was collected from the upper 1 to 3 feet of Test P2. Other percolation test locations were adjacent to boring locations.

2.4 SURFACE CONDITIONS

The train depot project site is generally level with a loading ramp located in the northeastern portion. The existing warehouse covers roughly half the project site with either asphalt pavement or concrete covering the remaining surface with small landscape areas near South La Patera Lane. The existing warehouse floor elevation is up to about 4 feet higher than surrounding grade to accommodate loading without a ramp in the northwestern portion. There is about a 20-foot

elevation differential between the train depot location and the intersection of South La Patera Lane and Hollister Avenue. As noted previously, underground fuel tanks are located adjacent to the southwest corner of the warehouse. Area drains are also located throughout the hardscape area.

PHOTO 2.4-1: East Side of Train Station Depot Site



PHOTO 2.4-2: West Side of Train Station Depot Site



EXHIBIT "B" (Geotechnical Exploration)

PHOTO 2.4-3: South La Patera Lane at Hollister Avenue



2.5 SUBSURFACE CONDITIONS

The borings generally encountered an upper layer of stiff to hard sandy lean clay, which ranged between 8 and 14 feet in thickness. The Plasticity Index ranged between 2 and 21, indicating a low to medium shrink/swell potential. Underlying the clay, the borings encountered varying layers of clayey sand, silty sand, silt, and lean clay. Sandy layers ranged from medium dense to very dense and clayey layers were stiff to hard. Borings 1-B2 and 1-B3 encountered a hard lean clay layer with marine shells at depths of approximately 38 feet and 35 feet respectively. Underlying the existing warehouse, Boring 1-B3 encountered approximately 5 feet of hard lean clay fill with Plasticity Indices ranging between 8 and 31, indicating high variability of the fill and a low to high shrink/swell potential.

Consult the Site Plan and exploration logs for specific subsurface conditions at each location. We include our exploration logs in Appendix A. The logs contain the soil type, color, consistency, and visual classification in general accordance with the Unified Soil Classification System. The logs graphically depict the subsurface conditions encountered at the time of the exploration.

2.6 GROUNDWATER CONDITIONS

We observed static groundwater in two of our subsurface explorations. Groundwater was encountered at 20 feet below the ground surface at boring 1-B5 and 30 feet below the ground surface at Boring 1-B2. Boring 1-B5 is located nearly 1,500 feet from the train depot project site

Fluctuations in the level of groundwater may occur due to variations in rainfall, irrigation practice, and other factors not evident at the time measurements were made.

2.7 LABORATORY TESTING

Select samples recovered during drilling activities were tested to determine various soil characteristics:

TABLE 2.7-1: Laboratory Testing

CHARACTERISTIC	TEST METHOD
Natural Moisture Content	ASTM D2216
Plasticity Index	ASTM D4318
Hydrometer	ASTM D422
Particle Size Distribution	ASTM D1140
Unconfined Compression	ASTM D2166
R-Value	CTM-301

Moisture contents, dry densities, plasticity indices, and fines contents are recorded on the boring logs in Appendix A; other laboratory data and individual test results are included in Appendix B.

3.0 CONCLUSIONS

From a geotechnical engineering viewpoint, in our opinion, the site is suitable for the proposed development, provided the geotechnical recommendations in this report are properly incorporated into the design plans, specifications, and construction. The primary geotechnical concerns that could affect development on the site is expansive soils and strong ground shaking. We summarize our conclusions below.

3.1 EXPANSIVE SOILS

We observed potentially expansive lean clay near the surface of the site in Borings 1-B2, 1-B3, and 1-B4, which may exhibit low to high shrink/swell potential with variations in moisture content.

Expansive soils change in volume with changes in moisture. They can shrink or swell and cause heaving and cracking of slabs-on-grade, pavements, and structures founded on shallow foundations. Building damage due to volume changes associated with expansive soils can be reduced by: (1) using a rigid mat foundation that is designed to resist the settlement and heave of expansive soil, (2) deepening the foundations to below the zone of moisture fluctuation, i.e. by using deep footings or drilled piers, and/or (3) using footings at normal shallow depths but bottomed on a layer of select fill having a low expansion potential.

Successful performance of structures on expansive soils requires special attention during construction. It is imperative that exposed soils be kept moist prior to placement of concrete for foundation construction. It can be difficult to remoisturize clayey soils without excavation, moisture conditioning, and recompaction.

We have also provided specific grading recommendations for compaction of clay soil at the site. The purpose of these recommendations is to reduce the swell potential of the clay by compacting the soil at a high moisture content and controlling the amount of compaction. The effects of expansive soil may be reduced with proper foundation design and construction.

EXHIBIT B (Geotechnical Exploration)

3.2 EXISTING FILL

Our borings indicate that portions of the site are underlain by existing fill. It is unclear what level of moisture conditioning or compaction was performed on the fill without proper documentation.

Without proper documentation of existing fill placed on the site, we recommend complete removal and recompaction of the existing fill. We present fill removal recommendations in Section 5.1.

3.3 SEISMIC HAZARDS

Potential seismic hazards resulting from a nearby moderate to major earthquake can generally be classified as primary and secondary. The primary effect is ground rupture, also called surface faulting. The common secondary seismic hazards include ground shaking, and ground lurching. The following sections present a discussion of these hazards as they apply to the site. Based on topographic and lithologic data, the risk of regional subsidence or uplift, landslides, and seiches is considered low to negligible at the site.

3.3.1 Ground Rupture

Since there are no known active faults crossing the property and the site is not located within an Earthquake Fault Special Study Zone, it is our opinion that ground rupture is unlikely at the subject property.

3.3.2 Ground Shaking

An earthquake of moderate to high magnitude generated within the Santa Barbara region could cause considerable ground shaking at the site, similar to that which has occurred in the past. To mitigate the shaking effects, structures should be designed using sound engineering judgment and the most recent California Building Code (CBC) requirements, as a minimum. Seismic design provisions of current building codes generally prescribe minimum lateral forces, applied statically to the structure, combined with the gravity forces of dead-and-live loads. The code-prescribed lateral forces are generally considered to be substantially smaller than the comparable forces that would be associated with a major earthquake. Therefore, structures should be able to: (1) resist minor earthquakes without damage, (2) resist moderate earthquakes without structural damage but with some nonstructural damage, and (3) resist major earthquakes without collapse but with some structural as well as nonstructural damage. Conformance to the current building code recommendations does not constitute any kind of guarantee that significant structural damage would not occur in the event of a maximum magnitude earthquake; however, it is reasonable to expect that a well-designed and well-constructed structure will not collapse or cause loss of life in a major earthquake (SEAOC, 1996).

3.3.3 Liquefaction

Seismically induced soil liquefaction is a process by which soil undergoes a significant loss of strength due to cyclic loading and corresponding increase in pore water pressure. The effects of liquefaction can be a drastic decrease in soil shear strength, vertical settlement, lateral spreading and ground surface disruptions. Soils most susceptible to liquefaction are clean, loose, saturated, uniformly graded fine sands below the groundwater table. Empirical evidence and laboratory testing indicates that loose to medium dense gravels, silty sands, low-plasticity silts, and some low-plasticity clays are also potentially liquefiable.

We performed a liquefaction potential analysis of blow count to estimate liquefaction potential using the procedure introduced by the 1996 National Center for Earthquake Engineering Research (NCEER) workshop and the 1998 NCEER/National Science Foundation (NSF) workshop. The workshops are summarized by Youd et al. (2001). The Cyclic Stress Ratio (CSR) was estimated from the PGA_M of 1.11g. The Magnitude Scaling Factor (MSF) was estimated for a mean Moment Magnitude of 7.4. The results indicate that a silty sand layer located below the groundwater level in Boring 1-B3 is potentially liquefiable.

3.3.4 Seismically Induced Settlement Analyses

Seismically induced settlement can be generally subdivided into two categories for granular soils, settlement as a result of liquefaction of saturated or nearly saturated soils and dynamic densification of non-saturated soils. We have included recommendations for mitigation of seismic settlement in our Foundation Recommendations.

3.3.4.1 Liquefaction-Induced Settlement

Deformation of the ground surface is a common result of liquefaction. Vertical settlement may result from densification of the deposit or volume loss from venting to the ground surface. Densification occurs as excess pore pressures dissipate, resulting as vertical settlement at the ground surface. In addition to the above analysis, we also evaluated the capping effect of any overlying non-liquefiable soils. In order for liquefaction-induced ground failure to occur, the pore water pressure generated within the liquefied strata must exert a sufficient enough force to break through the overlying soil and vent to the surface resulting in sand boils or fissures.

In 1985, Ishihara presented preliminary empirical criteria to assess the potential for ground surface disruption at liquefiable sites based on the relationship between thickness of liquefiable sediments and thickness of overlying non-liquefiable soil. A more recent study by Youd and Garris (1995) expanded on the work of Ishihara to include data from over 308 exploratory borings, 15 different earthquakes, and several ranges of recorded peak ground acceleration.

Based on the above studies and thickness of liquefiable material, it appears there is a sufficient cap of non-liquefiable material to reduce the risk of surface venting.

We calculated potential liquefaction-induced settlement estimate using Ishihara and Yoshimine (1992). We estimate the total liquefaction-induced settlement based on Boring 1-B3 to be less than 1 inch.

3.3.4.2 Dynamic Densification

Densification of loose granular soil above the water table can cause settlement of the ground surface due to earthquake-induced vibrations. Sands encountered above the assumed groundwater level at the site medium dense to dense. We estimate that these deposits may settle up to about $\frac{1}{3}$ inch in Boring 1-B2 using the procedure by Tokimatsu and Seed (1984/1987).

3.3.5 Lateral Spreading

Lateral spreading is a failure within weaker soil material, such as lurching or liquefaction, which causes the soil to move toward a free face or down a slope. Due to relatively level topography and distance to free faces, it is our opinion that the risk of lateral spreading is low.

3.3.6 Ground Lurching

Ground lurching is a result of the rolling motion imparted to the ground surface during energy released by an earthquake. Such rolling motion can cause ground cracks to form in weaker soils. The potential for the formation of these cracks is considered greater at contacts between deep alluvium and bedrock. Such an occurrence is possible at the site as in other locations in the Santa Barbara region, but based on the site location, it is our opinion that the offset is expected to be minor. We provide recommendations for foundation and pavement design in this report that are intended to reduce the potential for adverse impacts from lurch cracking.

3.3.7 Flooding and Tsunamis

The Civil Engineer should review pertinent information relating to possible flood levels for the subject site based on final pad elevations and provide appropriate design measures for development of the project, if recommended.

3.4 STATIC AND PERCHED GROUNDWATER

It does not appear that the static groundwater level beneath the site is likely to affect the proposed development. However, perched water can:

1. Impede grading activities.
2. Cause moisture damage to sensitive floor coverings.
3. Transmit moisture vapor through slabs causing excessive mold/mildew build-up, fogging of windows, and damage to computers and other sensitive equipment.
4. Cause premature pavement failure if hydrostatic pressures build up beneath the section.

We provide recommendations to reduce the effects of perched water in subsequent sections including the use of vapor retarders and cut-off curbs.

3.5 SOIL CORROSION POTENTIAL

As part of this study, we obtained representative soil samples from both the project site and the borrow site and submitted to a qualified analytical lab for determination of pH, resistivity, sulfate, and chloride. The results are included in Appendix B and summarized in the table below.

TABLE 3.5-1: Corrosion Potential Test Results

SAMPLE NUMBER AND DEPTH	REDOX POTENTIAL (mV)	pH	RESISTIVITY (ohms-cm)	CHLORIDE CONCENTRATION (mg/kg)	SULFATE CONCENTRATION (mg/kg)
1-B2 @ 1-3'	180	8.85	1,900	N.D.	30
1-B3 @ 1-3'	200	7.87	1,400	N.D.	43
1-B4 @ 1-3'	210	7.71	4,400	N.D.	25

According to Cerco Analytical, based upon the resistivity measurements, 1-B2 @ 1-3' and 1-B3 @ 1-3' are classified as "corrosive" and 1-B4 @ 1-3' is classified as "moderately corrosive." All buried iron, steel, cast iron, ductile iron, galvanized steel, and dielectric coated steel or iron should be properly protected against corrosion.

The chloride ion concentrations were reported as none detected with a reporting limit of 15 mg/kg.

The sulfate ion concentrations are determined to be insufficient to damage reinforced concrete structures and cement mortar-coated steel at these locations.

The pH of the soils ranged from 7.71 and 8.85 and does not present corrosion problems for buried iron, steel, mortar-coated steel, and reinforced concrete structures.

The redox potential of 1-B2 @ 1-3' is indicative of potentially "moderately corrosive" soils and the remaining samples are indicative of potentially "slightly corrosive" soils resulting from anaerobic soil conditions.

Considering a 'Not Applicable' sulfate exposure according to ACI 318, a minimum concrete compressive strength of 2,500 psi is specified by the building code. It should be noted, however, that the structural engineering design requirements for concrete may result in more stringent concrete specifications. We recommend using a maximum water-to-cement ratio of 0.50 to reduce vapor intrusion. If desired to investigate further, we recommend consultation with a corrosion engineer.

3.6 NATURALLY OCCURRING RADON GAS

Radon is a radioactive gas formed by the decay of small amounts of uranium and thorium naturally present in rock and soil. Sometimes radon gas can move from underlying soil and rock into houses and become concentrated in indoor air. According to research performed by the California Geological Survey (CGS) (Churchill, 2008) high radon potential areas relate to a group of Monterey Formation geologic units and portions of adjacent alluvial units that have a Monterey Formation component. In Santa Barbara and Ventura counties, Rincon Shale was identified as a radon prone geologic unit (Churchill, 1997). The CGS has mapped the project area as an area overlain by soil and rock was not encountered in any of our exploration locations, therefore, the potential for naturally occurring radon gas is low.

4.0 CONSTRUCTION MONITORING

Our experience and that of our profession clearly indicate that the risk of costly design, construction, and maintenance problems can be significantly lowered by retaining the design geotechnical engineering firm to:

1. Review the final grading, improvement, and foundation plans and specifications prior to construction to evaluate whether our recommendations have been implemented, and to provide additional or modified recommendations, as needed. This also allows us to check if any changes have occurred in the nature, design or location of the proposed improvements and provides the opportunity to prepare a written response with updated recommendations.
2. Perform construction monitoring to check the validity of the assumptions we made to prepare this report. Earthwork operations should be performed under the observation of our representative to check that the site is properly prepared, the selected fill materials are satisfactory, and that placement and compaction of the fills has been performed in accordance with our recommendations and the project specifications. Sufficient notification to us prior to earthwork is important.

EXHIBIT "B" (Geotechnical Exploration)

If we are not retained to perform the services described above, then we are not responsible for any party's interpretation of our report (and subsequent addenda, letters, and verbal discussions).

5.0 EARTHWORK RECOMMENDATIONS

As used in this report, relative compaction refers to the in-place dry unit weight of soil expressed as a percentage of the maximum dry unit weight of the same soil, as determined by the ASTM D1557 laboratory compaction test procedure, latest edition. Compacted soil is not acceptable if it is unstable; it should exhibit only minimal flexing or pumping, as observed by an ENGEO representative. The term "moisture condition" refers to adjusting the moisture content of the soil by either drying if too wet or adding water if too dry.

We define "structural areas" as any area sensitive to settlement of compacted soil. These areas include, but are not limited to building pads, sidewalks, pavement areas, and retaining walls.

5.1 EXISTING FILL REMOVAL

In the area of the proposed building structure, remove existing fill to competent native soil, as evaluated by an ENGEO representative. The lateral extent and depth of fill is expected to vary. Fill should be more prominent underlying the existing warehouse structure and is estimated to be up to about 5 feet in thickness. Removed material may be reused as engineered fill if it meets the recommendations of Section 5.4; however, due to the relative shrink/swell potential compared to the native site material, we do not recommend the existing fill be placed within the envelope of the proposed train station depot building if conventional footings with slab-on-grade is utilized for the foundation type. Fill may remain in place in areas outside the proposed building if the fill, as observed by ENGEO, appears firm and meets the recommendations of Section 5.4.

5.2 GENERAL SITE CLEARING

Areas to be developed should be cleared of surface and subsurface deleterious materials, including existing building foundations, slabs, buried tanks, utility and irrigation lines, pavements, debris, and designated trees, shrubs, and associated roots. Clean and backfill excavations extending below the planned finished site grades with suitable material compacted to the recommendations presented in Section 5.6. Retain ENGEO to observe and test backfilling.

5.3 OVER-OPTIMUM SOIL MOISTURE CONDITIONS

The contractor should anticipate encountering excessively over-optimum (wet) soil moisture conditions during winter or spring grading, or during or following periods of rain. Wet soil can make proper compaction difficult or impossible. Wet soil conditions can be mitigated by:

1. Frequent spreading and mixing during warm dry weather.
2. Mixing with drier materials.
3. Mixing with a lime, lime-flash, or cement product; or
4. Stabilizing with aggregate, geotextile stabilization fabric, or both.

Options 3 and 4 should be evaluated by ENGEO prior to implementation.

EXHIBIT "B" (Geotechnical Exploration)

5.4 ACCEPTABLE FILL

Onsite soil material is suitable as fill material provided it is processed to remove concentrations of organic material, debris, and particles greater than 4 inches in maximum dimension.

Imported fill materials should meet the above requirements and have a plasticity index less than 12. Allow ENGEO to sample and test proposed imported fill materials at least 5 days prior to delivery to the site.

5.5 REUSE OF ONSITE RECYCLED MATERIALS

If desired to reuse asphaltic or Portland Cement concrete as engineered fill, we recommend that it be ground up and thoroughly mixed with onsite or import soil. In general, recycled asphalt or concrete should be ground down to less than 4 inches in greatest dimension, with no more than 25 percent larger than 2½ inches. Recycled material should be thoroughly mixed with a sufficient amount of soil, such that there is no more than 40 percent by weight of recycled material in the final mix.

We recommend that fill containing recycled asphalt and concrete be placed near the bottom of the proposed basement fills and/or spread out evenly across the site. Recycled fill should not be used within 2 feet of finished grade in building or roadway areas.

If proper equipment is used and quality control standards implemented, recycled material may be used as Class 2 Aggregate Subbase or Base if laboratory testing shows it meets Caltrans specifications for the material.

5.6 FILL COMPACTION

5.6.1 Grading in Structural Areas

The exposed non-yielding surface to receive fill or improvements should be scarified to a depth of 8 inches, moisture conditioned, and recompacted to provide adequate bonding with the initial lift of fill. Fill should be placed in loose lifts lift thickness not exceeding 8 inches.

We provide the following compaction recommendations:

TABLE 5.6.1-1: Compaction Recommendations

FILL DEPTH FROM PROPOSED FINISH GRADE	MINIMUM PERCENTAGE POINTS OVER OPTIMUM MOISTURE CONTENT	RELATIVE COMPACTION
Onsite soil	3	90% min.
Non-expansive building pad fill	0	95% min.
Pavement Subgrade (upper 12 inches)	2	95% min.
Non-expansive trench backfill	0	90% min.
Caltrans Class 2 AB (sidewalk, pavement, curb, and gutter)	0	95% min

Relative compaction refers to in-place dry density of the fill material expressed as a percentage of the maximum dry density (as determined by ASTM D-1557). Optimum moisture is the moisture content corresponding to the maximum dry density.

5.6.2 Underground Utility Backfill

The contractor is responsible for conducting all trenching and shoring in accordance with CALOSHA requirements. Project consultants involved in utility design should specify pipe-bedding materials. Trench backfill should be compacted in accordance with the recommendations provided in Section 5.6.1. In general, we do not recommend the use of rock backfill with little to no fines. ENGEO should be consulted prior to use.

Where utility trenches cross underneath buildings, we recommend that a plug be placed within the trench backfill to help prevent the normally granular bedding materials from acting as a conduit for water to enter beneath the building. The plug should be constructed using a sand cement slurry (minimum 28-day compressive strength of 500 psi) or relatively impermeable native soil for pipe bedding and backfill. We recommend that the plug extend for a distance of at least 3 feet in each direction from the point where the utility enters the building perimeter.

Jetting of backfill is not an acceptable means of compaction. We may allow thicker loose lift thicknesses based on acceptable density test results, where increased effort is applied to rocky fill or for the first lift of fill over pipe bedding.

5.7 SITE DRAINAGE

5.7.1 Surface Drainage

The project civil engineer is responsible for designing surface drainage improvements. With regard to geotechnical engineering issues, we recommend that finish grades be sloped away from buildings and pavements to the maximum extent practical to reduce the potentially damaging effects of expansive soil. The latest California Building Code Section 1804.4 specifies minimum slopes of 5 percent away from foundations. Where property boundaries or surface improvements restrict meeting this slope requirement, we recommend that specific drainage requirements be developed. As a minimum, we recommend the following:

1. Discharge roof downspouts into closed conduits and direct away from foundations to appropriate drainage devices.
2. Do not allow water to pond near foundations, pavements, or exterior flatwork.

5.8 STORMWATER INFILTRATION

We performed percolation testing on August 14, 2019. Generally, percolation rates are very low, less than 2¼ inches over an 8-hour period. A final measurement was taken the morning of August 15, 2019 prior to backfilling the holes with cement grout. This is further supported by the density and stiffness of the site soils and fines content (percentage passing the No. 200 sieve) generally exceeding 30 percent. Percolation test results are included in Appendix C. In some of the test locations, the readings show an increase in water level within the borehole with time. We speculate that due to the very low percolation rate and removing water to establish 12 inches of water for a starting point, water seeped into the borehole from the wetted sidewalls. Therefore, the following percolation rates were calculated from the final reading a day after the initial start of the test. No correction factors have been applied to the below percolation rates.

EXHIBIT "B" (Geotechnical Exploration)

TABLE 5.8-1: Percolation Rates

TEST LOCATION	SOIL	PERCOLATION RATE
P-1	Sandy Lean Clay	1,490 min/in
P-2	Sandy Lean Clay	945 min/in
P-3	Sandy Silt	446 min/in
P-4	Sandy Lean Clay	390 min/in

In accordance with the Stormwater Technical Guide for Low Impact Development, Compliance with Stormwater Post-Construction Requirements in Santa Barbara County dated February 18, 2014, onsite testing information is used to generally justify using an infiltration rate of 0.5 in/hr (120 min/in) or greater. Therefore, Best Management Practices should assume that negligible stormwater infiltration will occur at the site.

6.0 FOUNDATION RECOMMENDATIONS

We developed foundation recommendations using data obtained from our field exploration, laboratory test results, and engineering analysis. As previously mentioned, foundations should be appropriate to reduce the effects of expansive soil. We recommend three foundation types.

- Post-tensioned mat slab.
- Conventionally reinforced mat slab.
- Conventional footings with interconnected grade-beams, slab-on-grade, and non-expansive pad cap.

6.1 POST-TENSIONED MAT SLAB

The proposed train station depot building may be supported on post-tensioned (PT) mat foundations bearing on prepared native soil or engineered fill.

The Structural Engineer should determine the actual PT mat thickness using the geotechnical recommendations in this report; we defer to the professional judgment of the Structural Engineer on the necessary mat thickness. ENGEO should be retained to review the PT mat foundation design. We recommend that the thickened edge be at least 12 inches wide.

The PT mat may be designed for an average allowable bearing pressure of up to 1,000 pounds per square foot (psf) for dead-plus-live loads with maximum localized bearing pressures of 1,500 psf at column or wall loads. Allowable bearing pressures can be increased by one-third for wind or seismic loads. Design PT mats using the criteria presented in Table 6.1-1.

TABLE 6.1-1: Post-Tensioned Mat Design Recommendations

CONDITION	CENTER LIFT	EDGE LIFT
Edge Moisture Variation Distance, e_m (feet)	7.7	4.1
Differential Soil Movement, y_m (inches)	0.5	1.2

The above values are based on the procedure presented by the Post-Tensioning Institute “Design of Post-Tensioned Slabs-on-Ground” Third Edition, including appropriate addenda (2004) or “Standard Requirements for Design and Analysis of Shallow Post-Tensioned Concrete Foundations on Expansive Soils” (PTI DC 10.5-12).

Underlay PT mats with a moisture reduction system as recommended below. In addition, moisture conditioning of the building foundation subgrade should be to a moisture content at least five percentage points above optimum immediately prior to foundation construction. The subgrade should not be allowed to dry prior to concrete placement. We also recommend that ENGEO be retained to observe the pre-pour moisture conditions to check that our report recommendations have been followed.

6.1.1 Additional Settlement Requirements

We recommend that PT mats designed in accordance with the above recommendations be checked for a differential settlement of ½ inch over a distance of 30 feet for the non-collapse seismic case.

6.1.2 Slab Moisture Vapor Reduction

When buildings are constructed with concrete slab-on-grade, such as post-tensioned mats, water vapor from beneath the slab will migrate through the slab and into the building. This water vapor can be reduced but not stopped. Vapor transmission can negatively affect floor coverings and lead to increased moisture within a building. When water vapor migrating through the slab would be undesirable, we recommend the following to reduce, but not stop, water vapor transmission upward through the slab-on-grade.

1. Install a vapor retarder membrane directly beneath the slab. Seal the vapor retarder at all seams and pipe penetrations. Vapor retarders shall conform to Class A vapor retarder in accordance with ASTM E 1745, latest edition, "Standard Specification for Plastic Water Vapor Retarders used in Contact with Soil or Granular Fill under Concrete Slabs."
2. Concrete shall have a concrete water-cement ratio of no more than 0.50.
3. Provide inspection and testing during concrete placement to check that the proper concrete and water cement ratio are used.
4. Moist cure slabs for a minimum of 3 days or use other equivalent curing specific by the structural engineer.

The structural engineer should be consulted as to the use of a layer of clean sand or pea gravel (less than 5 percent passing the U.S. Standard No. 200 Sieve) placed on top of the vapor retarder membrane to assist in concrete curing.

6.2 CONVENTIONALLY REINFORCED MAT SLAB

The structure may, alternatively, be supported on conventionally reinforced mat foundation. We recommend the mat be designed to cantilever 6 feet at the perimeter and free span interior areas for a distance of 20 feet. The PT mat may be designed for an average allowable bearing pressure of up to 1,000 pounds per square foot (psf) for dead-plus-live loads with maximum localized bearing pressures of 1,500 psf at column or wall loads. These values may be increased by one-third when considering transient loads, such as wind or seismic. Provided the site earthwork is conducted in accordance with the recommendations of this report, a subgrade modulus of 100 psi/in can be used for structural slab design.

The foundation system should be designed to accommodate the settlement recommended in Section 6.1.1.

Vapor transmission through the mat should be reduced by implementing the recommendations in Section 6.1.2.

6.3 CONVENTIONAL FOOTINGS WITH SLAB-ON-GRADE

The proposed train depot can also be supported on continuous or isolated spread footings bearing in competent native soil or compacted fill in combination with non-expansive material supporting the slab-on-grade. Isolated footings should be structurally connected with grade-beams in at least two orthogonal horizontal directions to increase rigidity of the foundation system.

Due to the expansion potential of the near-surface soil, we recommend that interior floor slabs be supported on non-expansive fill to reduce the likelihood of slab damage from heave or shrinkage. For a conventional interior slab, we recommend a minimum 24 inches of non-expansive fill. The non-expansive fill should extend a minimum of five feet beyond the building envelope. The non-expansive fill should have a PI of 12 or less, have sufficient fines, and low corrosion potential for the foundation concrete. A sample of non-expansive fill should be provided to ENGEO a minimum of 5 days prior to delivering to the project site.

6.3.1 Footing Dimensions and Allowable Bearing Capacity

Provide minimum footing dimensions as follows in the Table 6.3.1-1 below.

TABLE 6.3.1-1: Minimum Footing Dimensions

FOOTING TYPE	*MINIMUM DEPTH (INCHES)	MINIMUM WIDTH (INCHES)
Continuous	24	12
Isolated	24	24

Minimum footing depths shown above are taken from lowest adjacent pad grade. The cold joint between the exterior footing and slab-on-grade should be located at least 4 inches above adjacent exterior grade.

Design foundations recommended above for a maximum allowable bearing pressure of 2,500 pounds per square foot (psf) for dead-plus-live loads. Increase this bearing capacity by one-third for the short-term effects of wind or seismic loading.

The maximum allowable bearing pressure is a net value; the weight of the footing may be neglected for design purposes. Footings located adjacent to utility trenches should have their bearing surfaces below an imaginary 1:1 (horizontal:vertical) plane projected upward from the bottom edge of the trench to the footing.

6.3.2 Waterstop

If a two-pour system is used for footings and slab, the cold joint between the exterior footing and slab-on-grade should be located at least 4 inches above adjacent finish exterior grade. If this is not done, then we recommend the addition of a waterstop between the two pours to reduce

moisture penetration through the cold joint and migration under the slab. Use of a monolithic pour would eliminate the need for the waterstop.

6.3.3 Reinforcement

The structural engineer should design footing reinforcement to support the intended structural loads without excessive settlement. Reinforce continuous footings with top and bottom steel to provide structural continuity and to permit spanning of local irregularities. At a minimum, continuous footings should be designed to structurally span a clear distance of 5 feet.

To help resist expansive soil movement, reinforce continuous footings with at least four No. 4 steel reinforcement bars, two top and two bottom.

6.3.4 Foundation Lateral Resistance

Lateral loads may be resisted by friction along the base and by passive pressure along the sides of foundations. The passive pressure is based on an equivalent fluid pressure in pounds per cubic foot (pcf). We recommend the following allowable values for design:

- Passive Lateral Pressure: 300 pcf
- Coefficient of Friction: 0.30

The above allowable values include a factor of safety of 1.5. Increase the above values by one-third for the short-term effects of wind or seismic loading.

Passive lateral pressure should not be used for footings on or above slopes.

6.3.5 Settlement

Provided our report recommendations are followed and given the proposed construction (Section 1.3), we estimate total and differential static foundation settlements to be less than approximately $\frac{3}{4}$ and $\frac{1}{2}$ inch acting over a distance of 30 feet, respectively. The foundation system should be designed to accommodate the seismic settlement recommended in Section 6.1.1.

6.3.6 Interior Concrete Floor Slabs

To reduce the effects of expansive soil on interior slabs, in addition to the non-expansive pad cap, we recommend the following:

1. Provide a minimum concrete thickness of 5 inches.
2. Reinforce slabs with No. 4 rebar on 16-inch centers, each way, placed within the middle third of the slab.

The structural engineer should provide final design thickness and additional reinforcement, if necessary, for the intended structural loads.

6.3.7 Slab Moisture Vapor Reduction

When buildings are constructed with concrete slab-on-grade, water vapor from beneath the slab will migrate through the slab and into the building. This water vapor can be reduced but not

stopped. Vapor transmission can negatively affect floor coverings and lead to increased moisture within a building. When water vapor migrating through the slab would be undesirable, we recommend the following to reduce, but not stop, water vapor transmission upward through the slab-on-grade.

1. Construct a moisture retarder system directly beneath the slab on-grade that consists of the following:
 - a. Vapor retarder membrane sealed at all seams and pipe penetrations and connected to all footings. Vapor retarders shall conform to Class A vapor retarder in accordance with ASTM E 1745, latest edition, "Standard Specification for Plastic Water Vapor Retarders used in Contact with Soil or Granular Fill under Concrete Slabs". The vapor retarder should be **underlain by**
 - b. 4 inches of clean crushed rock. Crushed rock should have 100 percent passing the ¾-inch sieve and less than 5 percent passing the No. 4 Sieve.
2. Use a concrete water-cement ratio for slabs-on-grade of no more than 0.50.
3. Provide inspection and testing during concrete placement to check that the proper concrete and water cement ratio are used.
4. Moist cure slabs for a minimum of 3 days or use other equivalent curing specified by the structural engineer.

The structural engineer should be consulted as to the use of a layer of clean sand or pea gravel (less than 5 percent passing the U.S. Standard No. 200 Sieve) placed on top of the vapor retarder membrane to assist in concrete curing.

6.4 DRILLED PIERS

Other improvements such as overheard canopies and lights may be supported on drilled, cast-in-place, straight-shaft friction piers.

The piers should have a minimum diameter of 12 inches and extend to a depth of at least 8 feet below the existing ground surface. Design piers for an allowable downward skin friction of 500 pounds per square foot for combined dead-plus-live loads with a one-third increase allowed for either transient wind or seismic loading. For pier load capacity computations, exclude the upper 3 feet.

Piers should be spaced a minimum of three pier diameters, center-to-center. Where closer spacing is unavoidable, the piers should be designed with a reduced skin friction of 330 psf. Resistance to uplift loads is developed in friction along the pier shafts. We recommend that an allowable uplift frictional resistance of 330 pounds per square foot be used.

Lateral loads exerted on drilled piers and may be resisted by a passive resistance based on an equivalent fluid pressure of 300 pounds per cubic foot acting against the 1.5 times individual pier diameter. The passive earth pressure should start at a depth of 12 inches or where there is 8 feet horizontal distance to daylight in sloping areas.

The bottoms of pier excavations should be dry, reasonably clean, and free of loose soil before reinforcing steel is installed and concrete is placed. We recommend that the excavation of piers

be performed under our direct observation to establish that the piers are founded in suitable materials and constructed in accordance with the recommendations presented in this letter.

If caving is observed, each shaft may need to be cased. If groundwater is encountered, remove it from excavations prior to concrete placement. If groundwater cannot be removed from excavations prior to concrete placement, then we recommend that concrete be placed by tremie pipe. The concrete should be tremied to the bottom of the hole keeping the tremie pipe below the surface of the concrete to avoid entrapment of water in the concrete. As concrete is poured, water is displaced out of the hole.

In addition, the expansive soils may exert upward pressure on the base of grade beams. This force can be neglected if a 2-inch void form of degradable material is utilized at the base of the beams/panels. Under no circumstance should grade beams be cast upon dry, desiccated soil.

Pier holes should be drilled with straight shafts and special care during construction to not allow concrete to “mushroom” out at the top of the pier. If needed, a sonotube concrete form may be used. If the provided recommendations are incorporated into the construction practices, the uplift pressure on the drilled piers may be neglected.

The pier reinforcement should be designed by the Structural Engineer, but as a minimum, at least two No. 4 rebars should extend the full length of each pier. Where applicable, the pier reinforcement should be tied to the grade beam as recommended by the Structural Engineer.

While structural loads were not provided, we anticipate that total vertical settlement for the recommended pier foundation should not exceed approximately ½ inch.

6.5 CBC PARAMETERS

It is our understanding that structures will be designed under the upcoming 2019 California Building Code (CBC). Based on the subsurface conditions encountered in the borings, we characterized the site as Site Class D in accordance with the 2019 CBC. We provide the 2019 CBC seismic design parameters in Table 6.5-1 below, which include design spectral response acceleration parameters based on the mapped Risk-Targeted Maximum Considered Earthquake (MCE_R) spectral response acceleration parameters.

TABLE 6.5-1: 2019 CBC Seismic Design Parameters

PARAMETER	VALUE
Site Class	D
Mapped MCE _R Spectral Response Acceleration at Short Periods, S _S (g)	2.291
Mapped MCE _R Spectral Response Acceleration at 1-second Period, S ₁ (g)	0.808
Site Coefficient, F _A	1.0
Site Coefficient, F _V	Null*
MCE _R Spectral Response Acceleration at Short Periods, S _{MS} (g)	2.291
MCE _R Spectral Response Acceleration at 1-second Period, S _{M1} (g)	Null*
Design Spectral Response Acceleration at Short Periods, S _{DS} (g)	1.527
Design Spectral Response Acceleration at 1-second Period, S _{D1} (g)	Null*
MCE _G Peak Ground Acceleration adjusted for Site Class effects, PGAM (g)	1.11

*Requires site-specific ground motion hazard analysis per ASCE 7-16 Section 11.4.8

Considering the proposed single-level train depot building, we estimate the fundamental periods of the proposed structure to be less than $1.5T_s$ (where T_s is 0.60 seconds for this project). Therefore, the structural engineer may consider exception of Section 11.4.8 of ASCE 7-16 as follows:

“A ground motion hazard analysis is not required for structures... where, structures on Site Class D sites with S_1 greater than or equal to 0.2, provided the value of the seismic response coefficient C_s is determined by Eq. (12.8-2) of ASCE 7-16 for values of $T \leq 1.5T_s$ and taken as equal to 1.5 times the value computed in accordance with either Eq. (12.8-3) of ASCE 7-16 for $1.5T_s < T \leq T_L$. or Eq. (12.8-4) of ASCE 7-16 for $T > T_L$.”

If the noted exception is not used, a ground motion hazard analysis should be performed and can be provided in a separate letter.

7.0 EXTERIOR FLATWORK

Exterior flatwork includes items such as concrete sidewalks, steps, and outdoor courtyards exposed to foot traffic only. Provide a minimum section of 4 inches of concrete over 4 inches of aggregate base. Thicken flatwork edges to at least 8 inches to help control moisture variations in the subgrade and place rebar within the middle third of the slab to help control the width and offset of cracks. Reinforcement consisting of No. 3 bars spaced 18 inches on-center each way can be placed to help reduce cracks. The turndown may be omitted if the thickness of the flatwork is increased to 6 inches. As is common with concrete construction, minor cracking should be expected. Construct control and construction joints in accordance with current Portland Cement Association Guidelines.

8.0 PAVEMENT DESIGN

8.1 FLEXIBLE PAVEMENTS

We obtained three near-surface samples for Resistance Value (R-Value) testing. The tests resulted in R-Values of 8, 7, and less than 5. The following pavement sections have been determined for Traffic Indices of 4.5 through 7, an assumed R-Value of 5, and in accordance to the design methods contained in chapter 630 of Caltrans Highway Design Manual.

We have also provided an alternative section based on the Caltrans Subgrade Enhancement Geosynthetic Design and Construction Guide (latest revision September 21, 2013). Based on this guideline, the subgrade enhancement should consist of a Class B1 Woven Geotextile. The geotextile should be placed between the subgrade and Class 2 aggregate base layer. The requirements of Class B1 Woven Geotextile are included in the following Table 8.1-1.

TABLE 8.1-1: Caltrans Class B1 Woven Geotextile Requirements

Elongation at break, % ASTM D 4632	Grab tensile strength (min), lb ASTM D 4632	Wide width tensile strength (min) at 5% strain, lb/ft ASTM D 4595	Wide width tensile strength (min) at ultimate strain, lb/ft ASTM D 4595	Tear strength (min), lb ASTM D 4533	Puncture strength (min), lb ASTM D 6241	Permittivity (min), Sec^{-1} ASTM D 4491	Apparent opening size (max), inch ASTM D 4751	Ultraviolet stability (retained strength after 500 hrs exposure) (min), % ASTM D 4355
<50	--	2,000	4,800	--	620	0.20	0.024	70

When using the Subgrade Enhancement Geotextile (SEG_T), the Caltrans Subgrade Enhancement Geosynthetic Design and Construction Guide allows the design R-value of the subgrade soil to be 20. With the SEG_T, the thickness of the hot mix asphalt remains the same but the thickness of Class 2 aggregate base is reduced.

TABLE 8.1-2: Pavement Sections

TRAFFIC INDEX (TI)	R-VALUE OF 5		
	HMA (INCHES)	AB (INCHES)	AB (INCHES) With SEG _T
4.5	2½	10	7
5.0	2¾	11	8
5.5	3¾	11	8
6.0	3¾	13	9
6.5	3¾	14	11
7.0	4	16	12

*Notes: HMA – Hot Mix Asphalt
 AB – Caltrans Class 2 aggregate base (R-Value of 78 or greater)
 Per City of Goleta General Street Specifications: when the traffic index is less than 5.5, the minimum thickness of HMA shall be 0.20' (~2½"). When the traffic index is 5.5 or greater, the minimum thickness of HMA shall be 0.30' (~3¾").

The Traffic Indices and minimum pavement section(s) should be confirmed by the Civil Engineer and the City of Goleta.

8.1.1 Pavement Construction

Pavement construction and all materials should conform to the specifications and requirements of the latest edition of the Standard Specifications by the Division of Highways, Department of Public Works, State of California, and City of Goleta requirements and the following minimum requirements.

- All pavement subgrades should be scarified to a depth of 12 inches below finished subgrade elevation. The subgrade soil should be moisture conditioned to at least 2 percentage points above optimum and compacted to at least 95 percent relative compaction in accordance with city requirements.
- Subgrade soil should be in a stable, non-pumping condition at the time aggregate base materials are placed and compacted.
- Adequate provisions must be made such that the subgrade soils and aggregate base materials are not allowed to become saturated.
- Aggregate base materials should meet current Caltrans specifications for Class 2 aggregate base and should be compacted to at least 95 percent of maximum dry density.
- Asphalt paving materials should meet current Caltrans specifications for asphalt concrete.

EXHIBIT "B" (Geotechnical Exploration)

8.2 RIGID PAVEMENTS

Use concrete pavement sections to resist heavy loads and turning forces in areas such as fire lanes or trash enclosures. Final design of rigid pavement sections, and accompanying reinforcement, should be performed based on estimated traffic loads and frequencies. We recommend the following minimum design sections for rigid pavements using ACI 330R-08 Design Guide for Concrete Parking Lots:

TABLE 8.2-1: Rigid Pavement Sections

AVERAGE DAILY TRUCK TRAFFIC (ADTT*)	R-VALUE OF 5	
	CONCRETE (IN)	AB (IN)
10	6	6
25	6½	9
100	7½	9
300	7½	12
700	8	12

*Notes: ADTT – average daily truck traffic. Trucks are defined as vehicles with at least six wheels; excludes panel trucks, pickup trucks, and other four-wheel vehicles.
AB – Caltrans Class 2 aggregate base (R-Value of 78 or greater)

TABLE 8.2-2: Spacing Between Joints

PAVEMENT THICKNESS (IN)	MAXIMUM SPACING (FT)
4, 4½	10
5, 5½	12½
6 or greater	15

- Jointed Plane Concrete Pavement (JPCP) should have a minimum 28-day compressive strength (f'c) of 4,000 psi for a 20-year design life.
- Design assumes there is edge support provided by a curb or paving.

8.3 SUBGRADE AND AGGREGATE BASE COMPACTION

Compact finish subgrade and aggregate base in accordance with Section 5.6. Aggregate Base should meet the requirements for ¾-inch maximum Class 2 AB in accordance with Section 26 of the latest Caltrans Standard Specifications.

8.4 CUT-OFF CURBS

Saturated pavement subgrade or aggregate base can cause premature failure or increased maintenance of asphalt concrete pavements. This condition often occurs where landscape areas directly abut and drain toward pavements. If desired to install pavement cutoff barriers, they should be considered where pavement areas lie downslope of any landscape areas that are to be sprinklered or irrigated, and should extend to a depth of at least 4 inches below the aggregate base layer. Cutoff barriers may consist of deepened concrete curbs or deep-root moisture barriers.

EXHIBIT "B" (Geotechnical Exploration)

If reduced pavement life and greater than normal pavement maintenance are acceptable to the owner, then the cutoff barrier may be eliminated.

9.0 LIMITATIONS AND UNIFORMITY OF CONDITIONS

This report presents geotechnical recommendations for design of the improvements discussed in Section 1.3 for the Goleta Train Depot project. If changes occur in the nature or design of the project, we should be allowed to review this report and provide additional recommendations, if any. It is the responsibility of the client to transmit the information and recommendations of this report to the appropriate organizations or people involved in design of the project, including but not limited to owners, architects, engineers, and designers. The conclusions and recommendations contained in this report are solely professional opinions and are valid for a period of no more than 2 years from the date of report issuance.

We strived to perform our professional services in accordance with generally accepted geotechnical engineering principles and practices currently employed in the area; no warranty is expressed or implied. There are risks of earth movement and property damages inherent in building on or with earth materials. We are unable to eliminate all risks; therefore, we are unable to guarantee or warrant the results of our services.

This report is based upon field and other conditions discovered at the time of report preparation. We developed this report with limited subsurface exploration data. We assumed that our subsurface exploration data are representative of the actual subsurface conditions across the site. Considering possible underground variability of soil and groundwater, additional costs may be required to complete the project. We recommend that the owner establish a contingency fund to cover such costs. If unexpected conditions are encountered, ENGEO must be notified immediately to review these conditions and provide additional and/or modified recommendations, as necessary.

Our services did not include excavation sloping or shoring, soil volume change factors, flood potential, or a geohazard exploration. In addition, our geotechnical exploration did not include work to determine the existence of possible hazardous materials. If any hazardous materials are encountered during construction, the proper regulatory officials must be notified immediately.

This document must not be subject to unauthorized reuse, that is, reusing without written authorization of ENGEO. Such authorization is essential because it requires ENGEO to evaluate the document's applicability given new circumstances, not the least of which is passage of time.

Actual field or other conditions will necessitate clarifications, adjustments, modifications or other changes to ENGEO's documents. Therefore, ENGEO must be engaged to prepare the necessary clarifications, adjustments, modifications or other changes before construction activities commence or further activity proceeds. If ENGEO's scope of services does not include onsite construction observation, or if other persons or entities are retained to provide such services, ENGEO cannot be held responsible for any or all claims arising from or resulting from the performance of such services by other persons or entities, and from any or all claims arising from or resulting from clarifications, adjustments, modifications, discrepancies or other changes necessary to reflect changed field or other conditions.

We determined the lines designating the interface between layers on the exploration logs using visual observations. The transition between the materials may be abrupt or gradual. The

exploration logs contain information concerning samples recovered, indications of the presence of various materials such as clay, sand, silt, rock, existing fill, etc., and observations of groundwater encountered. The field logs also contain our interpretation of the subsurface conditions between sample locations. Therefore, the logs contain both factual and interpretative information. Our recommendations are based on the contents of the final logs, which represent our interpretation of the field logs.

EXHIBIT "B" (Geotechnical Exploration)

SELECTED REFERENCES

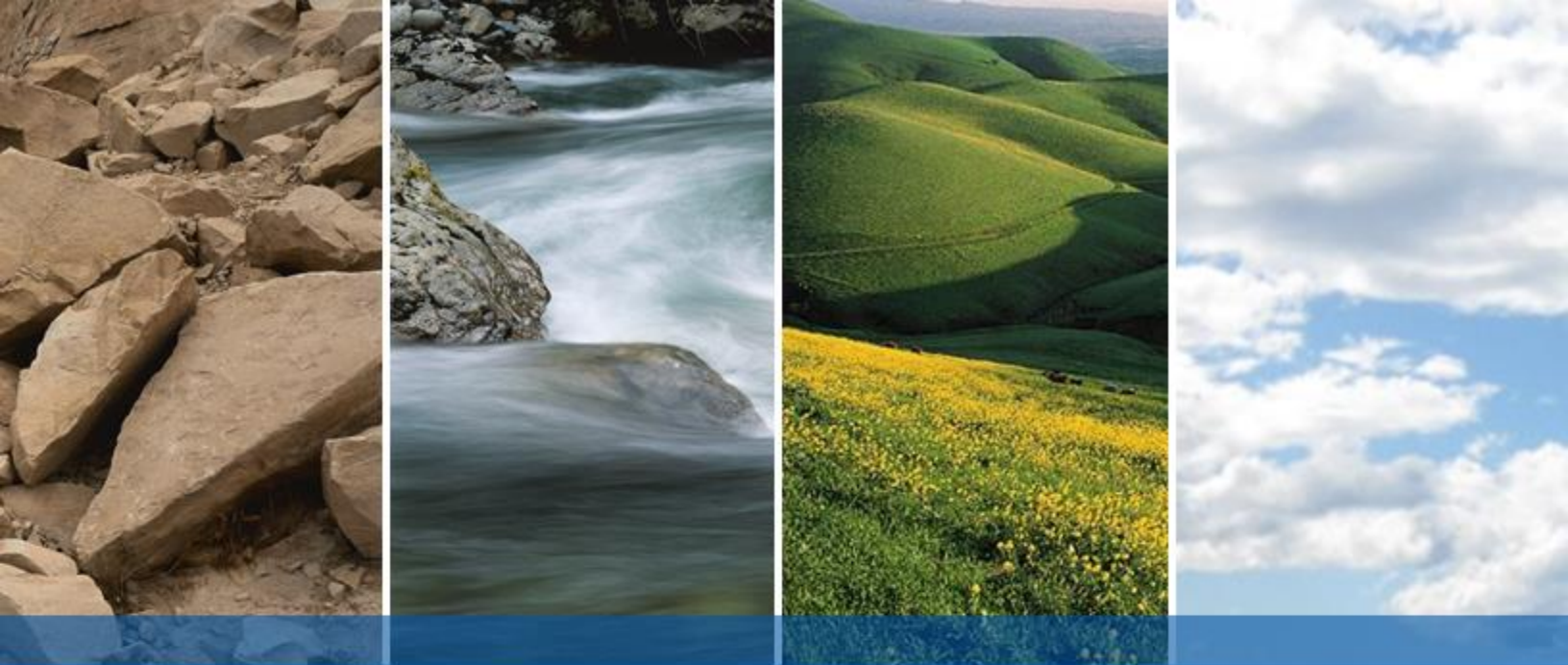
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EXHIBIT "B" (Geotechnical Exploration)

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EXHIBIT "B" (Geotechnical Exploration)



FIGURES

FIGURE 1: Vicinity Map

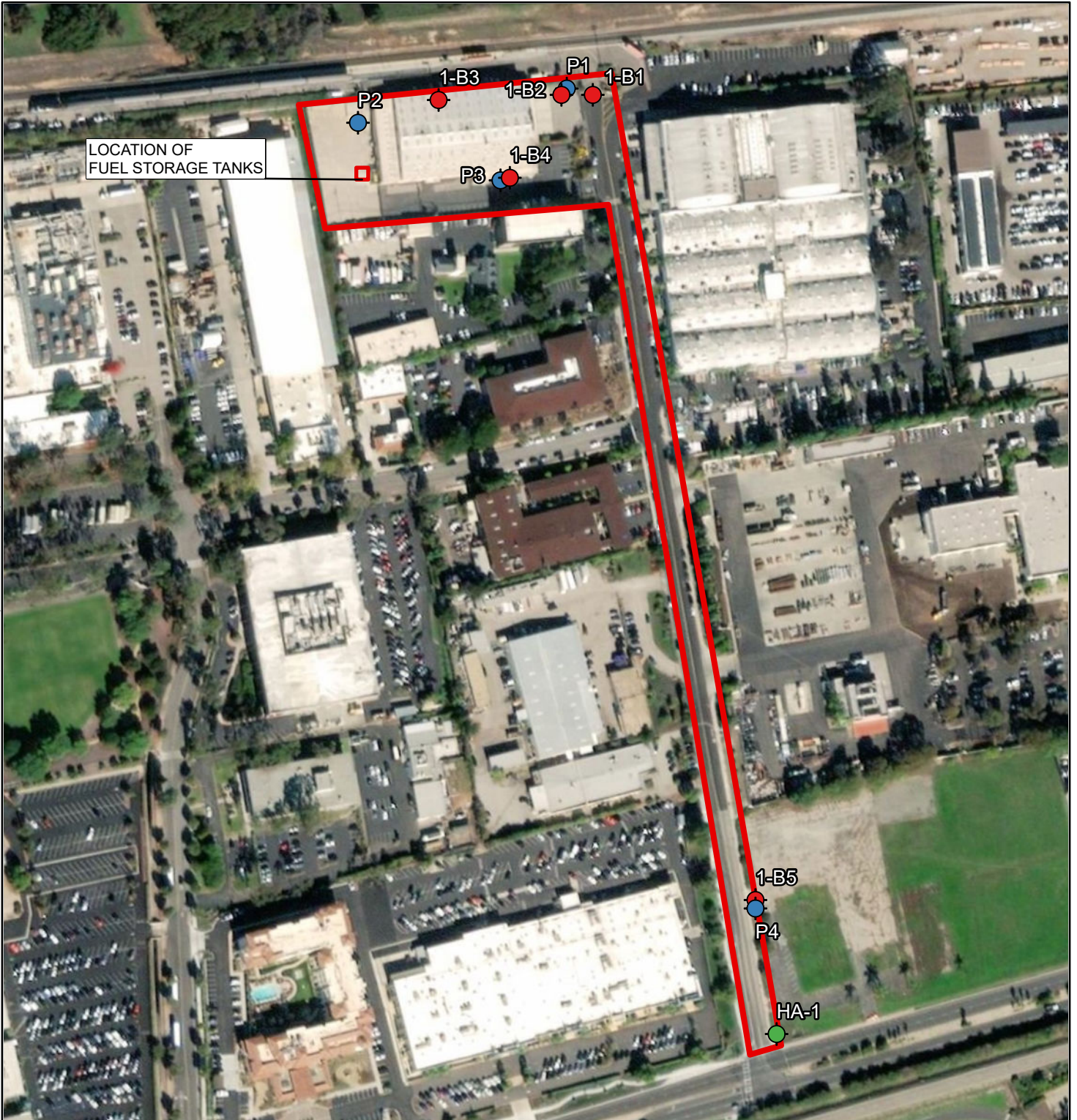
FIGURE 2: Site Plan

FIGURE 3: Regional Geologic Map

FIGURE 4: Regional Faulting and Seismicity Map

EXHIBIT "B" (Geotechnical Exploration)

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LOCATION OF FUEL STORAGE TANKS



EXPLANATION

ALL LOCATIONS ARE APPROXIMATE

- PROJECT SITE
- 1-B5 ● BORING (ENGEO, 2019)
- P4 ● PERCOLATION TEST (ENGEO, 2019)
- HA-1 ● HAND AUGER (ENGEO, 2019)

EXHIBIT "B" (Geotechnical Exploration)

BASEMAP SOURCE: ESRI MAPPING SERVICE

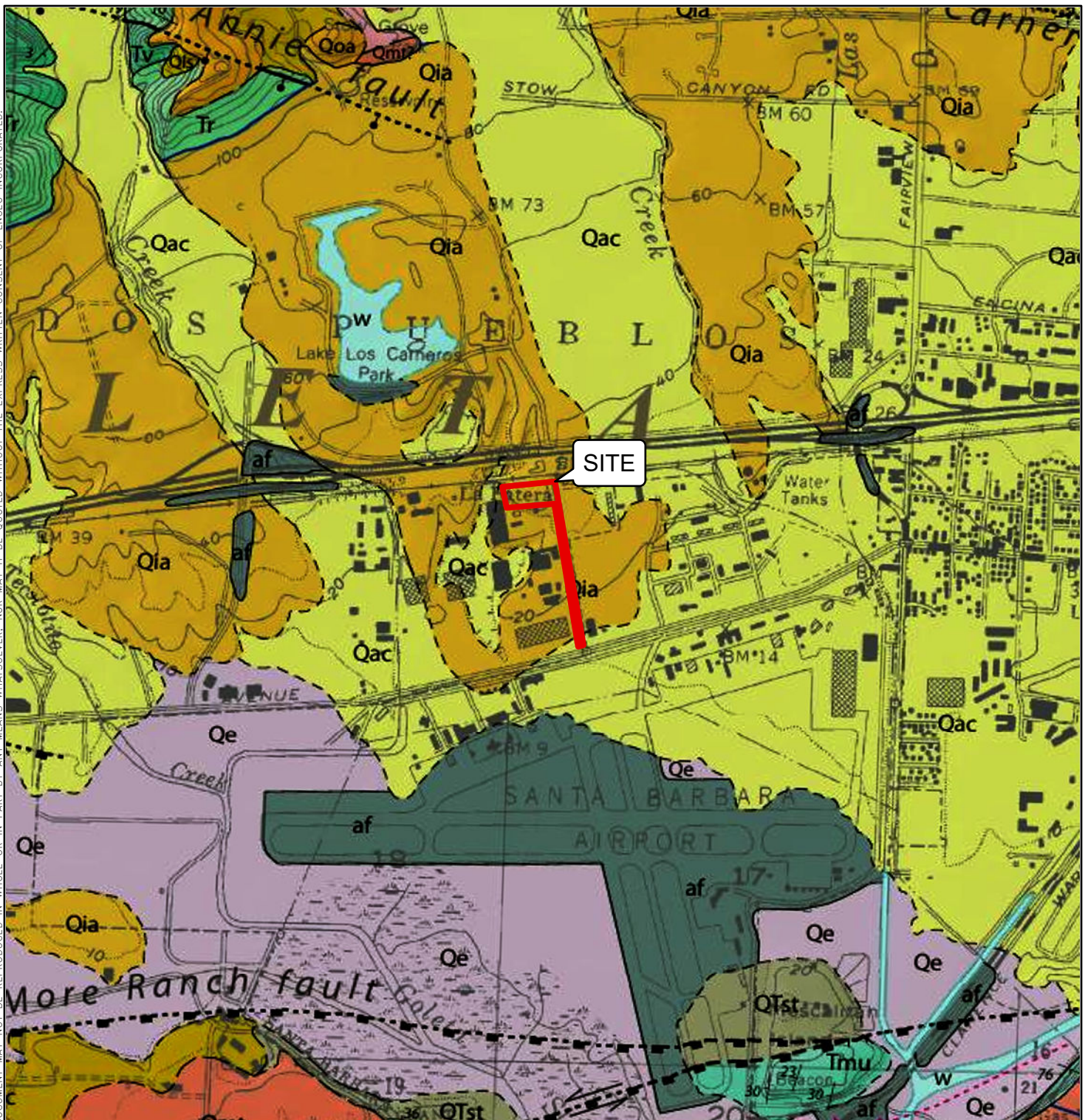


SITE PLAN
GOLETA TRAIN STATION
GOLETA, CALIFORNIA

PROJECT NO. : 16370.000.000	
SCALE: AS SHOWN	
DRAWN BY: QRL	CHECKED BY: RHB

FIGURE NO.
2

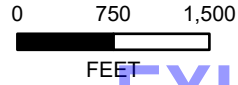
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EXPLANATION

ALL LOCATIONS ARE APPROXIMATE

- | | |
|--|--|
| af ARTIFICIAL FILL | Qmt MARINE-TERRACE DEPOSITS (UPPER PLEISTOCENE) |
| Qe ESTUARINE DEPOSITS (HOLOCENE) | Qst SILTSTONE UNIT (LOWER PLEISTOCENE AND UPPER PLEISTOCENE?) |
| Qac ALLUVIUM AND COLLUVIUM (HOLOCENE AND UPPER PLEISTOCENE) | Tmu UPPER SILICEOUS UNIT (UPPER MIOCENE) |
| Qls LANDSLIDE DEPOSITS (HOLOCENE TO MIDDLE PLEISTOCENE) | Tr RINCON SHALE (LOWER MIOCENE) |
| Qia INTERMEDIATE ALLUVIAL DEPOSITS (UPPER PLEISTOCENE) | |



BASEMAP SOURCE: MINOR ET. AL. 2007



REGIONAL GEOLOGIC MAP
 GOLETA TRAIN STATION
 GOLETA, CALIFORNIA

PROJECT NO. : 16370.000.000

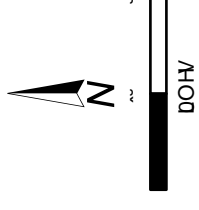
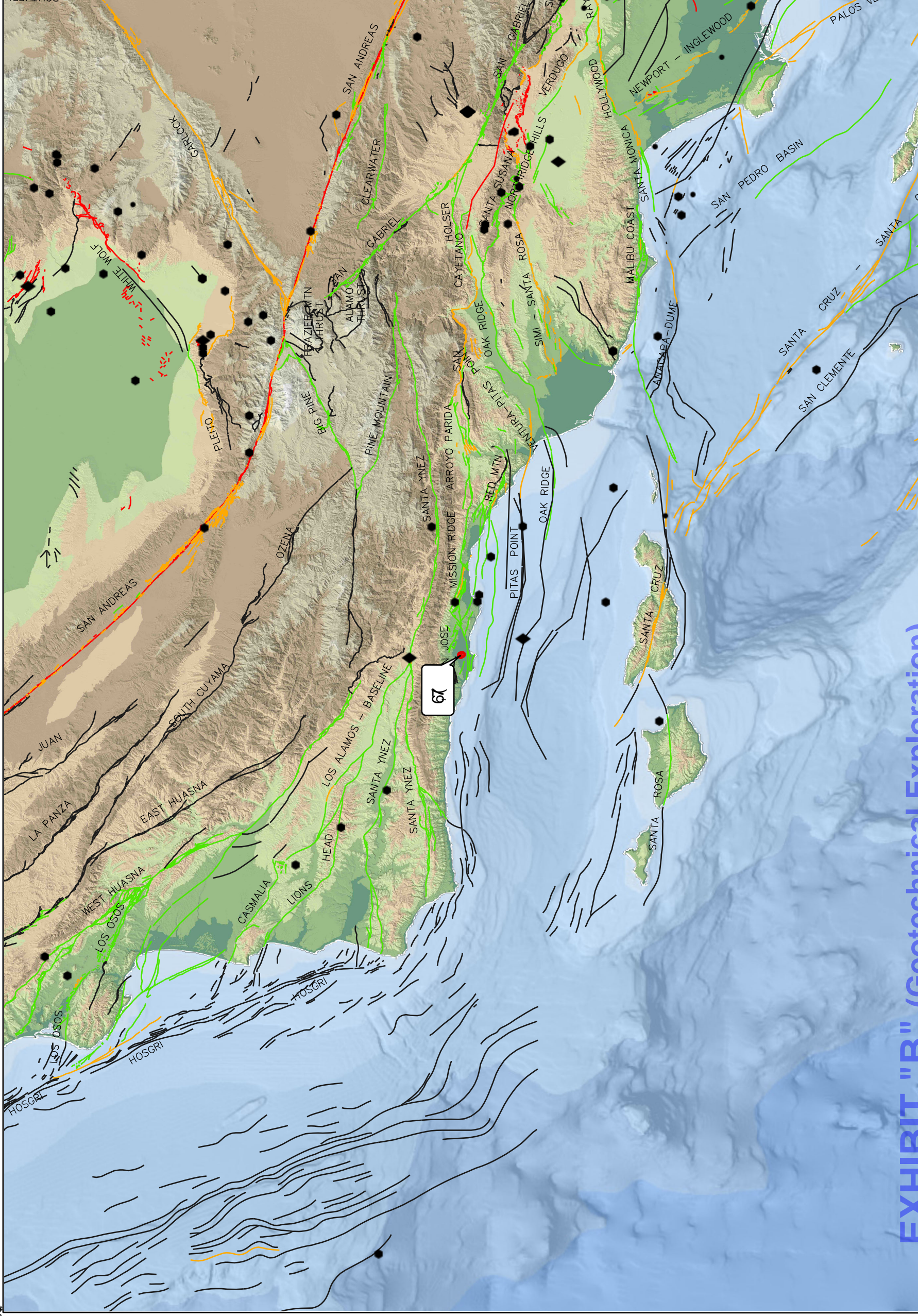
SCALE: AS SHOWN

DRAWN BY: QRL

CHECKED BY: RHB

FIGURE NO.

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EXHIBIT "B" (Geotechnical Exploration)

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APPENDIX A

**BORING LOG KEY
EXPLORATION LOGS**

EXHIBIT "B" (Geotechnical Exploration)

KEY TO BORING LOGS

MAJOR TYPES		DESCRIPTION	
COARSE-GRAINED SOILS MORE THAN HALF OF MAT'L LARGER THAN #200 SIEVE	GRAVELS MORE THAN HALF COARSE FRACTION IS LARGER THAN NO. 4 SIEVE SIZE	CLEAN GRAVELS WITH LESS THAN 5% FINES	GW - Well graded gravels or gravel-sand mixtures GP - Poorly graded gravels or gravel-sand mixtures
		GRAVELS WITH OVER 12 % FINES	GM - Silty gravels, gravel-sand and silt mixtures GC - Clayey gravels, gravel-sand and clay mixtures
	SANDS MORE THAN HALF COARSE FRACTION IS SMALLER THAN NO. 4 SIEVE SIZE	CLEAN SANDS WITH LESS THAN 5% FINES	SW - Well graded sands, or gravelly sand mixtures SP - Poorly graded sands or gravelly sand mixtures
		SANDS WITH OVER 12 % FINES	SM - Silty sand, sand-silt mixtures SC - Clayey sand, sand-clay mixtures
FINE-GRAINED SOILS MORE THAN HALF OF MAT'L SMALLER THAN #200 SIEVE	SILTS AND CLAYS LIQUID LIMIT 50 % OR LESS		ML - Inorganic silt with low to medium plasticity CL - Inorganic clay with low to medium plasticity OL - Low plasticity organic silts and clays
	SILTS AND CLAYS LIQUID LIMIT GREATER THAN 50 %		MH - Elastic silt with high plasticity CH - Fat clay with high plasticity OH - Highly plastic organic silts and clays
	HIGHLY ORGANIC SOILS		PT - Peat and other highly organic soils

For fine-grained soils with 15 to 29% retained on the #200 sieve, the words "with sand" or "with gravel" (whichever is predominant) are added to the group name.

For fine-grained soil with >30% retained on the #200 sieve, the words "sandy" or "gravelly" (whichever is predominant) are added to the group name.

GRAIN SIZES

U.S. STANDARD SERIES SIEVE SIZE				CLEAR SQUARE SIEVE OPENINGS			
	200	40	10	4	3/4 "	3"	12"
SILTS AND CLAYS	SAND			GRAVEL		COBBLES	BOULDERS
	FINE	MEDIUM	COARSE	FINE	COARSE		

RELATIVE DENSITY

<u>SANDS AND GRAVELS</u>	BLOWS/FOOT (S.P.T.)
VERY LOOSE	0-4
LOOSE	4-10
MEDIUM DENSE	10-30
DENSE	30-50
VERY DENSE	OVER 50

CONSISTENCY

<u>SILTS AND CLAYS</u>	<u>STRENGTH*</u>
VERY SOFT	0-1/4
SOFT	1/4-1/2
MEDIUM STIFF	1/2-1
STIFF	1-2
VERY STIFF	2-4
HARD	OVER 4

MOISTURE CONDITION

DRY	Dusty, dry to touch
MOIST	Damp but no visible water
WET	Visible freewater

LINE TYPES

—————	Solid - Layer Break
-----	Dashed - Gradational or approximate layer break

GROUND-WATER SYMBOLS

	Groundwater level during drilling
	Stabilized groundwater level

SAMPLER SYMBOLS

	Modified California (3" O.D.) sampler
	California (2.5" O.D.) sampler
	S.P.T. - Split spoon sampler
	Shelby Tube
	Dames and Moore Piston
	Continuous Core
	Bag Samples
	Grab Samples
NR	No Recovery

EXHIBIT "B" (Geotechnical Exploration) ENGEO

(S.P.T.) Number of blows of 140 lb. hammer falling 30" to drive a 2-inch O.D. (1-3/8 inch I.D.) sampler

* Unconfined compressive strength in tons/sq. ft., asterisk on log means determined by pocket penetrometer

— Expect Excellence —



LOG OF BORING 1-B1

LATITUDE: 34.437575

LONGITUDE: -119.842536

Geotechnical Exploration
Goleta Train Depot
Goleta, California
16370.000.000

DATE DRILLED: 8/12/2019
HOLE DEPTH: 11.5 ft.
HOLE DIAMETER: 8.0 in.
SURF ELEV (WGS 84): 31 ft.

LOGGED / REVIEWED BY: R. Hildebrant / RHB
DRILLING CONTRACTOR: 2R Drilling
DRILLING METHOD: Hollow Stem Auger
HAMMER TYPE: 140 lb. Auto Trip

Depth in Feet	Elevation in Feet	Sample Type	DESCRIPTION	Log Symbol	Water Level	Blow Count/Foot	Atterberg Limits			Fines Content (% passing #200 sieve)	Moisture Content (% dry weight)	Dry Unit Weight (pcf)	Shear Strength (psf) *field approximation	Unconfined Strength (tsf) *field approximation	Strength Test Type
							Liquid Limit	Plastic Limit	Plasticity Index						
			4" ASPHALT PAVEMENT												
			6" AGGREGATE BASE												
	30		SANDY LEAN CLAY TO CLAYEY SAND (CL-SC), dark reddish brown, stiff, moist, fine- to medium-grained sand, R-Value = 7			6	28	14	14	47			1.5*	PP	
5															
	25					6									
			CLAYEY SAND (SC), dark reddish brown, dense, moist, fine- to medium-grained sand, ~20-25% fines												
10															
	20					34									
			Bottom of boring at approximately 11½ feet below the ground surface No groundwater encountered during drilling												

EXHIBIT "B" (Geotechnical Exploration)



LOG OF BORING 1-B2

LATITUDE: 34.437549

LONGITUDE: -119.84273

Geotechnical Exploration
Goleta Train Depot
Goleta, California
16370.000.000

DATE DRILLED: 8/12/2019
HOLE DEPTH: 51.5 ft.
HOLE DIAMETER: 8.0 in.
SURF ELEV (WGS 84): 30 ft.

LOGGED / REVIEWED BY: R. Hildebrant / RHB
DRILLING CONTRACTOR: 2R Drilling
DRILLING METHOD: Hollow Stem Auger
HAMMER TYPE: 140 lb. Auto Trip

Depth in Feet	Elevation in Feet	Sample Type	DESCRIPTION	Log Symbol	Water Level	Blow Count/Foot	Atterberg Limits			Fines Content (% passing #200 sieve)	Moisture Content (% dry weight)	Dry Unit Weight (pcf)	Shear Strength (psf) *field approximation	Unconfined Strength (tsf) *field approximation	Strength Test Type
							Liquid Limit	Plastic Limit	Plasticity Index						
			4" ASPHALT PAVEMENT												
			SANDY LEAN CLAY (CL), dark reddish brown, hard, moist, manganese nodules, fine- to medium-grained sand				37	16	21	62					
5	25					40				13.9	120	5146	5.15	UC	
						31	22	14	8	63	115.7	3073	3.07	UC	
						33							4.25*	PP	
10	20		CLAYEY SAND (SC), dark reddish brown, medium dense, moist			47				39	15.6	111.1			
15	15					40									
			SILTY SAND (SM), brown, medium dense to dense, moist, fine- to medium-grained sand			23				14	6.3				
20	10		Yellowish brown			28 50/5"				13					
25	5														

EXHIBIT "B" (Geotechnical Exploration)



LOG OF BORING 1-B2

LATITUDE: 34.437549

LONGITUDE: -119.84273

Geotechnical Exploration
Goleta Train Depot
Goleta, California
16370.000.000

DATE DRILLED: 8/12/2019
HOLE DEPTH: 51.5 ft.
HOLE DIAMETER: 8.0 in.
SURF ELEV (WGS 84): 30 ft.

LOGGED / REVIEWED BY: R. Hildebrant / RHB
DRILLING CONTRACTOR: 2R Drilling
DRILLING METHOD: Hollow Stem Auger
HAMMER TYPE: 140 lb. Auto Trip

Depth in Feet	Elevation in Feet	Sample Type	DESCRIPTION	Log Symbol	Water Level	Blow Count/Foot	Atterberg Limits			Fines Content (% passing #200 sieve)	Moisture Content (% dry weight)	Dry Unit Weight (pcf)	Shear Strength (psf) *field approximation	Unconfined Strength (tsf) *field approximation	Strength Test Type
							Liquid Limit	Plastic Limit	Plasticity Index						
			medium- to coarse-grained sand			72				25	6.3				
30	0		light yellowish brown, fine- to medium-grained sand			50/5"									
35	-5					57				10	8.1				
40	-10		LEAN CLAY (CL), grayish green, hard, moist, marine shells, iron staining			16					25.5		3.25*	PP	
45	-15					78							4.5*	PP	

EXHIBIT "B" (Geotechnical Exploration)



LOG OF BORING 1-B2

LATITUDE: 34.437549

LONGITUDE: -119.84273

Geotechnical Exploration
Goleta Train Depot
Goleta, California
16370.000.000

DATE DRILLED: 8/12/2019
HOLE DEPTH: 51.5 ft.
HOLE DIAMETER: 8.0 in.
SURF ELEV (WGS 84): 30 ft.

LOGGED / REVIEWED BY: R. Hildebrant / RHB
DRILLING CONTRACTOR: 2R Drilling
DRILLING METHOD: Hollow Stem Auger
HAMMER TYPE: 140 lb. Auto Trip

Depth in Feet	Elevation in Feet	Sample Type	DESCRIPTION	Log Symbol	Water Level	Blow Count/Foot	Atterberg Limits			Fines Content (% passing #200 sieve)	Moisture Content (% dry weight)	Dry Unit Weight (pcf)	Shear Strength (psf) *field approximation	Unconfined Strength (tsf) *field approximation	Strength Test Type
							Liquid Limit	Plastic Limit	Plasticity Index						
						83							4.5*	PP	
			Bottom of boring at approximately at 51½ ft below the ground surface No groundwater encountered during drilling												

EXHIBIT "B" (Geotechnical Exploration)



LOG OF BORING 1-B3

LATITUDE: 34.437536

LONGITUDE: -119.843453

Geotechnical Exploration
Goleta Train Depot
Goleta, California
16370.000.000

DATE DRILLED: 8/13/2019
HOLE DEPTH: 38.5 ft.
HOLE DIAMETER: 8.0 in.
SURF ELEV (WGS 84): 34 ft.

LOGGED / REVIEWED BY: R. Hildebrant / RHB
DRILLING CONTRACTOR: 2R Drilling
DRILLING METHOD: Hollow Stem Auger
HAMMER TYPE: 140 lb. Auto Trip

Depth in Feet	Elevation in Feet	Sample Type	DESCRIPTION	Log Symbol	Water Level	Blow Count/Foot	Atterberg Limits			Fines Content (% passing #200 sieve)	Moisture Content (% dry weight)	Dry Unit Weight (pcf)	Shear Strength (psf) *field approximation	Unconfined Strength (tsf) *field approximation	Strength Test Type
							Liquid Limit	Plastic Limit	Plasticity Index						
			4" CONCRETE												
			LEAN CLAY (CL), dark reddish brown, hard, moist, [FILL]				22	14	8	58					
30						22	50	19	31	80	19.8	107.8	3838	3.84 UC	
5			SANDY LEAN CLAY (CL), dark reddish brown, very stiff to hard, moist, manganese nodules, fine- to medium-grained sand			18							3.5*	PP	
25						36	35	16	19	78	16.9	116.4	5069	5.07 UC	
10			stiff, fine- to coarse-grained sand			44				63			3.5*	PP	
15															
20			fine-grained sand			13				81	21				
15															
20						22				68	18.2				
10															
25															

EXHIBIT "B" (Geotechnical Exploration)



LOG OF BORING 1-B3

LATITUDE: 34.437536

LONGITUDE: -119.843453

Geotechnical Exploration
Goleta Train Depot
Goleta, California
16370.000.000

DATE DRILLED: 8/13/2019
HOLE DEPTH: 38.5 ft.
HOLE DIAMETER: 8.0 in.
SURF ELEV (WGS 84): 34 ft.

LOGGED / REVIEWED BY: R. Hildebrant / RHB
DRILLING CONTRACTOR: 2R Drilling
DRILLING METHOD: Hollow Stem Auger
HAMMER TYPE: 140 lb. Auto Trip

Depth in Feet	Elevation in Feet	Sample Type	DESCRIPTION	Log Symbol	Water Level	Blow Count/Foot	Atterberg Limits			Fines Content (% passing #200 sieve)	Moisture Content (% dry weight)	Dry Unit Weight (pcf)	Shear Strength (psf) *field approximation	Unconfined Strength (tsf) *field approximation	Strength Test Type
							Liquid Limit	Plastic Limit	Plasticity Index						
						30				28	10				
			SILTY SAND (SM), brown to pale olive, medium dense, moist, fine- to medium-grained sand												
	5														
	30		wet sample												
						24				26	25				
			SILT (ML), pale olive, very stiff, moist												
	0					14	27	NP	NP	74	26.9		2.25*	PP	
	35														
			LEAN CLAY (CL), grayish green, very stiff to hard, moist, marine shells												
						12	38	22	16		27		2.5*	PP	
						27 50/5"							4.5*	PP	
			Bottom of boring at approximately 38½ feet below ground surface Groundwater encountered at 30 feet during drilling, no groundwater measured at the end of drilling												

EXHIBIT "B" (Geotechnical Exploration)



LOG OF BORING 1-B4

LATITUDE: 34.437154

LONGITUDE: -119.843038

Geotechnical Exploration
Goleta Train Depot
Goleta, California
16370.000.000

DATE DRILLED: 8/12/2019
HOLE DEPTH: 31.5 ft.
HOLE DIAMETER: 8.0 in.
SURF ELEV (WGS 84): 32 ft.

LOGGED / REVIEWED BY: R. Hildebrant / RHB
DRILLING CONTRACTOR: 2R Drilling
DRILLING METHOD: Hollow Stem Auger
HAMMER TYPE: 140 lb. Auto Trip

Depth in Feet	Elevation in Feet	Sample Type	DESCRIPTION	Log Symbol	Water Level	Blow Count/Foot	Atterberg Limits			Fines Content (% passing #200 sieve)	Moisture Content (% dry weight)	Dry Unit Weight (pcf)	Shear Strength (psf) *field approximation	Unconfined Strength (tsf) *field approximation	Strength Test Type
							Liquid Limit	Plastic Limit	Plasticity Index						
			5" ASPHALT PAVEMENT												
30			SANDY SILT (ML), dark reddish brown, hard to very stiff, moist, manganese nodules, fine- to coarse-grained sand, R-Value = <5												
5			SANDY LEAN CLAY (ML), dark reddish brown, hard to very stiff, moist, manganese nodules, fine- to coarse-grained sand			24	18	16	2	56	14.2	119.6	1215	1.22	UC
25			fine-to medium-grained sand			15								4.5*	PP
10			LEAN CLAY (CL), dark reddish brown, very stiff, moist			35	34	16	18		15.1	116.6	4190	4.19	UC
20						14								3.25*	PP
15			CLAYEY SAND (SC), brown, medium dense, moist, ~30% fines			19					19.9	109		3.25*	PP
20			SILTY SAND (SM), brown, medium dense, moist, fine- to medium-grained sand			17				33	14.8				
25			POORLY GRADED SAND TO SILTY SAND (SP-SM), brown, dense, moist, fine- to medium-grained sand												

EXHIBIT "B" (Geotechnical Exploration)



LOG OF BORING 1-B4

LATITUDE: 34.437154

LONGITUDE: -119.843038

Geotechnical Exploration
Goleta Train Depot
Goleta, California
16370.000.000

DATE DRILLED: 8/12/2019
HOLE DEPTH: 31.5 ft.
HOLE DIAMETER: 8.0 in.
SURF ELEV (WGS 84): 32 ft.

LOGGED / REVIEWED BY: R. Hildebrant / RHB
DRILLING CONTRACTOR: 2R Drilling
DRILLING METHOD: Hollow Stem Auger
HAMMER TYPE: 140 lb. Auto Trip

Depth in Feet	Elevation in Feet	Sample Type	DESCRIPTION	Log Symbol	Water Level	Blow Count/Foot	Atterberg Limits			Fines Content (% passing #200 sieve)	Moisture Content (% dry weight)	Dry Unit Weight (pcf)	Shear Strength (psf) *field approximation	Unconfined Strength (tsf) *field approximation	Strength Test Type
							Liquid Limit	Plastic Limit	Plasticity Index						
5			POORLY GRADED SAND TO SILTY SAND (SP-SM), brown, dense, moist, fine- to medium-grained sand			34			9						
30			Bottom of boring at approximately 31½ feet below the ground surface No groundwater encountered during drilling			44			6						

EXHIBIT "B" (Geotechnical Exploration)



LOG OF BORING 1-B5

LATITUDE: 34.433692

LONGITUDE: -119.84146

Geotechnical Exploration
Goleta Train Depot
Goleta, California
16370.000.000

DATE DRILLED: 8/12/2019
HOLE DEPTH: 21.5 ft.
HOLE DIAMETER: 8.0 in.
SURF ELEV (WGS 84): 11 ft.

LOGGED / REVIEWED BY: R. Hildebrant / RHB
DRILLING CONTRACTOR: 2R Drilling
DRILLING METHOD: Hollow Stem Auger
HAMMER TYPE: 140 lb. Auto Trip

Depth in Feet	Elevation in Feet	Sample Type	DESCRIPTION	Log Symbol	Water Level	Blow Count/Foot	Atterberg Limits			Fines Content (% passing #200 sieve)	Moisture Content (% dry weight)	Dry Unit Weight (pcf)	Shear Strength (psf) *field approximation	Unconfined Strength (tsf) *field approximation	Strength Test Type
							Liquid Limit	Plastic Limit	Plasticity Index						
			3" ASPHALT PAVEMENT												
10			SANDY LEAN CLAY (CL), dark reddish brown, hard, moist, R-Value = 8				30	14	16	49					
			more clayey			9						>4.5*	PP		
5			more sandy, manganese nodules			26						>4.5*	PP		
						13						4.5*	PP		
10						17						4.5*	PP		
			SILTY SAND (SM), pale yellow, dense, moist, fine- to medium-grained sand, ~15% fines			49									
15															
			CLAYEY SAND (SC), brown, medium dense, wet, fine- to coarse-grained sand, ~20-25% fines			36									
20															
			Bottom of boring at approximately 21½ feet below the ground surface Groundwater measured at 20 feet at the end of drilling												

EXHIBIT "B" (Geotechnical Exploration)



LOG OF BORING HA-1

LATITUDE: 34.433018

LONGITUDE: -119.841326

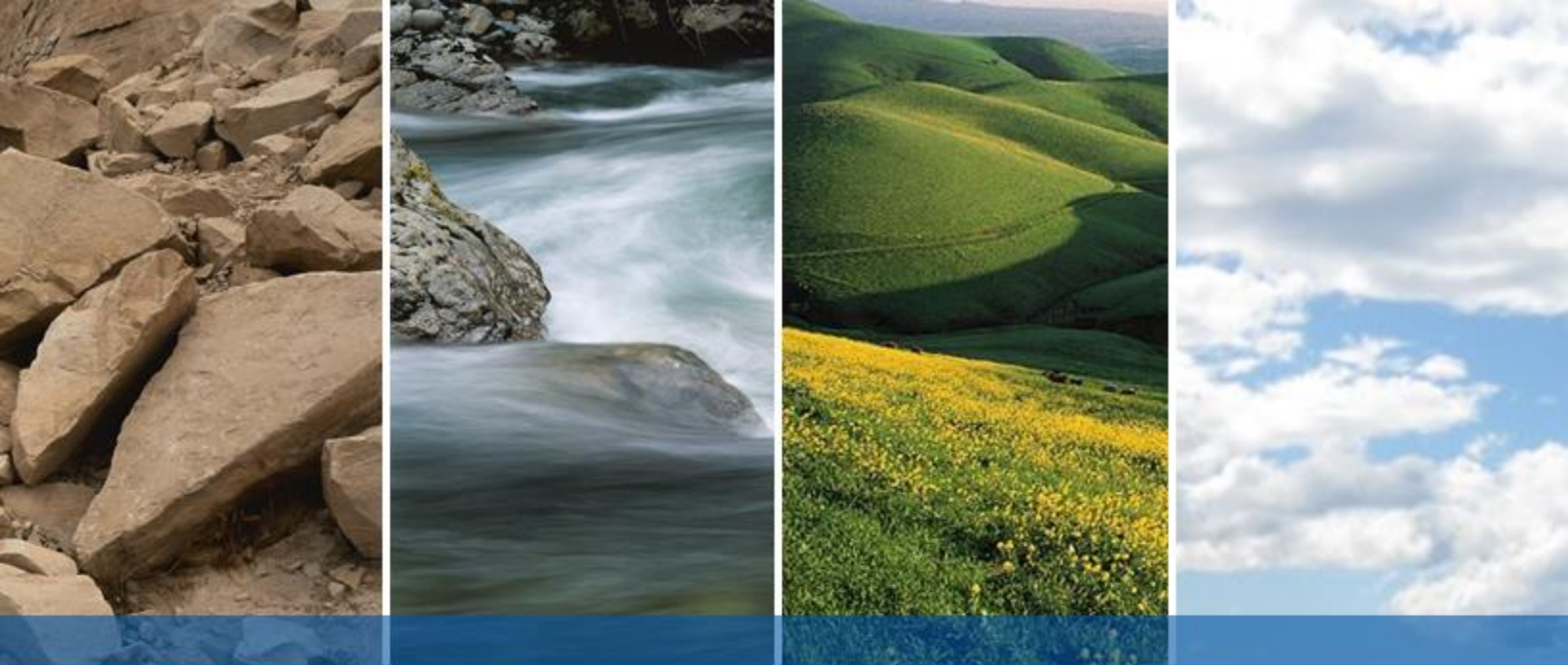
Geotechnical Exploration
Goleta Train Depot
Goleta, California
16370.000.000

DATE DRILLED: 7/17/2019
HOLE DEPTH: 13.5 ft.
HOLE DIAMETER: 4.0 in.
SURF ELEV (WGS 84): 9 ft.

LOGGED / REVIEWED BY: R. Hildebrant / RHB
DRILLING CONTRACTOR: N/A
DRILLING METHOD: Hand Auger
HAMMER TYPE: N/A

Depth in Feet	Elevation in Feet	Sample Type	DESCRIPTION	Log Symbol	Water Level	Blow Count/Foot	Atterberg Limits			Fines Content (% passing #200 sieve)	Moisture Content (% dry weight)	Dry Unit Weight (pcf)	Shear Strength (psf) *field approximation	Unconfined Strength (tsf) *field approximation	Strength Test Type
							Liquid Limit	Plastic Limit	Plasticity Index						
			CLAYEY SAND TO SANDY CLAY (SC-CL), dark brown, fine- to medium-grained sand, fine- to medium gravel, ~40% fines [FILL]												
5			LEAN CLAY WITH SAND (CL), reddish brown, moist, medium plasticity, fine- to medium-grained sand												
	5		CLAYEY SAND (SC), dark red, moist, fine- to medium-grained sand, ~20% fines												
	0		LEAN CLAY (CL), dark red, moist, medium plasticity												
10			CLAYEY SAND (SC), dark red, moist, fine- to medium-grained sand												
			SANDY CLAY (CL), dark red, moist, fine- to medium-grained sand												
			Bottom of boring at approximately 13½ feet below the ground surface No groundwater encountered during drilling												

EXHIBIT "B" (Geotechnical Exploration)



APPENDIX B

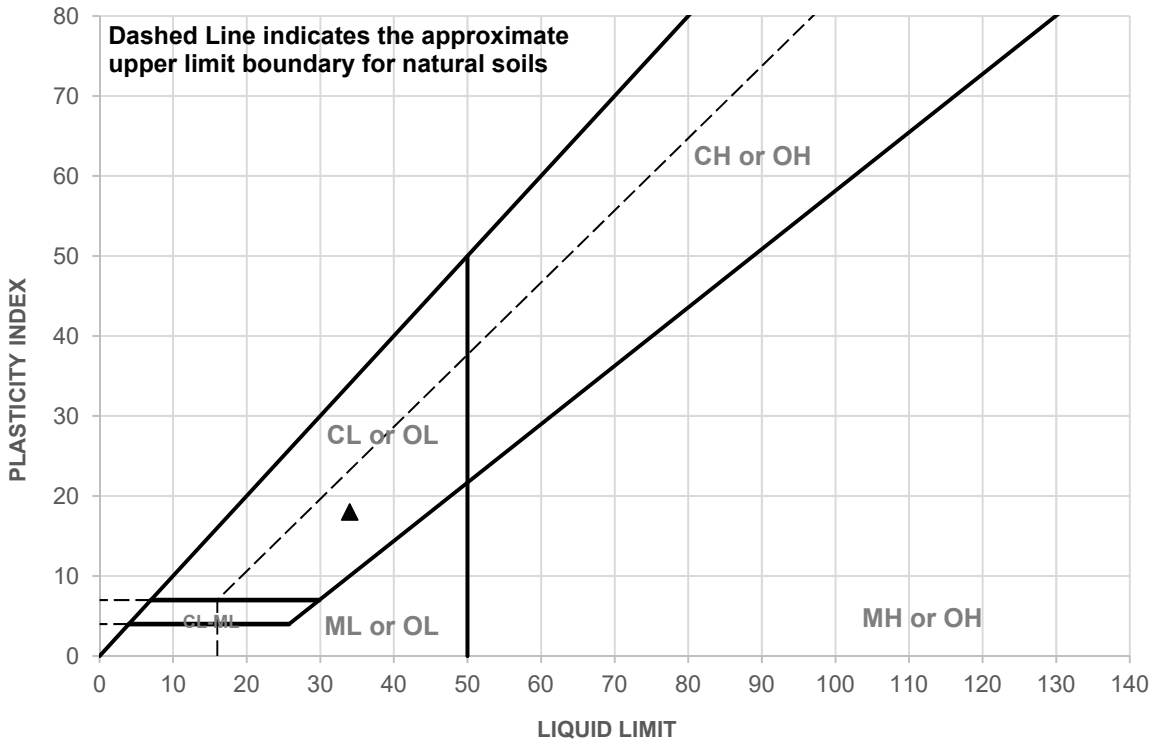
LABORATORY TEST DATA

**Liquid and Plastic Limits Test Report
Unconfined Compression Test
Particle Size Distribution Report
R-Value Test Report
Analytical Results of Soil Corrosion (2 pages)**

EXHIBIT "B" (Geotechnical Exploration)

LIQUID AND PLASTIC LIMITS TEST REPORT

ASTM D4318



SAMPLE ID	DEPTH	MATERIAL DESCRIPTION	LL	PL	PI
▲ 1-B4@8.0 ft	8.0 feet	See exploration logs	34	16	18

SAMPLE ID	TEST METHOD	REMARKS
▲ 1-B4@8.0 ft	PI: ASTM D4318, Wet Method	



CLIENT: Anil Verma Associates, Inc.

PROJECT NAME: City of Goleta Design for Train Station

PROJECT NO: 16370.000.000

PROJECT LOCATION: Goleta, California

REPORT DATE: 9/19/2019

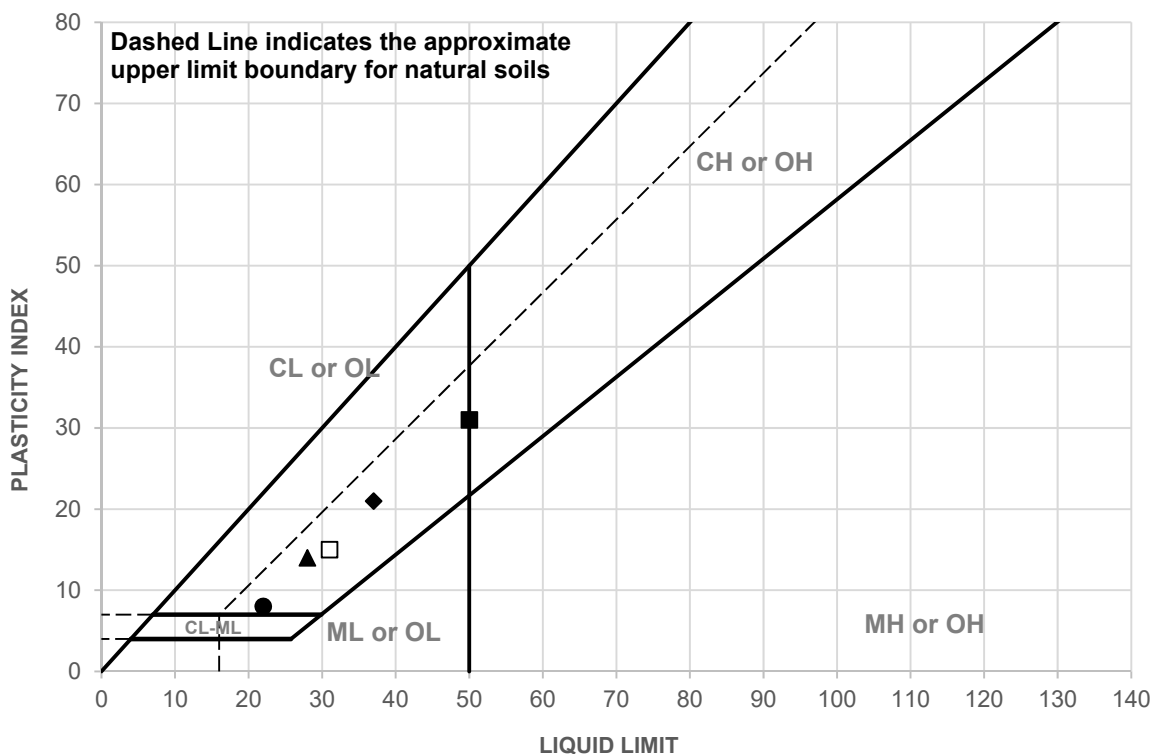
TESTED BY: G. Criste

REVIEWED BY: D. Seibold

EXHIBIT "B" (Geotechnical Exploration)

LIQUID AND PLASTIC LIMITS TEST REPORT

ASTM D4318



SAMPLE ID	DEPTH	MATERIAL DESCRIPTION	LL	PL	PI
▲	1-B1 (Bulk)	See exploration logs	28	14	14
◆	1-B2	1-3 feet	37	16	21
□	1-B2	6 feet	31	16	15
●	1-B3	1-3 feet	22	14	8
■	1-B3	3.5 feet	50	19	31

SAMPLE ID	TEST METHOD	REMARKS
▲	1-B1 (Bulk)	PI: ASTM D4318, Wet Method
◆	1-B2	PI: ASTM D4318, Wet Method
□	1-B2	PI: ASTM D4318, Wet Method
●	1-B3	PI: ASTM D4318, Wet Method
■	1-B3	PI: ASTM D4318, Wet Method



CLIENT: Anil Verma Associates, Inc.

PROJECT NAME: City of Goleta Design for Train Station

PROJECT NO: 16370.000.000

PROJECT LOCATION: Goleta, CA

REPORT DATE: 8/29/2019

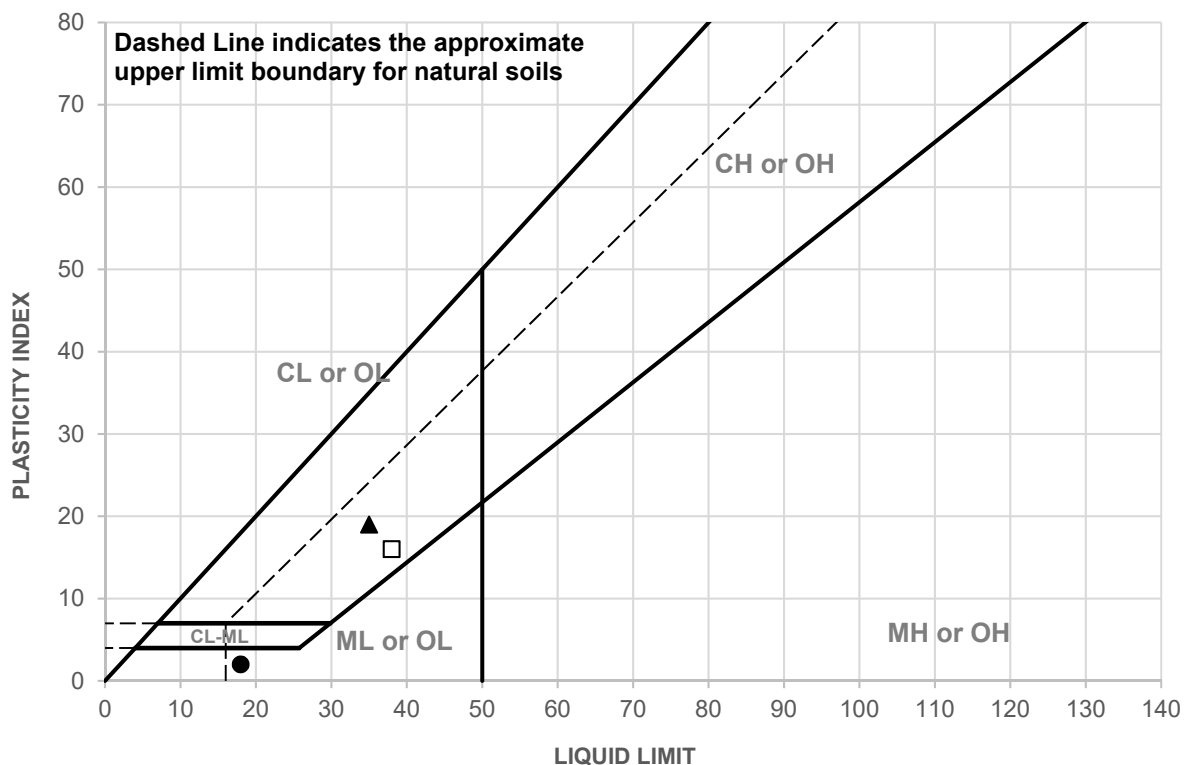
TESTED BY: L. Santo Domingo

REVIEWED BY: G. Criste

EXHIBIT "B" (Geotechnical Exploration)

LIQUID AND PLASTIC LIMITS TEST REPORT

ASTM D4318



	SAMPLE ID	DEPTH	MATERIAL DESCRIPTION	LL	PL	PI
▲	1-B3	8.5 feet	See exploration logs	35	16	19
◆	1-B3	32.5 feet	See exploration logs	27	NP	NP
□	1-B3	35 feet	See exploration logs	38	22	16
●	1-B4	3.5 feet	See exploration logs	18	16	2

	SAMPLE ID	TEST METHOD	REMARKS
▲	1-B3	PI: ASTM D4318, Wet Method	
◆	1-B3	PI: ASTM D4318, Wet Method	Could not roll to required 3.2 mm thickness
□	1-B3	PI: ASTM D4318, Wet Method	
●	1-B4	PI: ASTM D4318, Wet Method	



CLIENT: Anil Verma Associates, Inc.

PROJECT NAME: City of Goleta Design for Train Station

PROJECT NO: 16370.000.000

PROJECT LOCATION: Goleta, CA

REPORT DATE: 8/29/2019

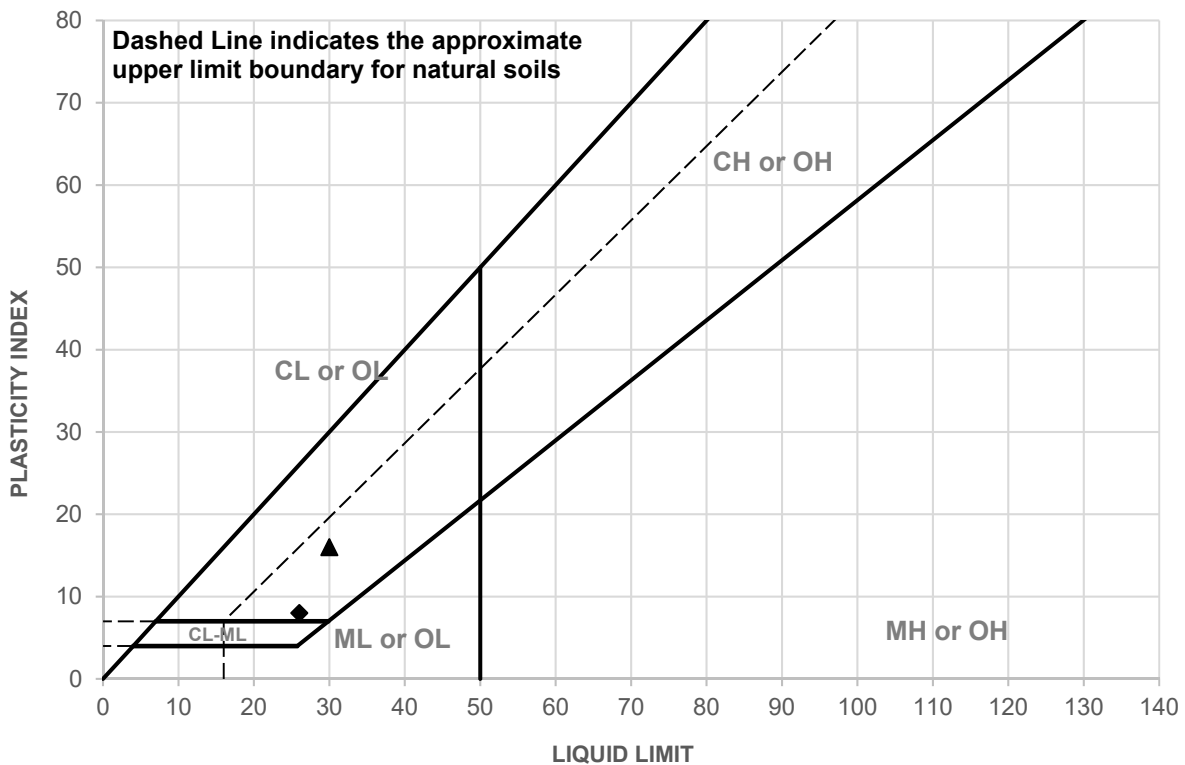
EXHIBIT "B" (Geotechnical Exploration)

TESTED BY: L. Santo Domingo

REVIEWED BY: G. Criste

LIQUID AND PLASTIC LIMITS TEST REPORT

ASTM D4318



SAMPLE ID	DEPTH	MATERIAL DESCRIPTION	LL	PL	PI
▲ 1-B5 (Bulk)		See exploration logs	30	14	16
◆ P2	1-3 feet	See exploration logs	26	18	8

SAMPLE ID	TEST METHOD	REMARKS
▲ 1-B5 (Bulk)	PI: ASTM D4318, Wet Method	
◆ P2	PI: ASTM D4318, Wet Method	



CLIENT: Anil Verma Associates, Inc.

PROJECT NAME: City of Goleta Design for Train Station

PROJECT NO: 16370.000.000

PROJECT LOCATION: Goleta, CA

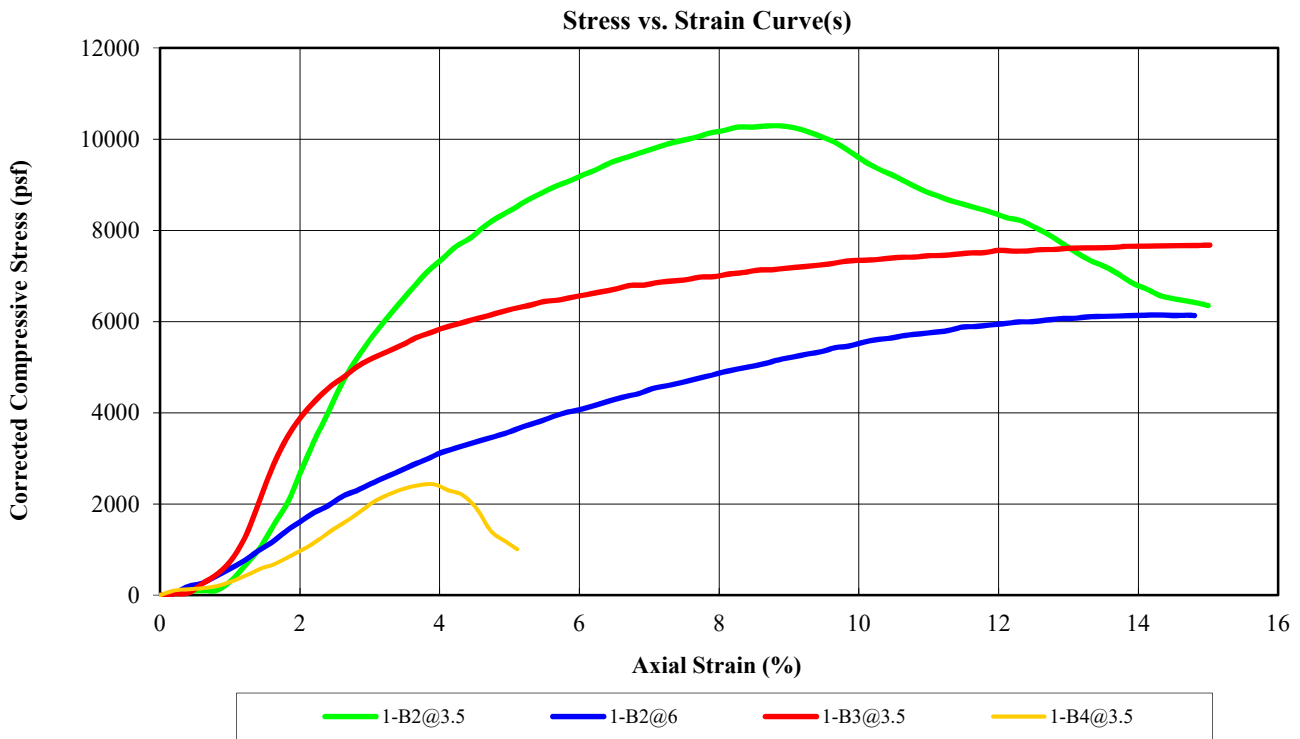
REPORT DATE: 8/29/2019

TESTED BY: L. Santo Domingo

REVIEWED BY: G. Criste

EXHIBIT "B" (Geotechnical Exploration)

UNCONFINED COMPRESSION TEST REPORT (ASTM D2166)



SPECIMEN				
BEFORE TEST	1-B2@3.5	1-B2@6	1-B3@3.5	1-B4@3.5
Moisture Content (%)	13.9	16.4	19.8	14.2
Dry Density (pcf)	120.0	115.7	107.8	119.6
Saturation (%)	97.2	100.0	98.3	98.0
Void Ratio	0.38	0.43	0.54	0.38
Diameter (in)	2.410	2.390	2.420	2.420
Height (in)	5.09	5.10	5.05	4.99
Height-To-Diameter Ratio	2.11	2.13	2.09	2.06
TEST DATA				
Unconfined Compressive Strength (psf)	10291	6146	7676	2430
Undrained Shear Strength (psf)	5146	3073	3838	1215
Strain Rate (in./min.)	0.05	0.05	0.05	0.05
Specific Gravity (Assumed)	2.650	2.650	2.650	2.650
Strain at Failure (%)	8.88	14.29	15.02	3.92
Liquid Limit				
Plastic Limit				
Test Remarks				
SPECIMEN	DESCRIPTION			
1-B2@3.5	See exploration logs			
1-B2@6	See exploration logs			
1-B3@3.5	See exploration logs			
1-B4@3.5	See exploration logs			

PROJECT NAME: City of Goleta Design for Train Station

Test Date: 08/28/19

PROJECT NO: 16370.000.000

Tested By: M. Quasem

CLIENT: Anil Verma Associates, Inc.

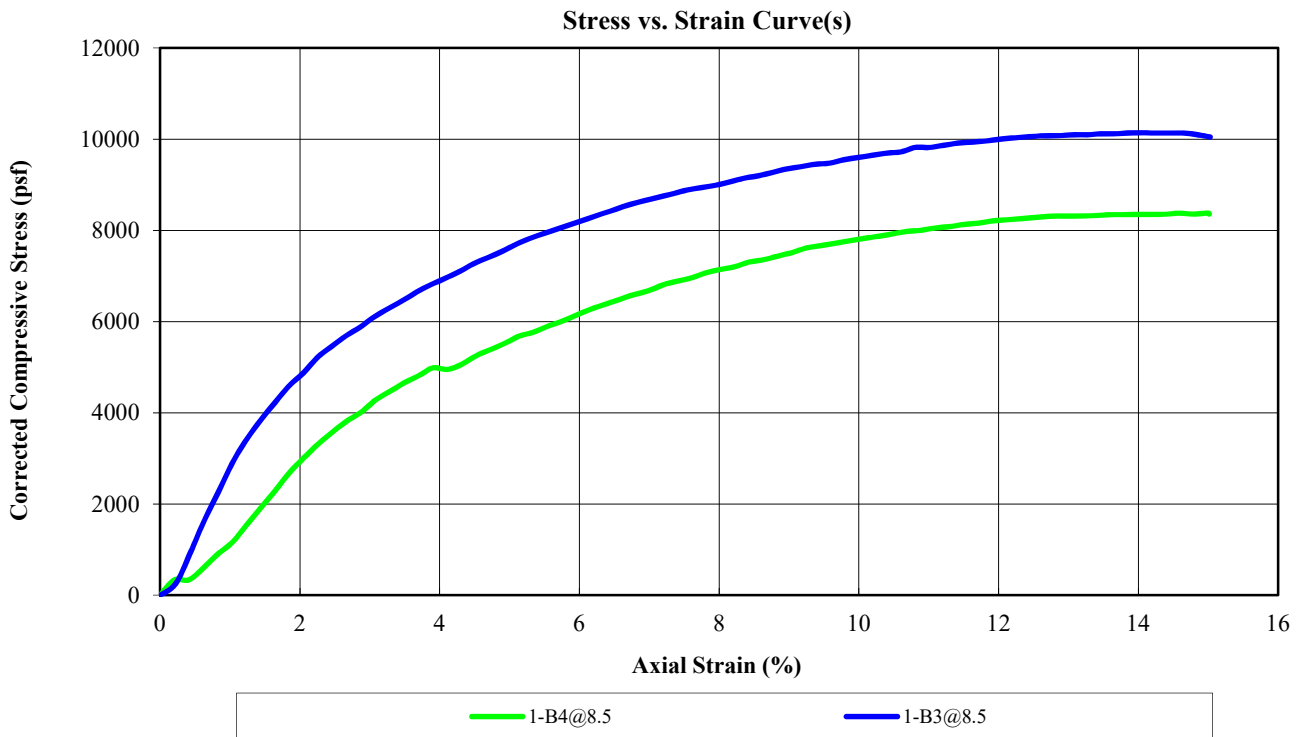
Reviewed By: G. Criste

LOCATION: Goleta, CA

PHASE NO: RIEM



UNCONFINED COMPRESSION TEST REPORT (ASTM D2166)



BEFORE TEST	SPECIMEN	
	1-B4@8.5	1-B3@8.5
Moisture Content (%)	15.1	16.9
Dry Density (pcf)	116.6	116.4
Saturation (%)	95.6	97.6
Void Ratio	0.42	0.46
Diameter (in)	2.420	2.396
Height (in)	5.00	5.04
Height-To-Diameter Ratio	2.07	2.10
TEST DATA		
Unconfined Compressive Strength (psf)	8380	10138
Undrained Shear Strength (psf)	4190	5069
Strain Rate (in./min.)	0.05	0.05
Specific Gravity (Assumed)	2.650	2.650
Strain at Failure (%)	15.00	13.86
Liquid Limit		
Plastic Limit		
Test Remarks		
SPECIMEN	DESCRIPTION	
1-B4@8.5	See exploration logs	
1-B3@8.5	See exploration logs	

PROJECT NAME: City of Goleta Design for Train Station

Test Date: 08/28/19

PROJECT NO: 16370.000.000

Tested By: M. Quasem

CLIENT: Anil Verma Associates, Inc.

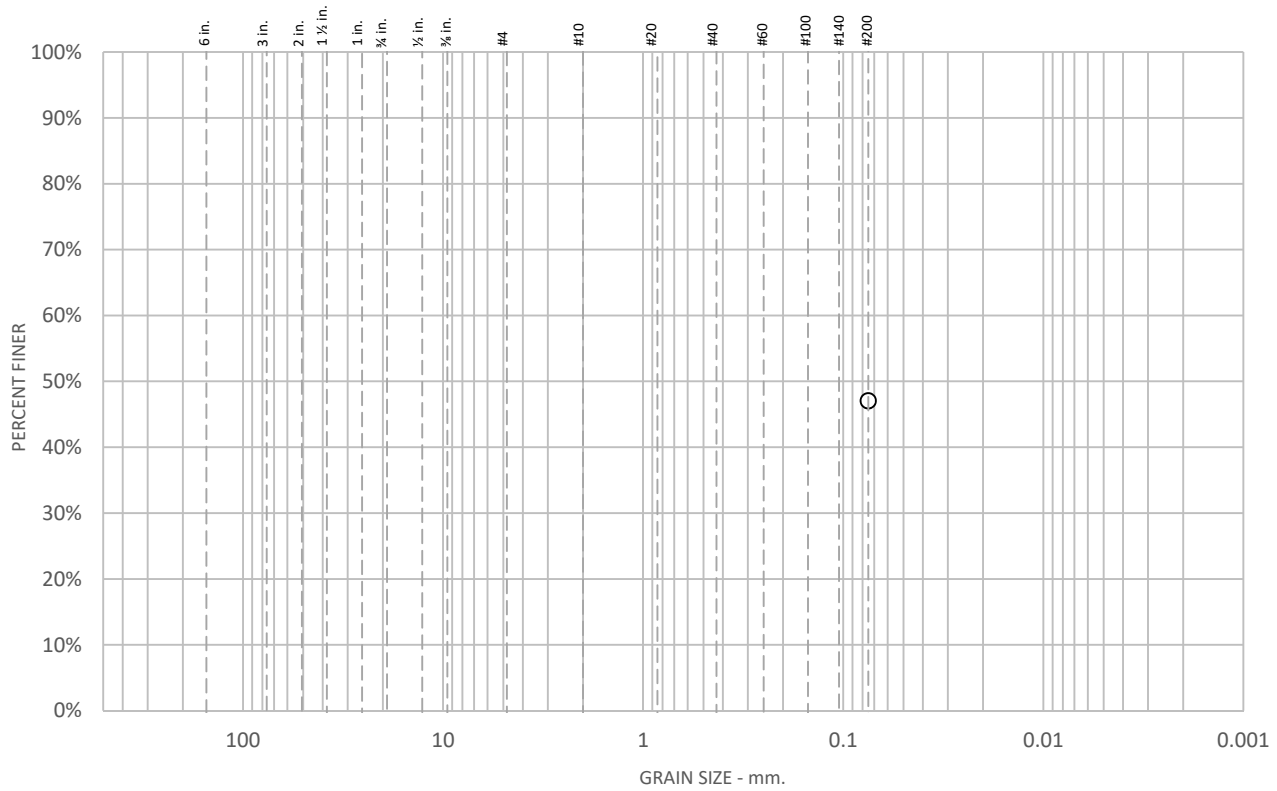
Reviewed By: G. Criste

LOCATION: Goleta, CA

PHASE NO: RIEM



Particle Size Distribution Report



% +75mm	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
						47.0	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#200	47.0		

Soil Description

See exploration logs

Atterberg Limits

PL = 14 LL = 28 PI = 14

Coefficients

D₉₀ = D₈₅ = D₆₀ =
D₅₀ = D₃₀ = D₁₅ =
D₁₀ = C_u = C_c =

Classification

USCS =

Remarks

PI: ASTM D4318, Wet Method ASTM D1140, Method B
Soak time = 180 min
Dry sample weight = 142.82 g

* (no specification provided)

Sample Number: 1-B1 (Bulk)

Client: Anil Verma Associates, Inc.

Project Number: 16370.000.000

Project: City of Goleta Design for Trian Station

Date: 8/30/2019

Project location: Goleta, CA



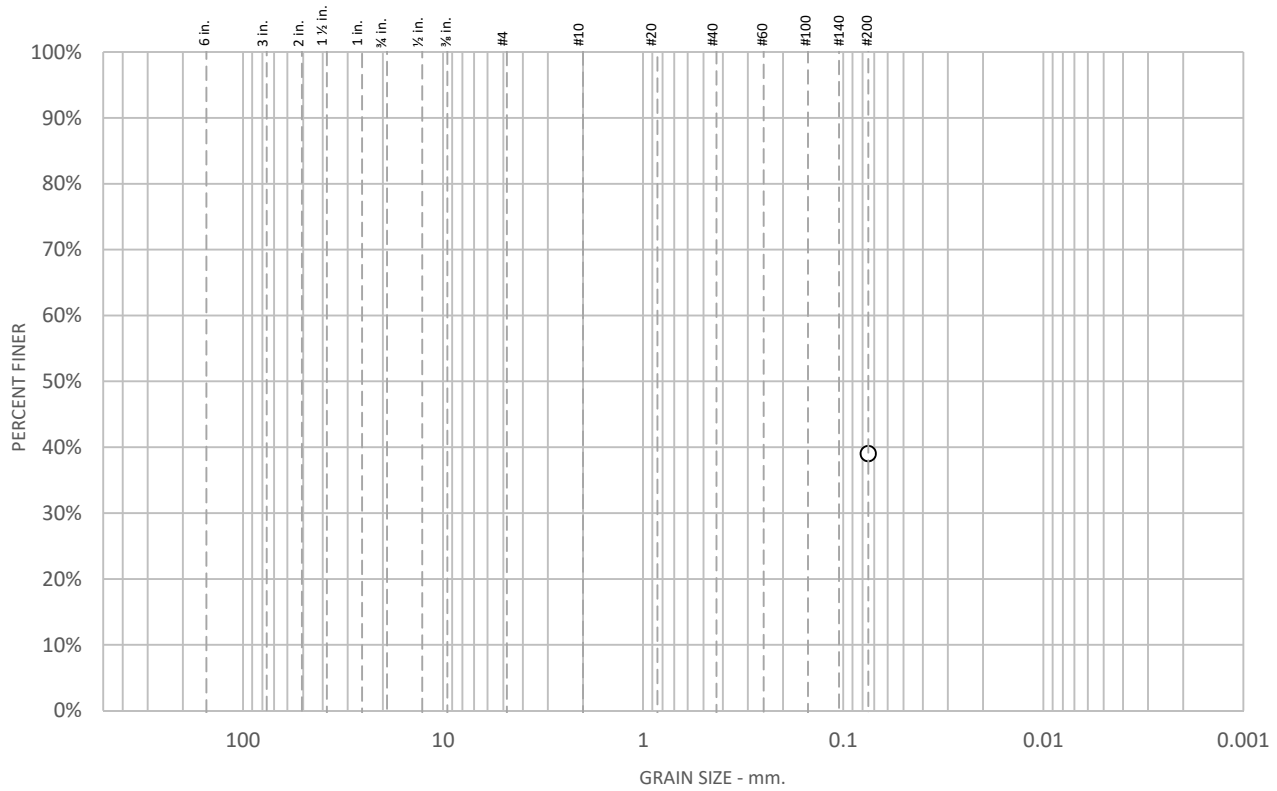
EXHIBIT "B" (Geotechnical Exploration)

Tested By: L. Santo Domingo

Checked By: M. Quasem

Test Location: 3420 Fostoria Way, Suite E, Danville, CA 94526

Particle Size Distribution Report



% +75mm	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
						39.0	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#200	39.0		

Soil Description

See exploration logs

Atterberg Limits

PL = LL = PI =

Coefficients

D₉₀ = D₈₅ = D₆₀ =
 D₅₀ = D₃₀ = D₁₅ =
 D₁₀ = C_u = C_c =

Classification

USCS =

Remarks

ASTM D1140, Method B
 Soak time = 180 min
 Dry sample weight = 44.85 g

* (no specification provided)

Sample Number: 1-B2 @ 10.5

Client: Anil Verma Associates, Inc.

Project Number: 16370.000.000

Project: City of Goleta Design for Trian Station

Date: 8/30/2019

Project location: Goleta, CA



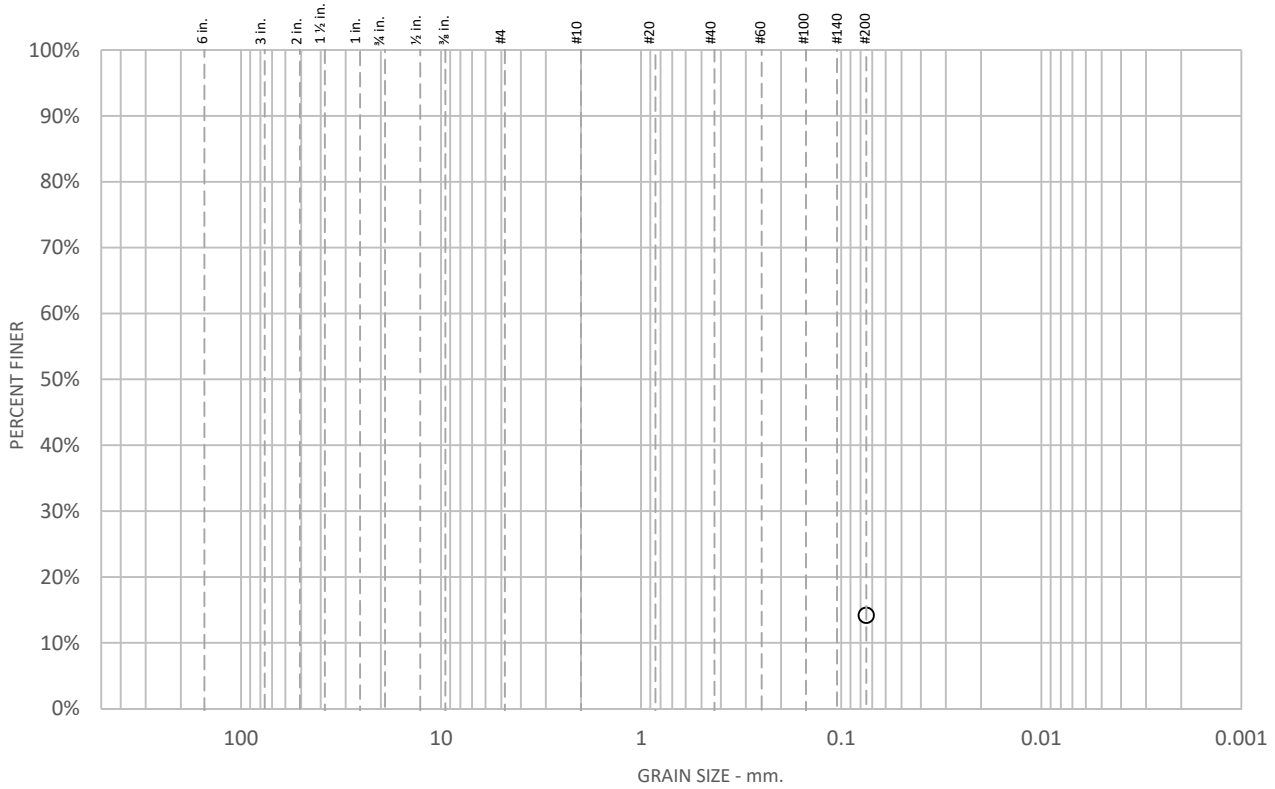
EXHIBIT "B" (Geotechnical Exploration)

Tested By: L. Santo Domingo

Checked By: M. Quasem

Test Location: 3420 Fostoria Way, Suite E, Danville, CA 94526

Particle Size Distribution Report



% +75mm	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
						14.2	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#200	14.2		

Soil Description

See exploration logs

Atterberg Limits

PL = LL = PI =

Coefficients

D₉₀ = D₈₅ = D₆₀ =
 D₅₀ = D₃₀ = D₁₅ =
 D₁₀ = C_u = C_c =

Classification

USCS =

Remarks

ASTM D1140, Method B
 Soak time = 180 min
 Dry sample weight = 118.52 g

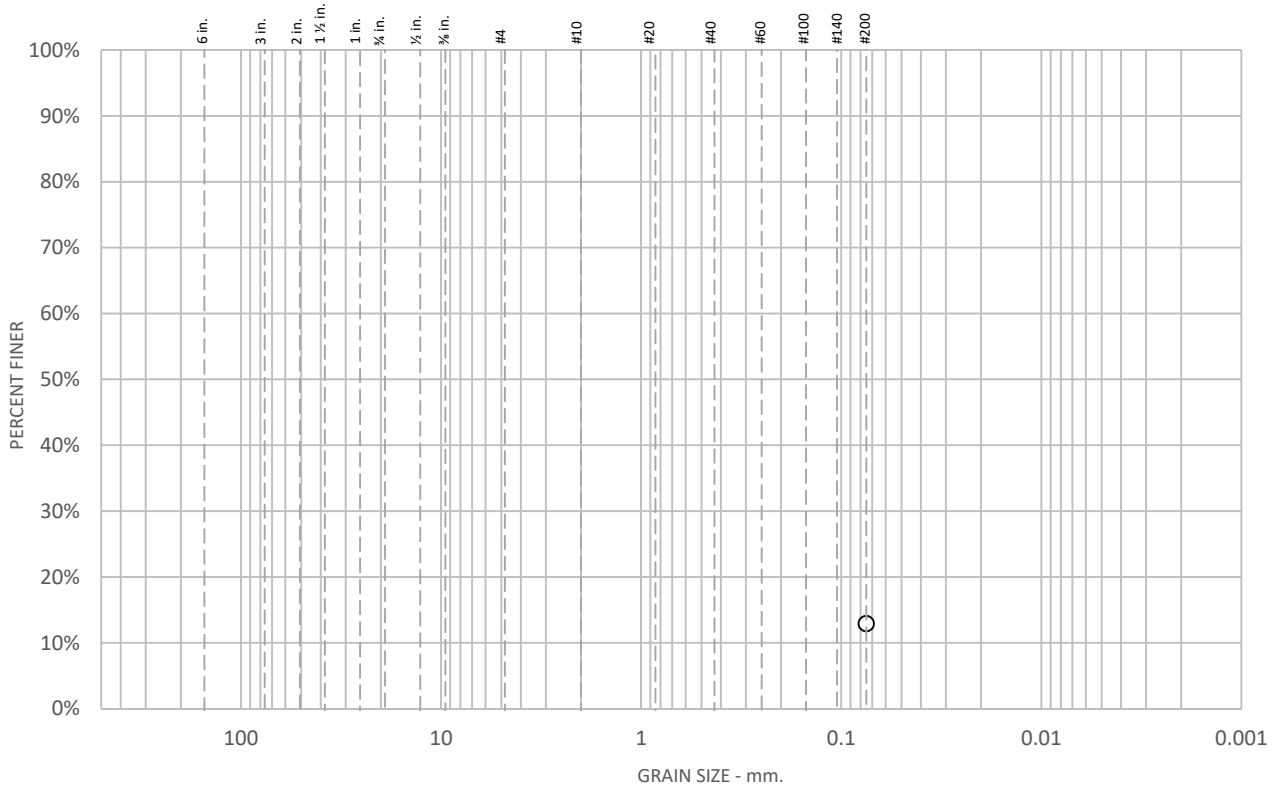
* (no specification provided)

Sample Number: 1-B2 @ 16.5 Client: Anil Verma Associates, Inc. Project: City of Goleta Design for Trian Station Project location: Goleta, CA	Project Number: 16370.000.000 Date: 8/30/2019	
Tested By: L. Santo Domingo		Checked By: M. Quasem

EXHIBIT "B" (Geotechnical Exploration)

Test Location: 3420 Fostoria Way, Suite E, Danville, CA 94526

Particle Size Distribution Report



% +75mm	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
						12.9	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#200	12.9		

Soil Description

See exploration logs

Atterberg Limits

PL = LL = PI =

Coefficients

D₉₀ = D₈₅ = D₆₀ =
 D₅₀ = D₃₀ = D₁₅ =
 D₁₀ = C_u = C_c =

Classification

USCS =

Remarks

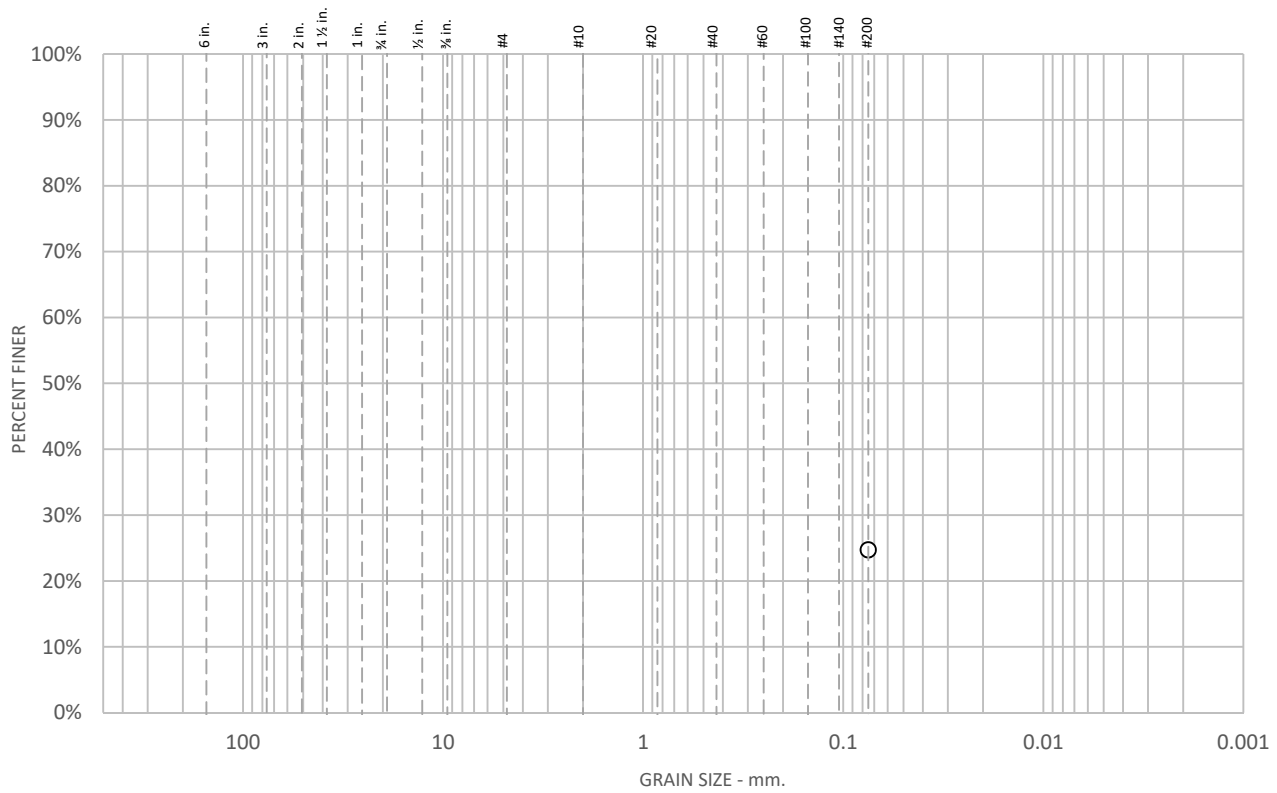
ASTM D1140, Method B
 Soak time = 180 min
 Dry sample weight = 107.75 g

* (no specification provided)

Sample Number: 1-B2 @ 20.5 Client: Anil Verma Associates, Inc. Project: City of Goleta Design for Trian Station Project location: Goleta, CA	Project Number: 16370.000.000 Date: 8/30/2019	
Tested By: L. Santo Domingo	Checked By: M. Quasem	EXHIBIT "B" (Geotechnical Exploration)

Test Location: 3420 Fostoria Way, Suite E, Danville, CA 94526

Particle Size Distribution Report



% +75mm	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
						24.7	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#200	24.7		

Soil Description

See exploration logs

Atterberg Limits

PL = LL = PI =

Coefficients

D₉₀ = D₈₅ = D₆₀ =
 D₅₀ = D₃₀ = D₁₅ =
 D₁₀ = C_u = C_c =

Classification

USCS =

Remarks

ASTM D1140, Method B
 Soak time = 180 min
 Dry sample weight = 227.5 g

* (no specification provided)

Sample Number: 1-B2 @ 25.5

Client: Anil Verma Associates, Inc.

Project Number: 16370.000.000

Project: City of Goleta Design for Trian Station

Date: 8/30/2019

Project location: Goleta, CA



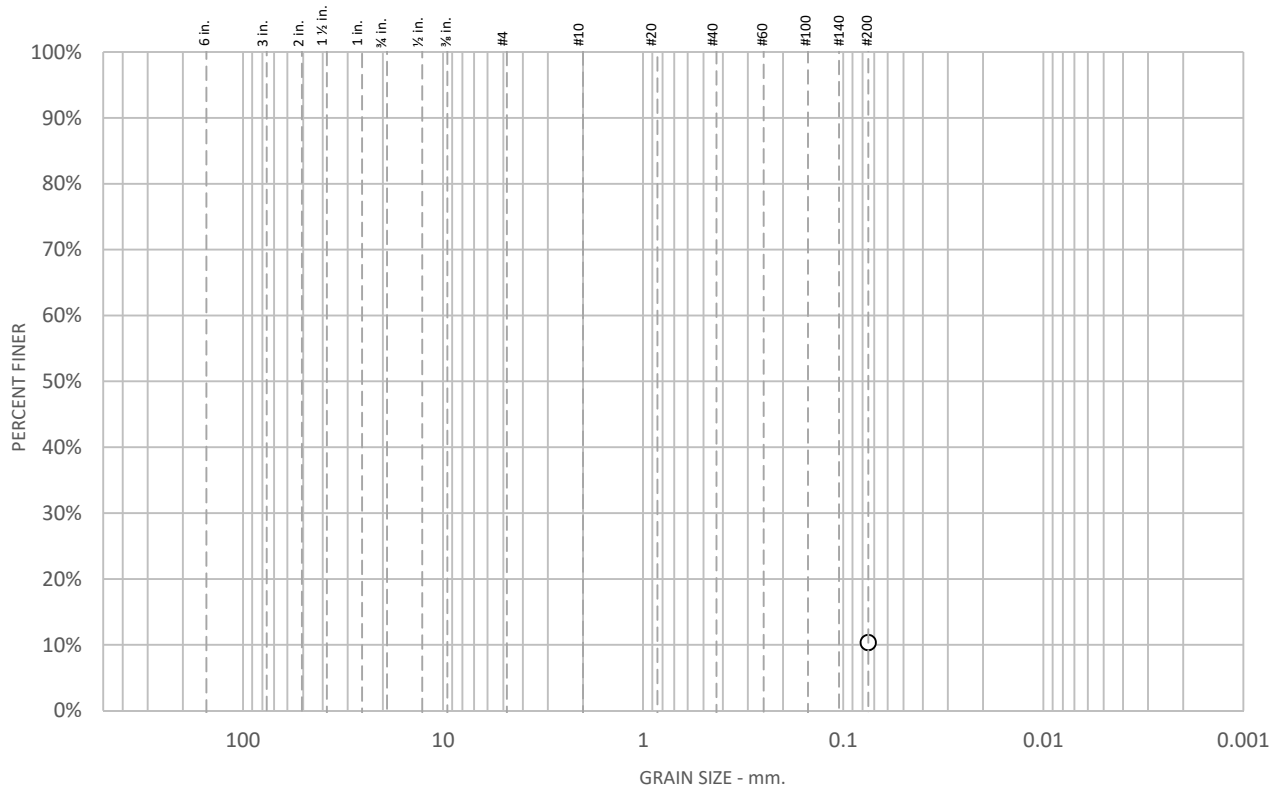
EXHIBIT "B" (Geotechnical Exploration)

Tested By: L. Santo Domingo

Checked By: M. Quasem

Test Location: 3420 Fostoria Way, Suite E, Danville, CA 94526

Particle Size Distribution Report



% +75mm	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
						10.3	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#200	10.3		

Soil Description

See exploration logs

Atterberg Limits

PL = LL = PI =

Coefficients

D₉₀ = D₈₅ = D₆₀ =
 D₅₀ = D₃₀ = D₁₅ =
 D₁₀ = C_u = C_c =

Classification

USCS =

Remarks

ASTM D1140, Method B
 Soak time = 180 min
 Dry sample weight = 166.76 g

* (no specification provided)

Sample Number: 1-B2 @ 35

Client: Anil Verma Associates, Inc.

Project Number: 16370.000.000

Project: City of Goleta Design for Trian Station

Date: 8/30/2019

Project location: Goleta, CA



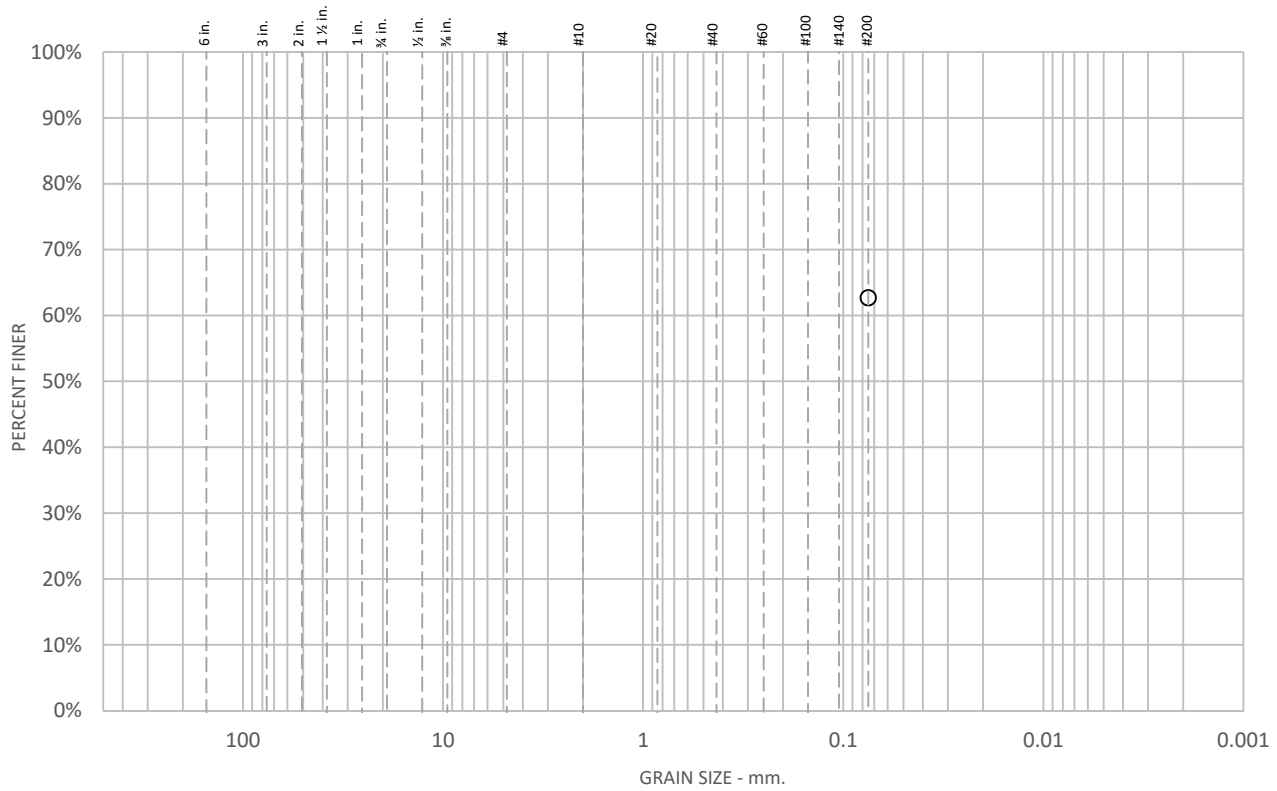
EXHIBIT "B" (Geotechnical Exploration)

Tested By: L. Santo Domingo

Checked By: M. Quasem

Test Location: 3420 Fostoria Way, Suite E, Danville, CA 94526

Particle Size Distribution Report



% +75mm	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
						62.7	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#200	62.7		

Soil Description

See exploration logs

Atterberg Limits

PL = LL = PI =

Coefficients

D₉₀ = D₈₅ = D₆₀ =
 D₅₀ = D₃₀ = D₁₅ =
 D₁₀ = C_u = C_c =

Classification

USCS =

Remarks

ASTM D1140, Method B
 Soak time = 180 min
 Dry sample weight = 122.7 g

* (no specification provided)

Sample Number: 1-B3 @ 11

Client: Anil Verma Associates, Inc.

Project Number: 16370.000.000

Project: City of Goleta Design for Trian Station

Date: 8/30/2019

Project location: Goleta, CA



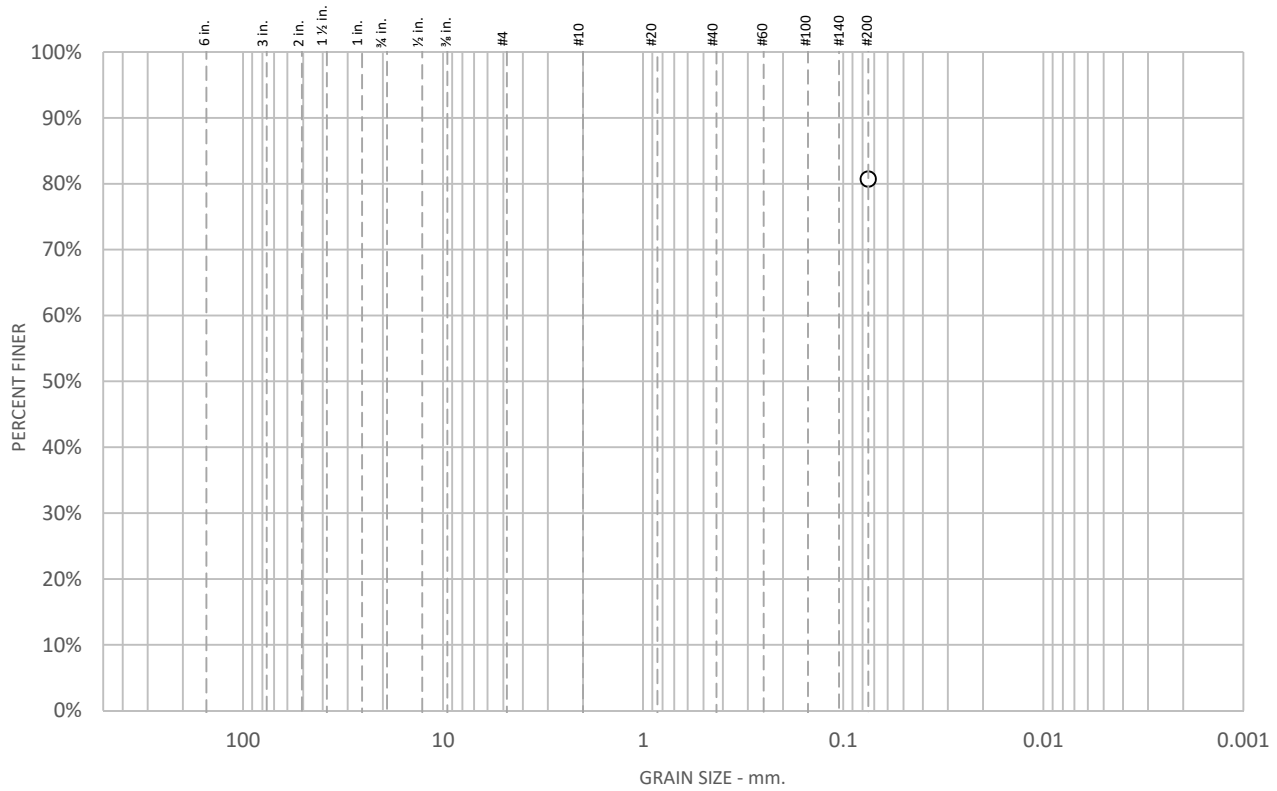
EXHIBIT "B" (Geotechnical Exploration)

Tested By: L. Santo Domingo

Checked By: M. Quasem

Test Location: 3420 Fostoria Way, Suite E, Danville, CA 94526

Particle Size Distribution Report



% +75mm	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
						80.7	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#200	80.7		

Soil Description

See exploration logs

Atterberg Limits

PL = LL = PI =

Coefficients

D₉₀ = D₈₅ = D₆₀ =
D₅₀ = D₃₀ = D₁₅ =
D₁₀ = C_u = C_c =

Classification

USCS =

Remarks

ASTM D1140, Method B
Soak time = 180 min
Dry sample weight = 159.2 g

* (no specification provided)

Sample Number: 1-B3 @ 15

Client: Anil Verma Associates, Inc.

Project Number: 16370.000.000

Project: City of Goleta Design for Trian Station

Date: 8/30/2019

Project location: Goleta, CA



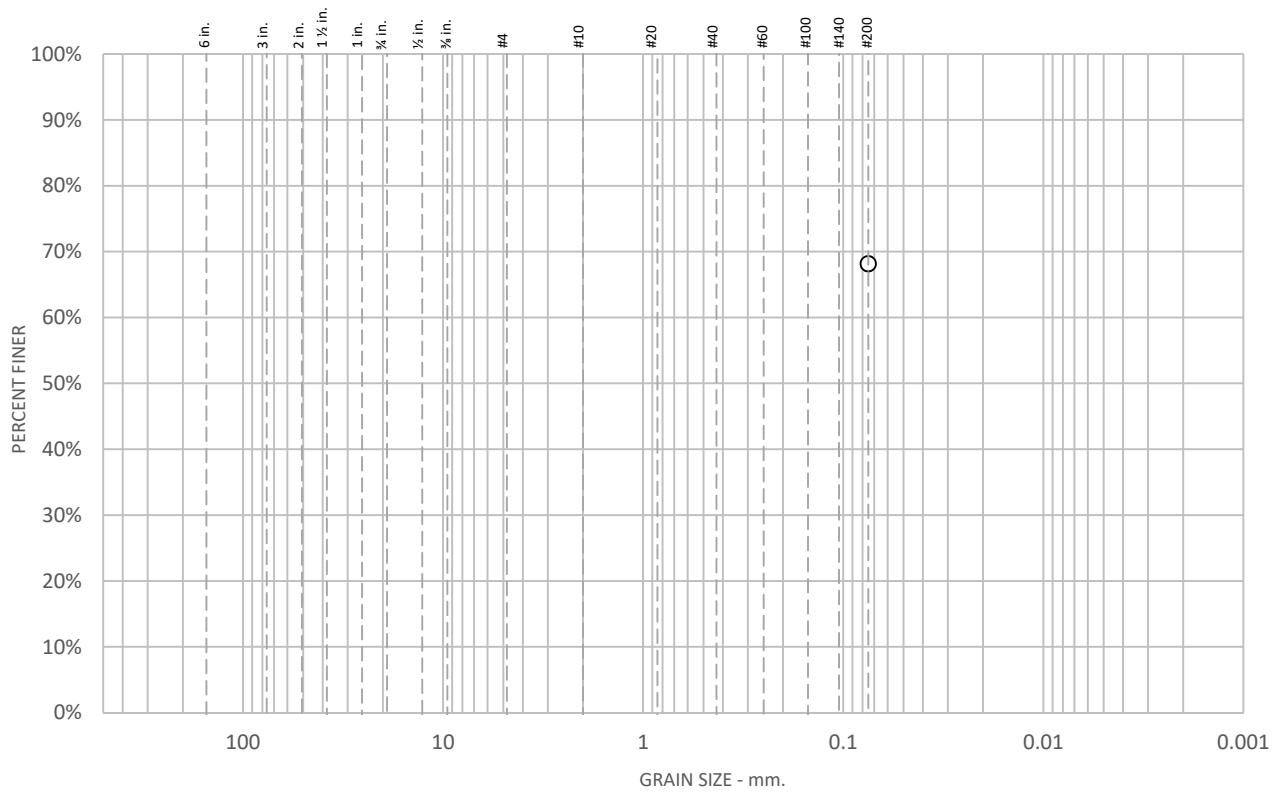
EXHIBIT "B" (Geotechnical Exploration)

Tested By: L. Santo Domingo

Checked By: M. Quasem

Test Location: 3420 Fostoria Way, Suite E, Danville, CA 94526

Particle Size Distribution Report



% +75mm	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
						68.1	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#200	68.1		

Soil Description

See exploration logs

Atterberg Limits

PL = LL = PI =

Coefficients

D₉₀ = D₈₅ = D₆₀ =
 D₅₀ = D₃₀ = D₁₅ =
 D₁₀ = C_u = C_c =

Classification

USCS =

Remarks

ASTM D1140, Method B
 Soak time = 180 min
 Dry sample weight = 131.42 g

* (no specification provided)

Sample Number: 1-B3 @ 20

Client: Anil Verma Associates, Inc.

Project Number: 16370.000.000

Project: City of Goleta Design for Trian Station

Date: 8/30/2019

Project location: Goleta, CA



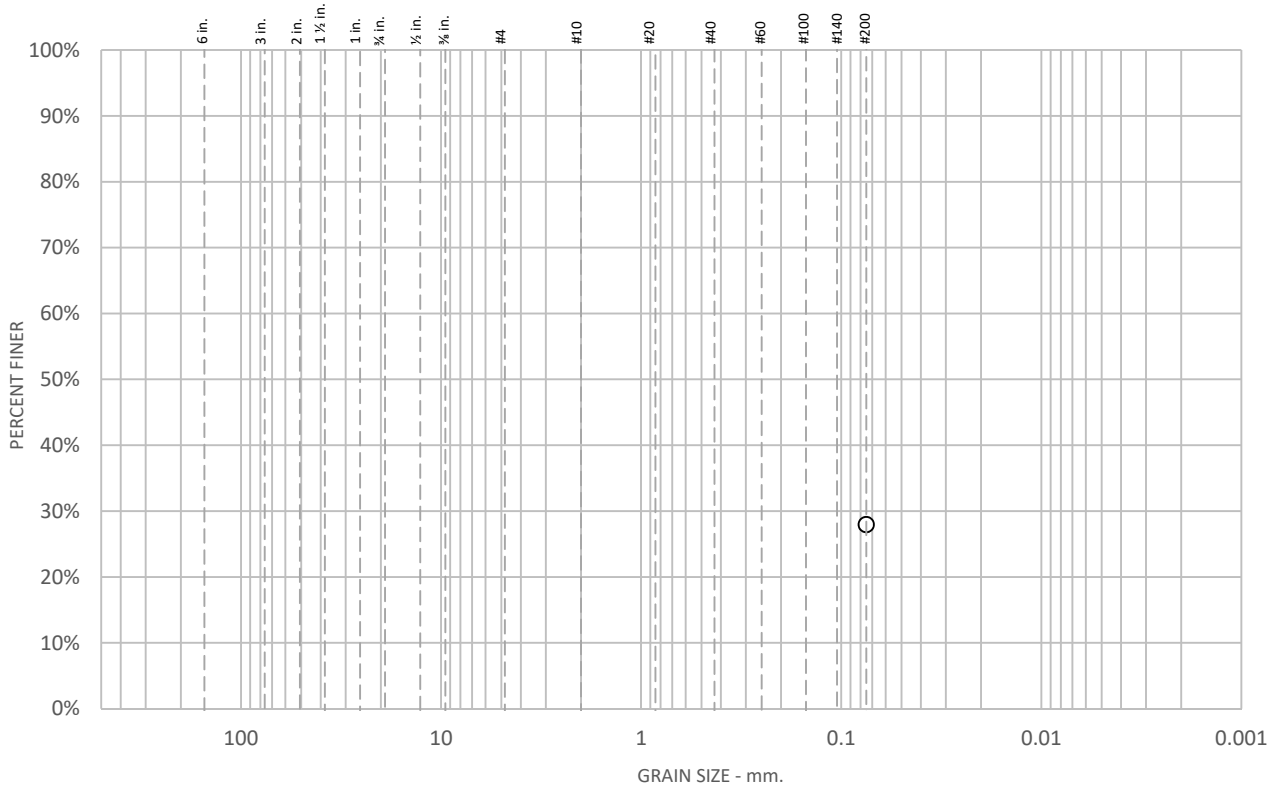
EXHIBIT "B" (Geotechnical Exploration)

Tested By: L. Santo Domingo

Checked By: M. Quasem

Test Location: 3420 Fostoria Way, Suite E, Danville, CA 94526

Particle Size Distribution Report



% +75mm	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
						28.0	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#200	28.0		

Soil Description

See exploration logs

Atterberg Limits

PL = LL = PI =

Coefficients

D₉₀ = D₈₅ = D₆₀ =
 D₅₀ = D₃₀ = D₁₅ =
 D₁₀ = C_u = C_c =

Classification

USCS =

Remarks

ASTM D1140, Method B
 Soak time = 180 min
 Dry sample weight = 109.97 g

* (no specification provided)

Sample Number: 1-B3 @ 25

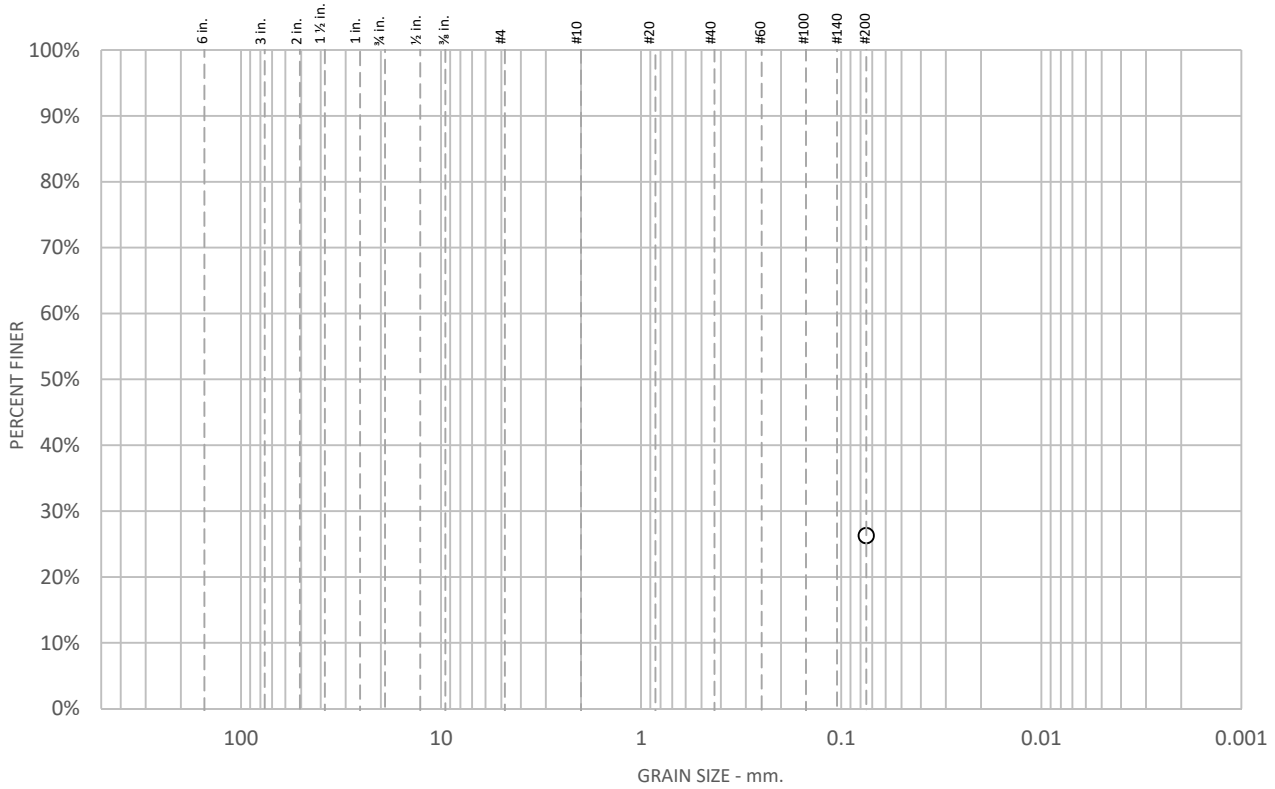
Client: Anil Verma Associates, Inc.	Project Number: 16370.000.000	ENGEO <i>Expect Excellence</i>
Project: City of Goleta Design for Trian Station	Date: 8/30/2019	
Project location: Goleta, CA		

EXHIBIT "B" (Geotechnical Exploration)

Tested By: L. Santo Domingo **Checked By:** M. Quasem

Test Location: 3420 Fostoria Way, Suite E, Danville, CA 94526

Particle Size Distribution Report



% +75mm	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
						26.3	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#200	26.3		

Soil Description

See exploration logs

Atterberg Limits

PL = LL = PI =

Coefficients

D₉₀ = D₈₅ = D₆₀ =
 D₅₀ = D₃₀ = D₁₅ =
 D₁₀ = C_u = C_c =

Classification

USCS =

Remarks

ASTM D1140, Method B
 Soak time = 180 min
 Dry sample weight = 185.99 g

* (no specification provided)

Sample Number: 1-B3 @ 30

Client: Anil Verma Associates, Inc.

Project Number: 16370.000.000

Project: City of Goleta Design for Trian Station

Date: 8/30/2019

Project location: Goleta, CA



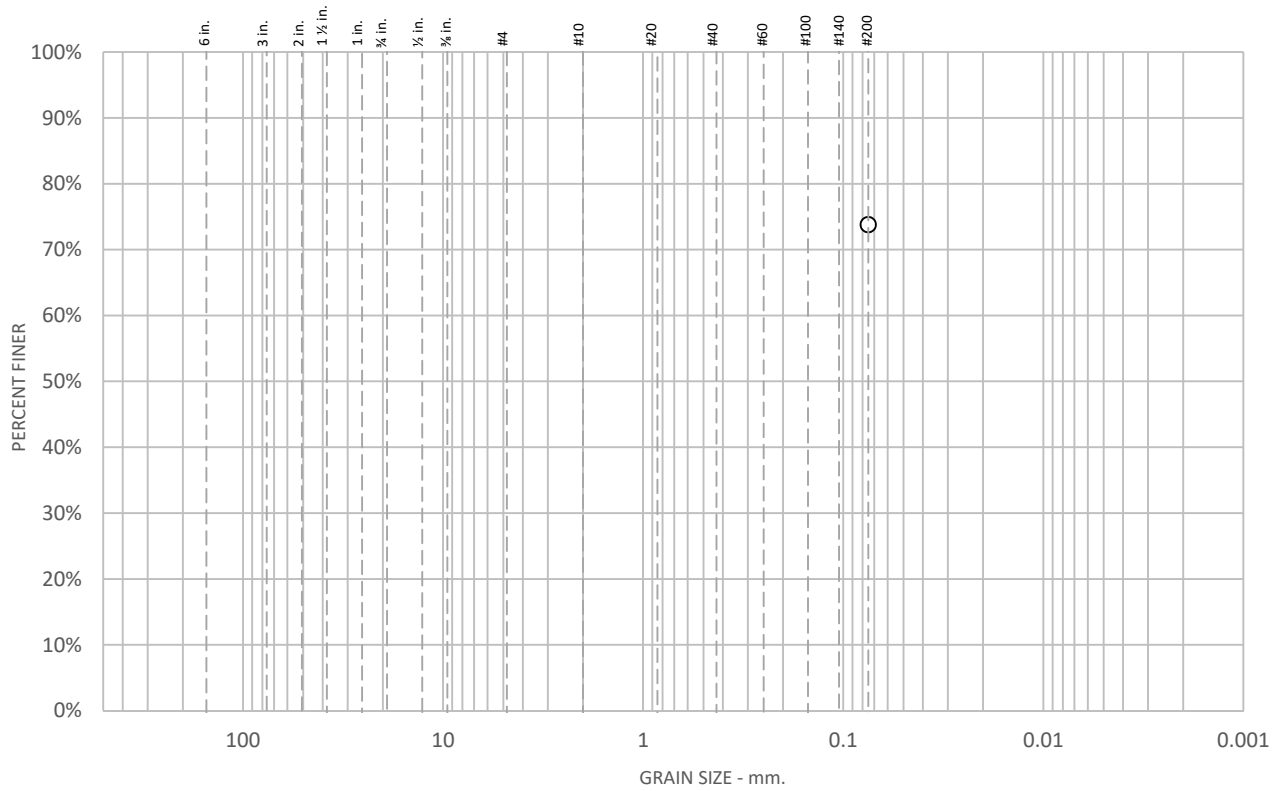
EXHIBIT "B" (Geotechnical Exploration)

Tested By: L. Santo Domingo

Checked By: M. Quasem

Test Location: 3420 Fostoria Way, Suite E, Danville, CA 94526

Particle Size Distribution Report



% +75mm	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
						73.8	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#200	73.8		

Soil Description

See exploration logs

Atterberg Limits

PL = NP LL = NV PI = NP

Coefficients

D₉₀ = D₈₅ = D₆₀ =
 D₅₀ = D₃₀ = D₁₅ =
 D₁₀ = C_u = C_c =

Classification

USCS =

Remarks

PI: ASTM D4318, Wet Method ASTM D1140, Method B
 Soak time = 180 min
 Dry sample weight = 109.91 g

* (no specification provided)

Sample Number: 1-B3 @ 32.5

Client: Anil Verma Associates, Inc.

Project Number: 16370.000.000

Project: City of Goleta Design for Trian Station

Date: 8/30/2019

Project location: Goleta, CA



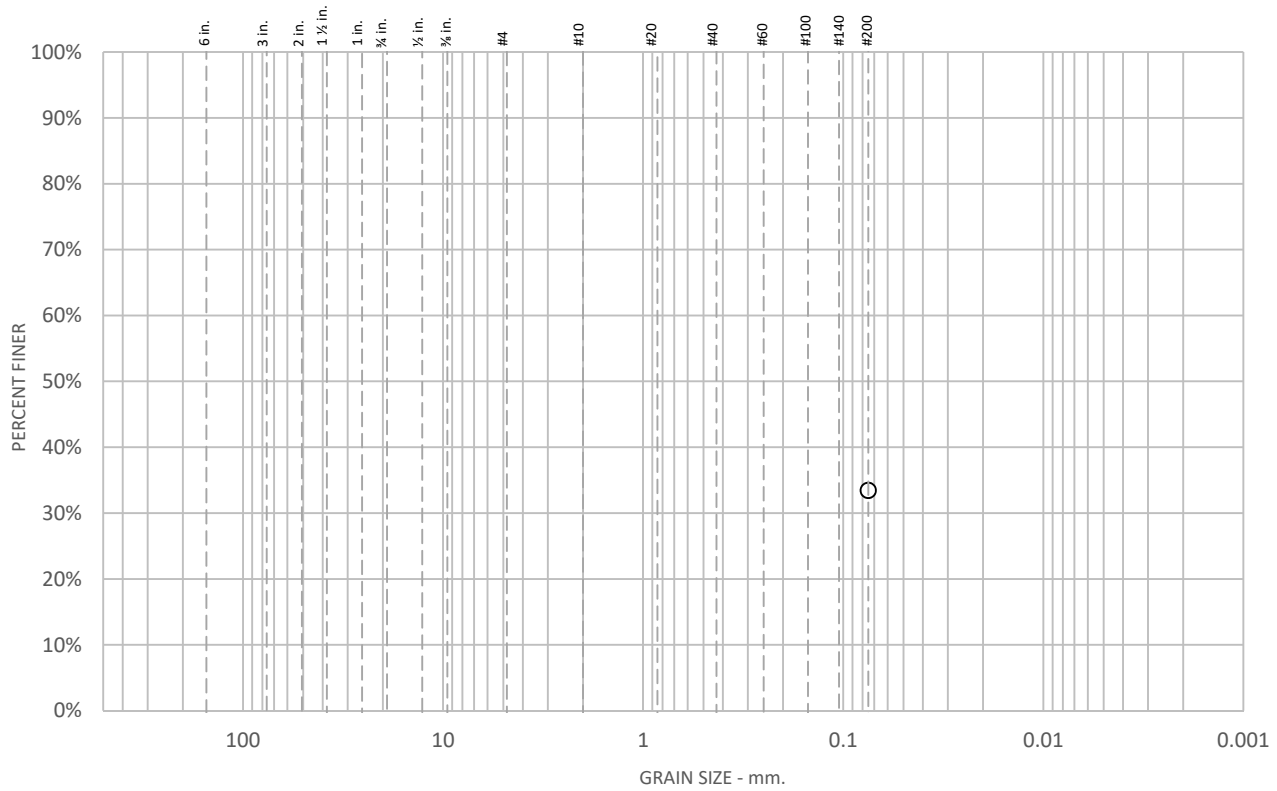
EXHIBIT "B" (Geotechnical Exploration)

Tested By: L. Santo Domingo

Checked By: M. Quasem

Test Location: 3420 Fostoria Way, Suite E, Danville, CA 94526

Particle Size Distribution Report



% +75mm	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
						33.4	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#200	33.4		

* (no specification provided)

Soil Description

See exploration logs

Atterberg Limits

PL = LL = PI =

Coefficients

D₉₀ = D₈₅ = D₆₀ =
D₅₀ = D₃₀ = D₁₅ =
D₁₀ = C_u = C_c =

Classification

USCS =

Remarks

ASTM D1140, Method B
Soak time = 180 min
Dry sample weight = 174.65 g

Sample Number: 1-B4 @ 20

Client: Anil Verma Associates, Inc.

Project Number: 16370.000.000

Project: City of Goleta Design for Trian Station

Date: 8/30/2019

Project location: Goleta, CA



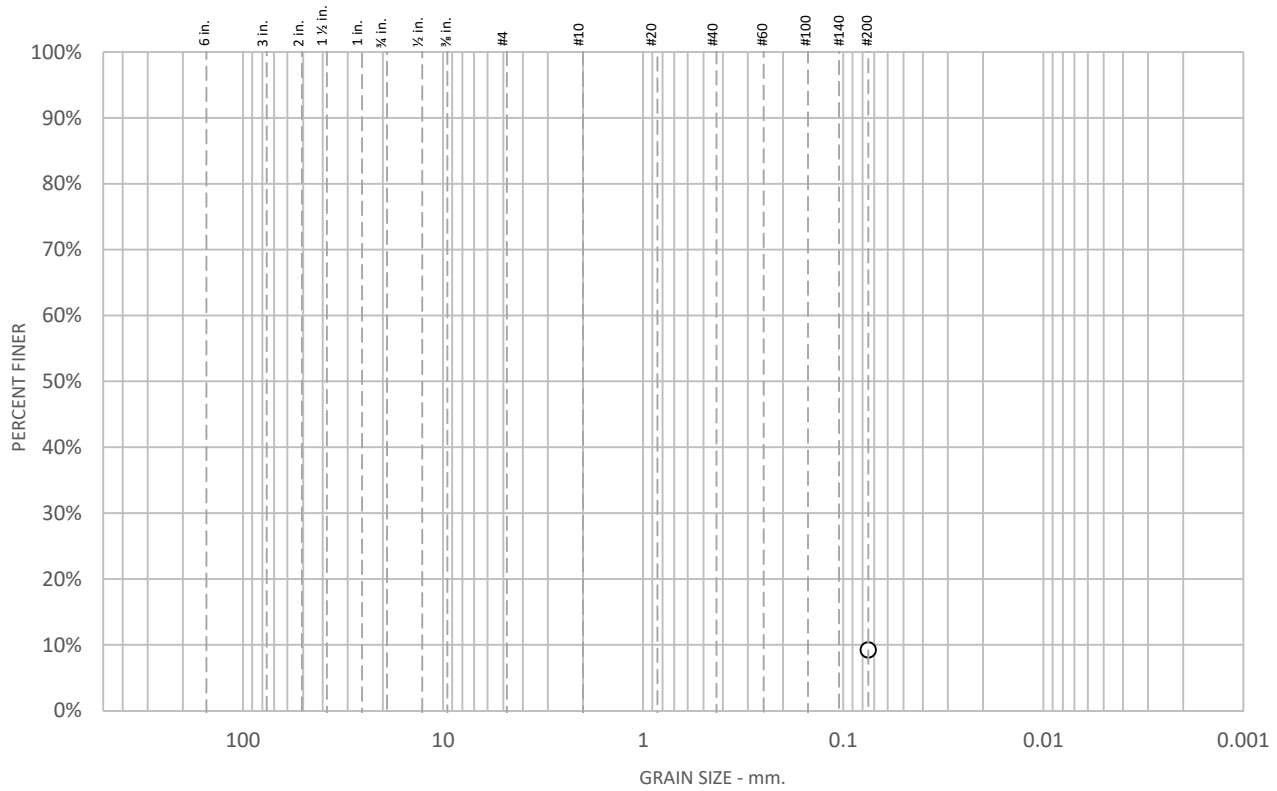
EXHIBIT "B" (Geotechnical Exploration)

Tested By: L. Santo Domingo

Checked By: M. Quasem

Test Location: 3420 Fostoria Way, Suite E, Danville, CA 94526

Particle Size Distribution Report



% +75mm	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
						9.2	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#200	9.2		

Soil Description

See exploration logs

Atterberg Limits

PL = LL = PI =

Coefficients

D₉₀ = D₈₅ = D₆₀ =
D₅₀ = D₃₀ = D₁₅ =
D₁₀ = C_u = C_c =

Classification

USCS =

Remarks

ASTM D1140, Method B
Soak time = 180 min
Dry sample weight = 141.65 g

* (no specification provided)

Sample Number: 1-B4 @ 25

Client: Anil Verma Associates, Inc.

Project Number: 16370.000.000

Project: City of Goleta Design for Trian Station

Date: 8/30/2019

Project location: Goleta, CA



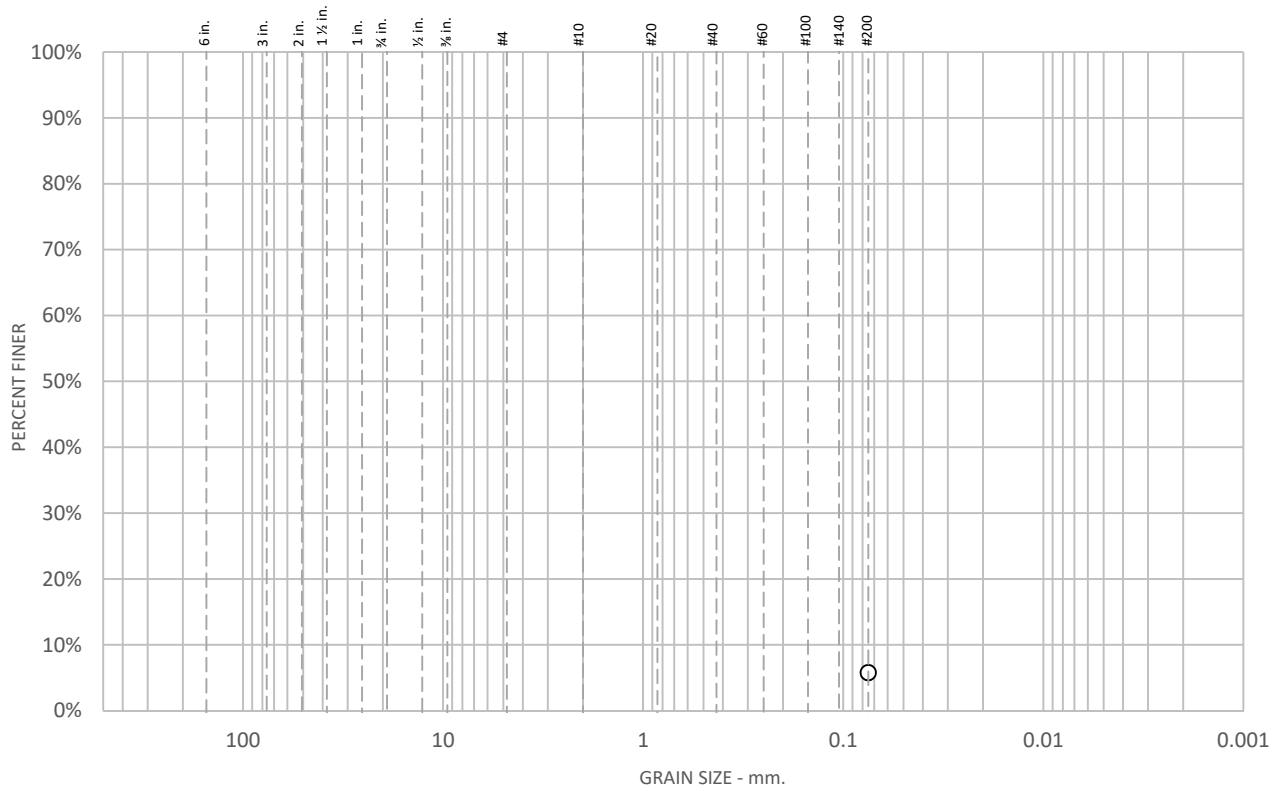
EXHIBIT "B" (Geotechnical Exploration)

Tested By: L. Santo Domingo

Checked By: M. Quasem

Test Location: 3420 Fostoria Way, Suite E, Danville, CA 94526

Particle Size Distribution Report



% +75mm	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
						5.8	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#200	5.8		

Soil Description

See exploration logs

Atterberg Limits

PL = LL = PI =

Coefficients

D₉₀ = D₈₅ = D₆₀ =
 D₅₀ = D₃₀ = D₁₅ =
 D₁₀ = C_u = C_c =

Classification

USCS =

Remarks

ASTM D1140, Method B
 Soak time = 180 min
 Dry sample weight = 172.09 g

* (no specification provided)

Sample Number: 1-B4 @ 30

Client: Anil Verma Associates, Inc.

Project Number: 16370.000.000

Project: City of Goleta Design for Trian Station

Date: 8/30/2019

Project location: Goleta, CA



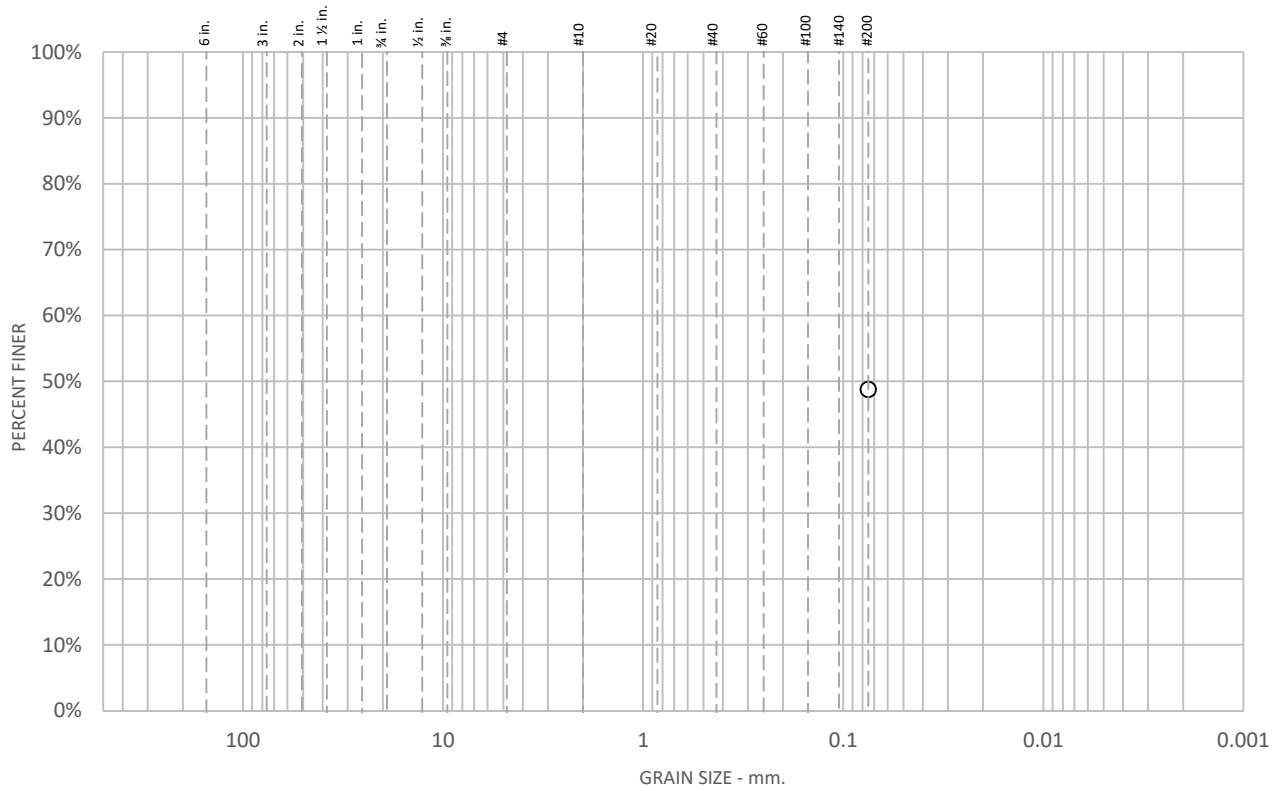
EXHIBIT "B" (Geotechnical Exploration)

Tested By: L. Santo Domingo

Checked By: M. Quasem

Test Location: 3420 Fostoria Way, Suite E, Danville, CA 94526

Particle Size Distribution Report



% +75mm	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
						48.8	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#200	48.8		

* (no specification provided)

Soil Description

See exploration logs

Atterberg Limits

PL = 14 LL = 30 PI = 16

Coefficients

D₉₀ = D₈₅ = D₆₀ =
D₅₀ = D₃₀ = D₁₅ =
D₁₀ = C_u = C_c =

Classification

USCS =

Remarks

PI: ASTM D4318, Wet Method ASTM D1140, Method B
Soak time = 180 min
Dry sample weight = 158.43 g

Sample Number: 1-B5 (Bulk)

Client: Anil Verma Associates, Inc.

Project Number: 16370.000.000

Project: City of Goleta Design for Trian Station

Date: 8/30/2019

Project location: Goleta, CA



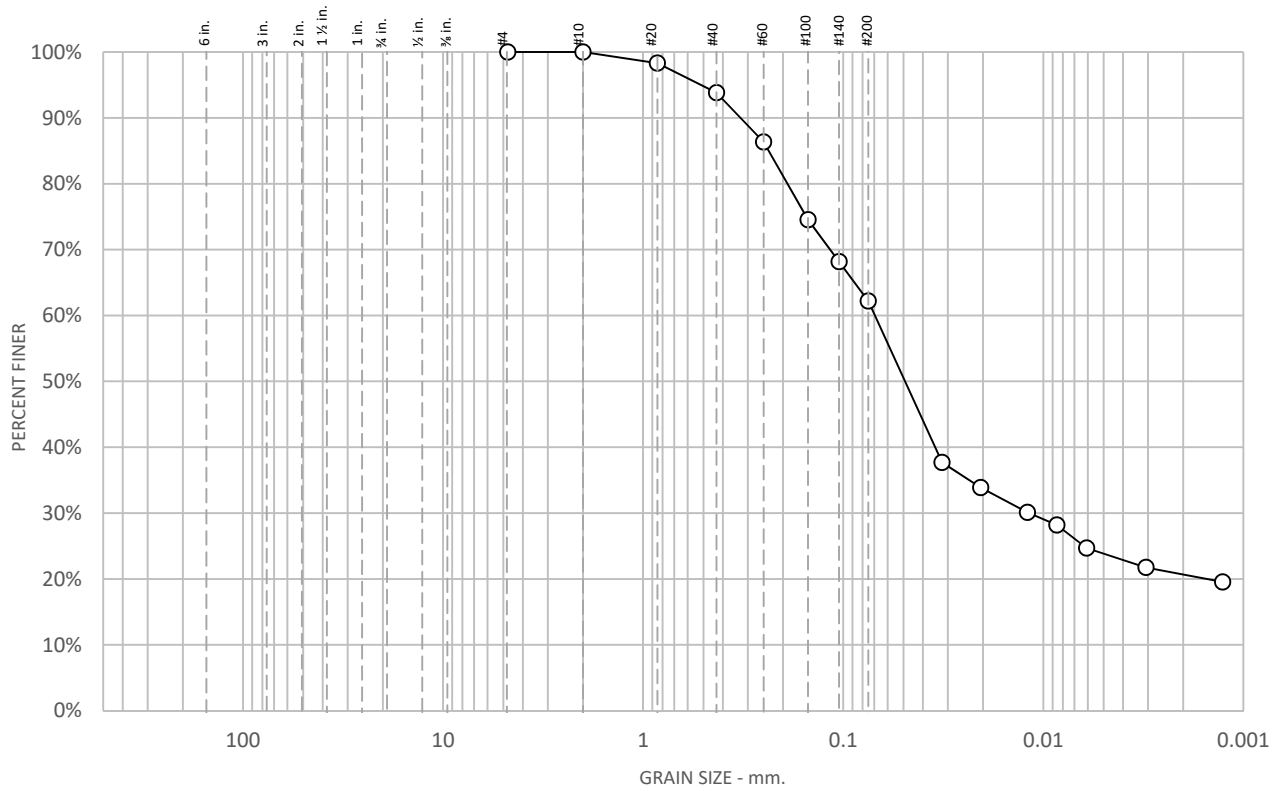
EXHIBIT "B" (Geotechnical Exploration)

Tested By: L. Santo Domingo

Checked By: M. Quasem

Test Location: 3420 Fostoria Way, Suite E, Danville, CA 94526

Particle Size Distribution Report



% +75mm	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
				6.2	31.6	41.5	20.7

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#4	100.0		
#10	100.0		
#20	98.3		
#40	93.8		
#60	86.3		
#100	74.5		
#140	68.2		
#200	62.2		
0.0321 mm.	37.7		
0.0206 mm.	33.9		
0.0120 mm.	30.1		
0.0086 mm.	28.2		
0.0061 mm.	24.7		
0.0031 mm.	21.7		
0.0013 mm.	19.5		

Soil Description

See exploration logs

Atterberg Limits

PL = 16 LL = 37 PI = 21

Coefficients

D₉₀ = 0.3260 mm D₈₅ = 0.2359 mm D₆₀ = 0.0695 mm
D₅₀ = 0.0491 mm D₃₀ = 0.0118 mm D₁₅ =
D₁₀ = C_u = C_c =

Classification

USCS = CL

Remarks

GS: ASTM D422 ASTM D422
Silt/clay division of 0.002mm used
PI: ASTM D4318, Wet Method
USCS: ASTM D2487

* (no specification provided)

Sample Number: 1-B2 @ 1-3

Client: Anil Verma Associates, Inc. **Project Number:** 16370.000.000
Project: City of Goleta Design for Train Station **Date:** 8/30/2019
Project location: Goleta, CA

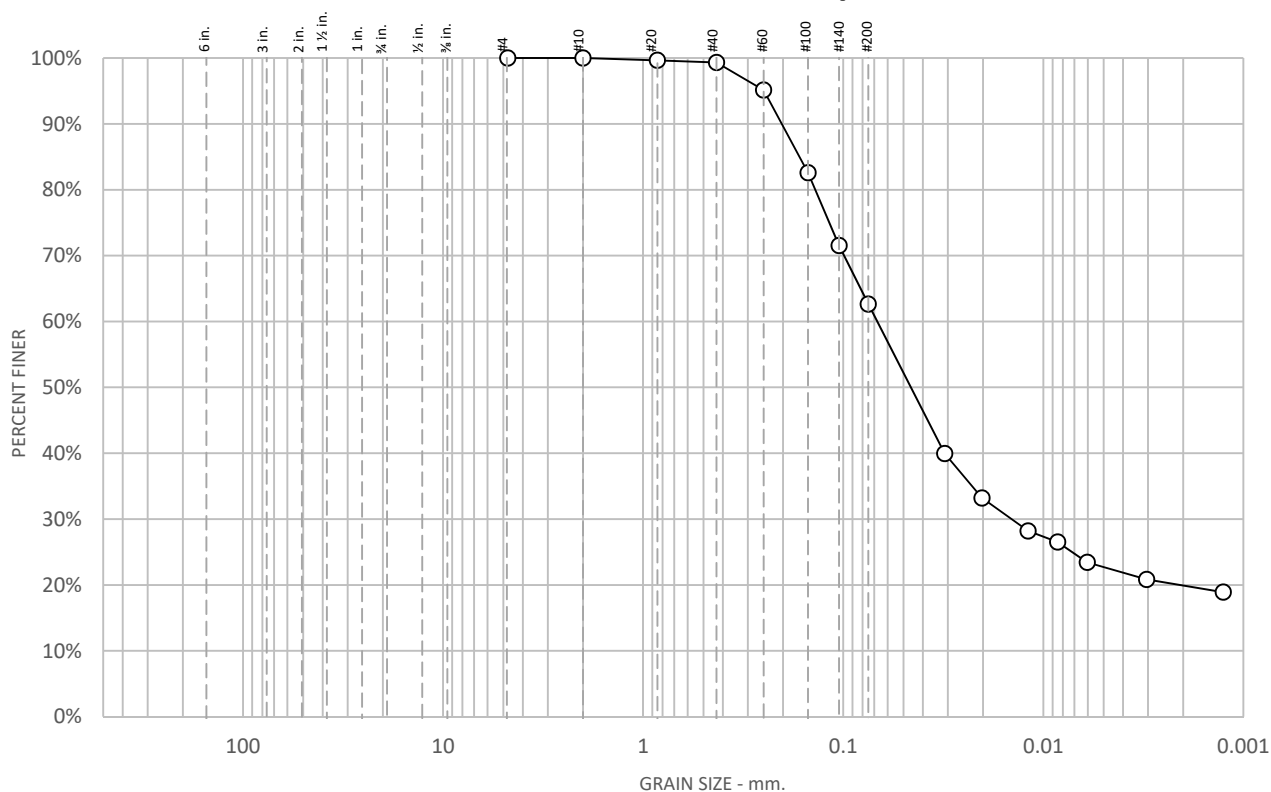


EXHIBIT "B" (Geotechnical Exploration)

Tested By: L. Santo Domingo **Checked By:** M. Quasem

Test Location: 3420 Fostoria Way, Suite E, Danville, CA 94526

Particle Size Distribution Report



% +75mm	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
				0.7	36.7	42.7	19.9

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#4	100.0		
#10	100.0		
#20	99.7		
#40	99.3		
#60	95.1		
#100	82.6		
#140	71.5		
#200	62.6		
0.0311 mm.	39.9		
0.0202 mm.	33.2		
0.0119 mm.	28.2		
0.0085 mm.	26.5		
0.0060 mm.	23.4		
0.0030 mm.	20.8		
0.0013 mm.	18.9		

* (no specification provided)

Soil Description
See exploration logs

Atterberg Limits
PL = 16 LL = 31 PI = 15

Coefficients
D₉₀ = 0.2028 mm D₈₅ = 0.1655 mm D₆₀ = 0.0677 mm
D₅₀ = 0.0460 mm D₃₀ = 0.0144 mm D₁₅ =
D₁₀ = C_u = C_c =

Classification
USCS = CL

Remarks
GS: ASTM D422 ASTM D422
Silt/clay division of 0.002mm used
PI: ASTM D4318, Wet Method
USCS: ASTM D2487

Sample Number: 1-B2 @ 6

Client: Anil Verma Associates, Inc.

Project Number: 16370.000.000

Project: City of Goleta Design for Train Station

Date: 8/30/2019

Project location: Goleta, CA



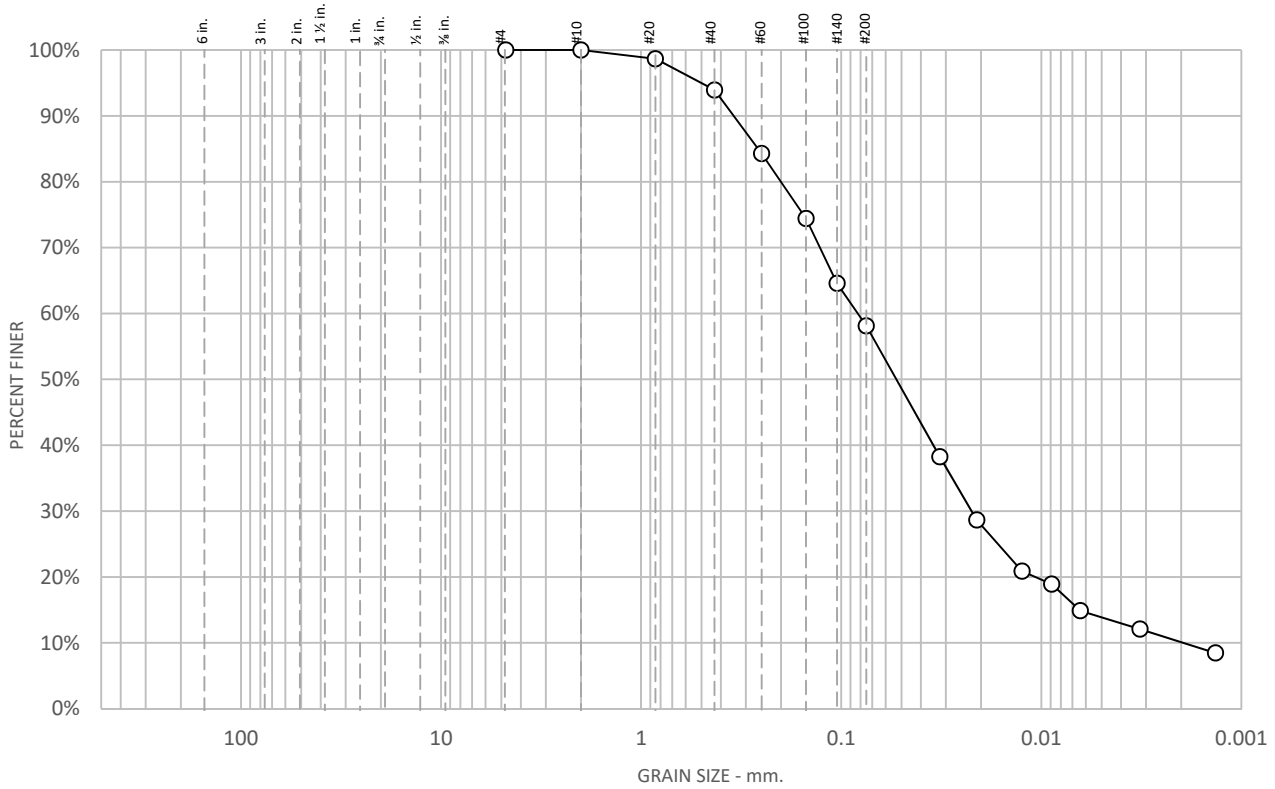
EXHIBIT "B" (Geotechnical Exploration)

Tested By: L. Santo Domingo

Checked By: M. Quasem

Test Location: 3420 Fostoria Way, Suite E, Danville, CA 94526

Particle Size Distribution Report



% +75mm	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
				6.1	35.8	48.0	10.1

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#4	100.0		
#10	100.0		
#20	98.7		
#40	93.9		
#60	84.3		
#100	74.4		
#140	64.6		
#200	58.1		
0.0322 mm.	38.2		
0.0210 mm.	28.7		
0.0125 mm.	20.9		
0.0089 mm.	18.9		
0.0064 mm.	14.9		
0.0032 mm.	12.1		
0.0013 mm.	8.5		

Soil Description

See exploration logs

Atterberg Limits

PL = 14 LL = 22 PI = 8

Coefficients

D₉₀ = 0.3447 mm D₈₅ = 0.2604 mm D₆₀ = 0.0827 mm
 D₅₀ = 0.0531 mm D₃₀ = 0.0223 mm D₁₅ = 0.0065 mm
 D₁₀ = 0.0020 mm C_u = 42.38 C_c = 3.09

Classification

USCS = CL

Remarks

GS: ASTM D422 ASTM D422
 Silt/clay division of 0.002mm used
 PI: ASTM D4318, Wet Method
 USCS: ASTM D2487

* (no specification provided)

Sample Number: 1-B3 @ 1-3

Client: Anil Verma Associates, Inc. Project Number: 16370.000.000

Project: City of Goleta Design for Train Station Date: 8/30/2019

Project location: Goleta, CA



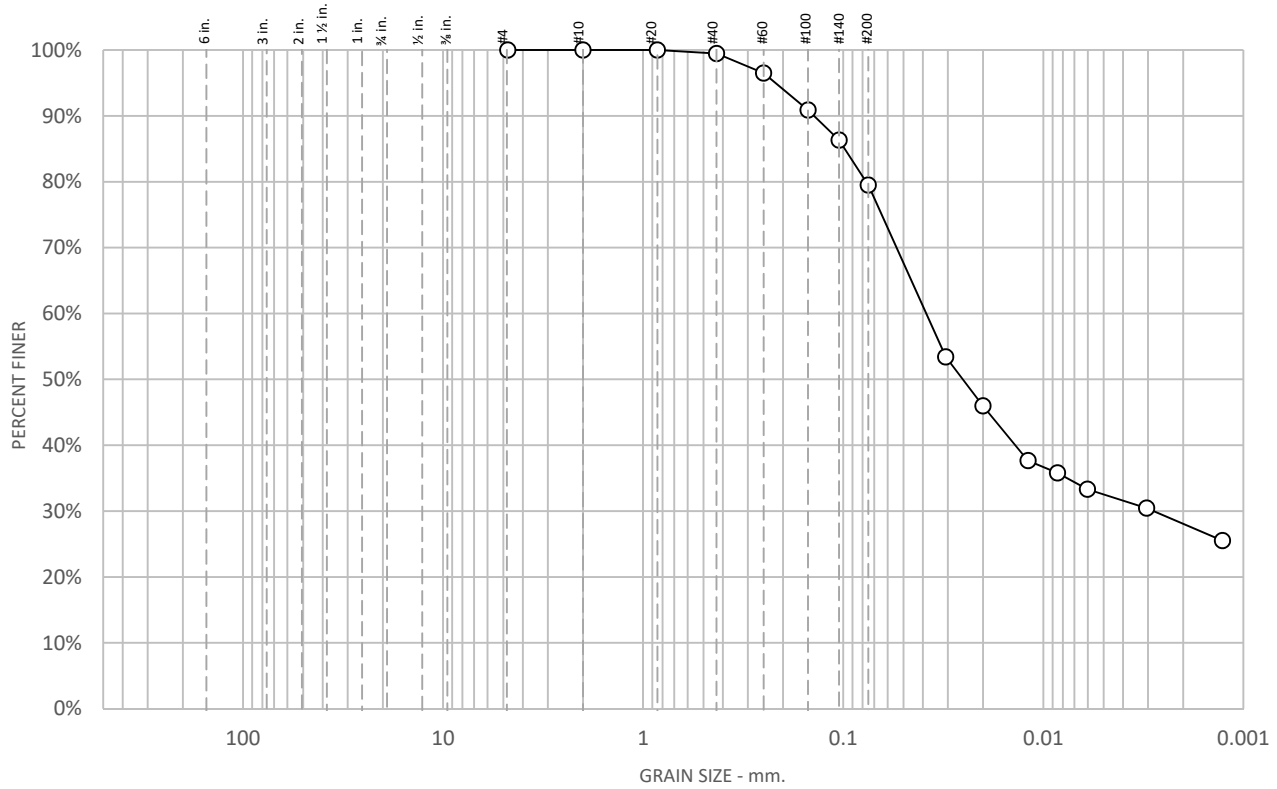
EXHIBIT "B" (Geotechnical Exploration)

Tested By: L. Santo Domingo

Checked By: M. Quasem

Test Location: 3420 Fostoria Way, Suite E, Danville, CA 94526

Particle Size Distribution Report



% +75mm	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
				0.5	20.0	51.4	28.1

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#4	100.0		
#10	100.0		
#20	100.0		
#40	99.5		
#60	96.5		
#100	90.9		
#140	86.3		
#200	79.5		
0.0307 mm.	53.4		
0.0200 mm.	46.0		
0.0119 mm.	37.7		
0.0085 mm.	35.8		
0.0060 mm.	33.3		
0.0030 mm.	30.5		
0.0013 mm.	25.5		

Soil Description
See exploration logs

Atterberg Limits
 PL = 19 LL = 50 PI = 31

Coefficients
 D₉₀ = 0.1400 mm D₈₅ = 0.0984 mm D₆₀ = 0.0385 mm
 D₅₀ = 0.0253 mm D₃₀ = 0.0028 mm D₁₅ =
 D₁₀ = C_u = C_c =

Classification
USCS = CL

Remarks
 GS: ASTM D422 ASTM D422
 Silt/clay division of 0.002mm used
 PI: ASTM D4318, Wet Method
 USCS: ASTM D2487

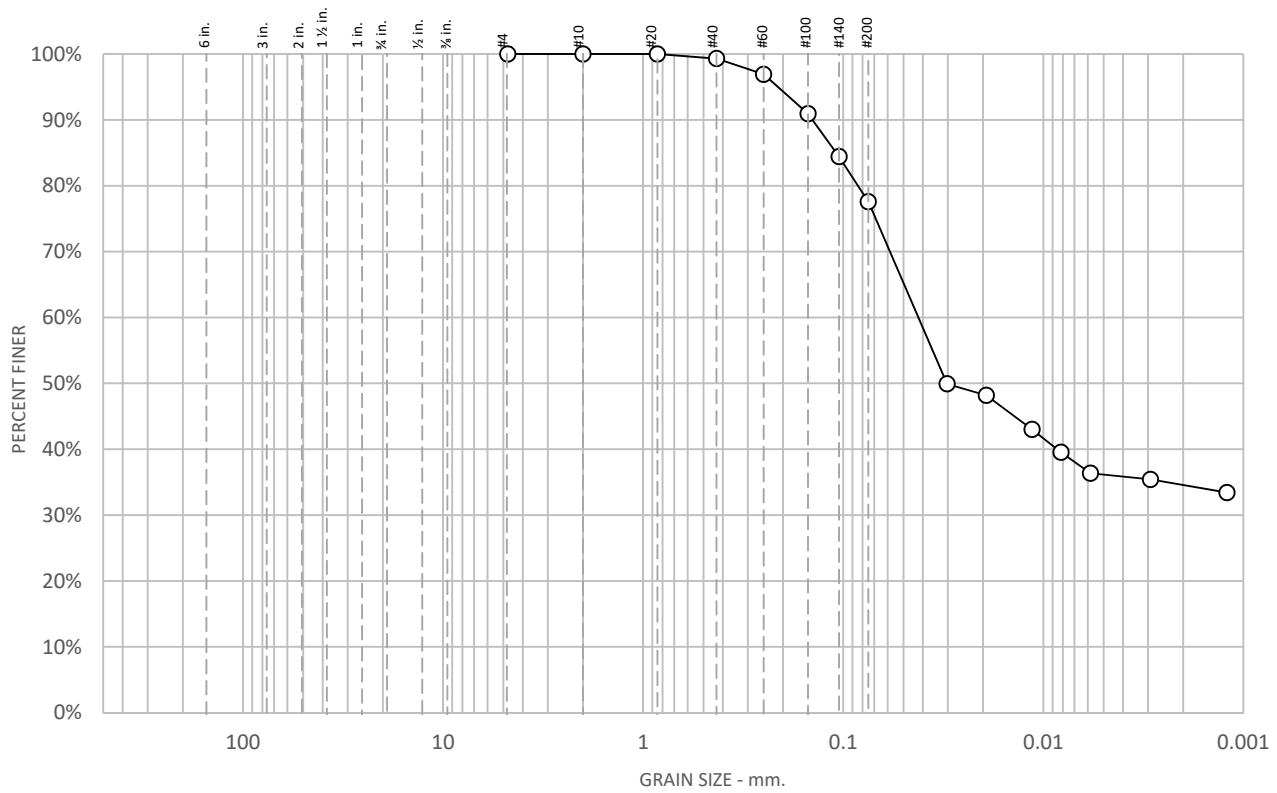
* (no specification provided)

Sample Number: 1-B3 @ 3.5		Project Number: 16370.000.000		
Client: Anil Verma Associates, Inc.		Date: 8/30/2019		
Project: City of Goleta Design for Train Station		Project location: Goleta, CA		
Tested By: L. Santo Domingo		Checked By: M. Quasem		

EXHIBIT "B" (Geotechnical Exploration)

Test Location: 3420 Fostoria Way, Suite E, Danville, CA 94526

Particle Size Distribution Report



% +75mm	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
				0.7	21.7	43.0	34.6

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#4	100.0		
#10	100.0		
#20	100.0		
#40	99.3		
#60	96.9		
#100	90.9		
#140	84.4		
#200	77.6		
0.0303 mm.	49.9		
0.0193 mm.	48.2		
0.0114 mm.	43.0		
0.0082 mm.	39.5		
0.0058 mm.	36.3		
0.0029 mm.	35.4		
0.0012 mm.	33.4		

Soil Description

See exploration logs

Atterberg Limits

PL = 16 LL = 35 PI = 19

Coefficients

D₉₀ = 0.1425 mm D₈₅ = 0.1084 mm D₆₀ = 0.0421 mm
D₅₀ = 0.0303 mm D₃₀ = D₁₅ =
D₁₀ = C_u = C_c =

Classification

USCS = CL

Remarks

GS: ASTM D422 ASTM D422
Silt/clay division of 0.002mm used
PI: ASTM D4318, Wet Method
USCS: ASTM D2487

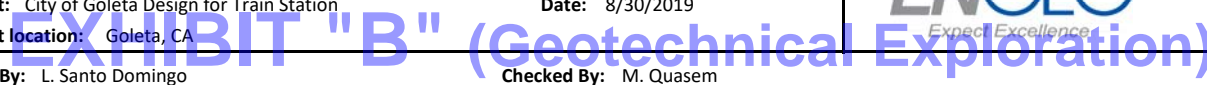
* (no specification provided)

Sample Number: 1-B3 @ 8.5

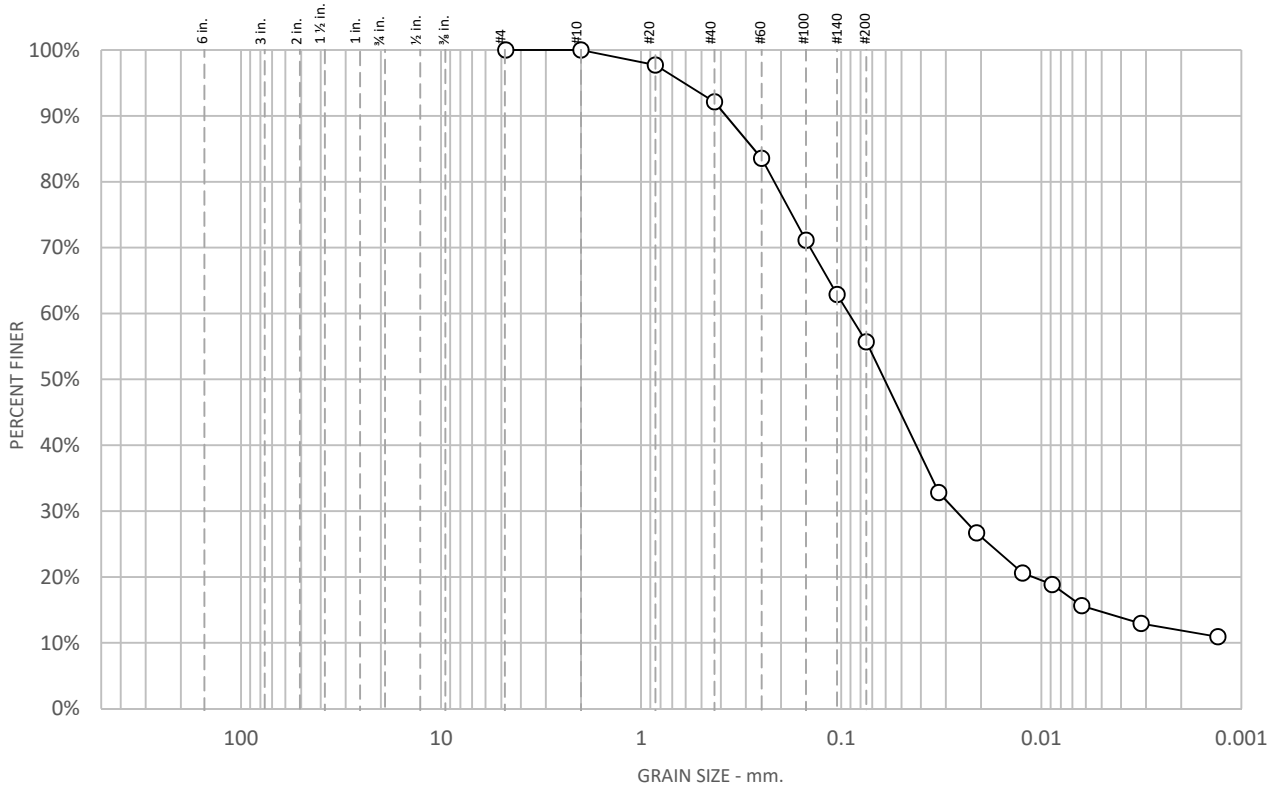
Client: Anil Verma Associates, Inc.	Project Number: 16370.000.000	
Project: City of Goleta Design for Train Station	Date: 8/30/2019	
Project location: Goleta, CA		

Tested By: L. Santo Domingo **Checked By:** M. Quasem

Test Location: 3420 Fostoria Way, Suite E, Danville, CA 94526



Particle Size Distribution Report



% +75mm	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
				7.9	36.4	43.8	11.9

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#4	100.0		
#10	100.0		
#20	97.7		
#40	92.1		
#60	83.5		
#100	71.1		
#140	62.9		
#200	55.7		
0.0326 mm.	32.8		
0.0211 mm.	26.7		
0.0124 mm.	20.6		
0.0088 mm.	18.8		
0.0063 mm.	15.6		
0.0032 mm.	12.9		
0.0013 mm.	10.9		

* (no specification provided)

Soil Description		
See exploration logs		
Atterberg Limits		
PL = 16	LL = 18	PI = 2
Coefficients		
D ₉₀ = 0.3761 mm	D ₈₅ = 0.2742 mm	D ₆₀ = 0.0917 mm
D ₅₀ = 0.0609 mm	D ₃₀ = 0.0267 mm	D ₁₅ = 0.0054 mm
D ₁₀ =	C _u =	C _c =
Classification		
USCS = CL		
Remarks		
GS: ASTM D422		ASTM D422
Silt/clay division of 0.002mm used		
PI: ASTM D4318, Wet Method		
USCS: ASTM D2487		

Sample Number: 1-B4 @ 3.5

Client: Anil Verma Associates, Inc.

Project: City of Goleta Design for Train Station

Project location: Goleta, CA

Project Number: 16370.000.000

Date: 8/30/2019



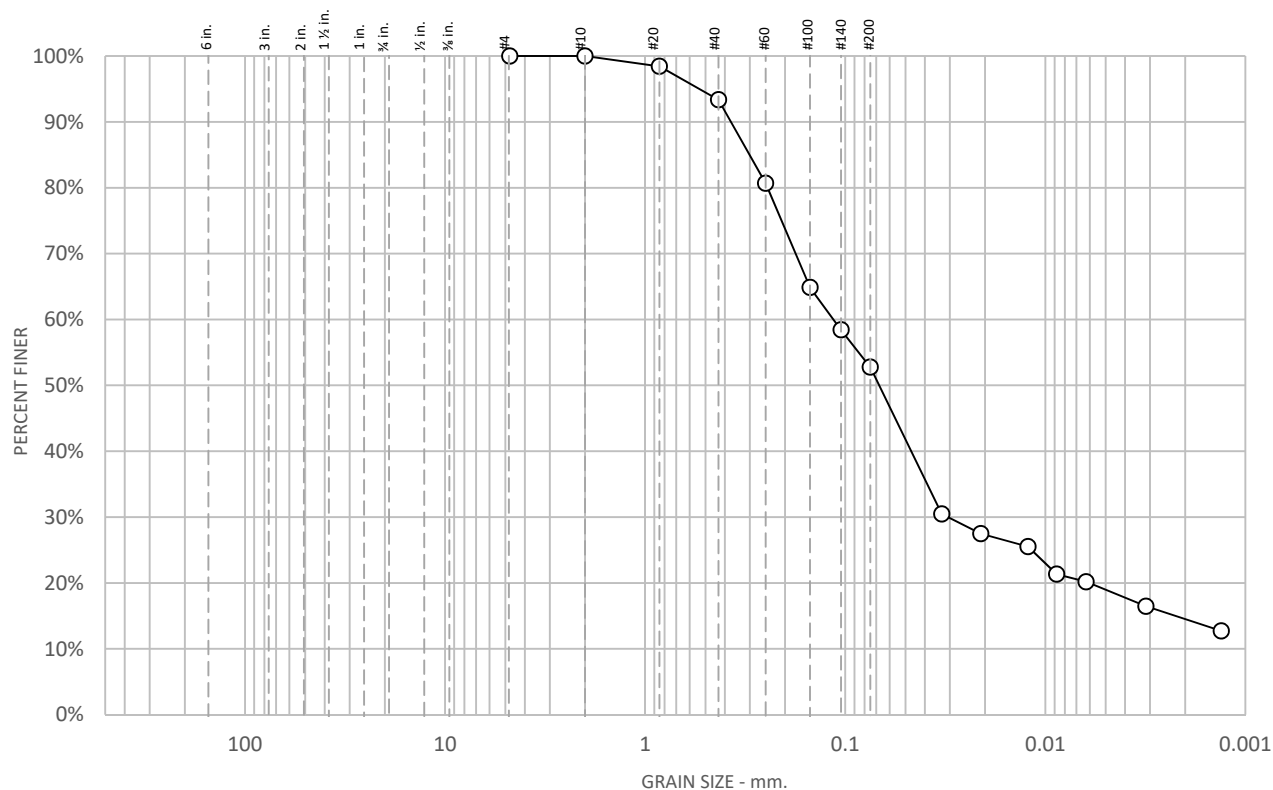
Tested By: L. Santo Domingo

Checked By: M. Quasem

EXHIBIT "B" (Geotechnical Exploration)

Test Location: 3420 Fostoria Way, Suite E, Danville, CA 94526

Particle Size Distribution Report



% +75mm	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
				6.6	40.6	38.3	14.5

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#4	100.0		
#10	100.0		
#20	98.4		
#40	93.4		
#60	80.7		
#100	64.9		
#140	58.4		
#200	52.8		
0.0329 mm.	30.5		
0.0210 mm.	27.5		
0.0122 mm.	25.5		
0.0088 mm.	21.3		
0.0063 mm.	20.2		
0.0031 mm.	16.5		
0.0013 mm.	12.7		

* (no specification provided)

<u>Soil Description</u>		
See exploration logs		
<u>Atterberg Limits</u>		
PL = 18	LL = 26	PI = 8
<u>Coefficients</u>		
D ₉₀ = 0.3724 mm	D ₈₅ = 0.3008 mm	D ₆₀ = 0.1146 mm
D ₅₀ = 0.0677 mm	D ₃₀ = 0.0307 mm	D ₁₅ = 0.0022 mm
D ₁₀ =	C _u =	C _c =
<u>Classification</u>		
USCS = CL		
<u>Remarks</u>		
GS: ASTM D422	ASTM D422	
Silt/clay division of 0.002mm used		
PI: ASTM D4318, Wet Method		
USCS: ASTM D2487		

Sample Number: P2 @ 1-3

Client: Anil Verma Associates, Inc.

Project Number: 16370.000.000

Project: City of Goleta Design for Train Station

Date: 8/30/2019

Project location: Goleta, CA



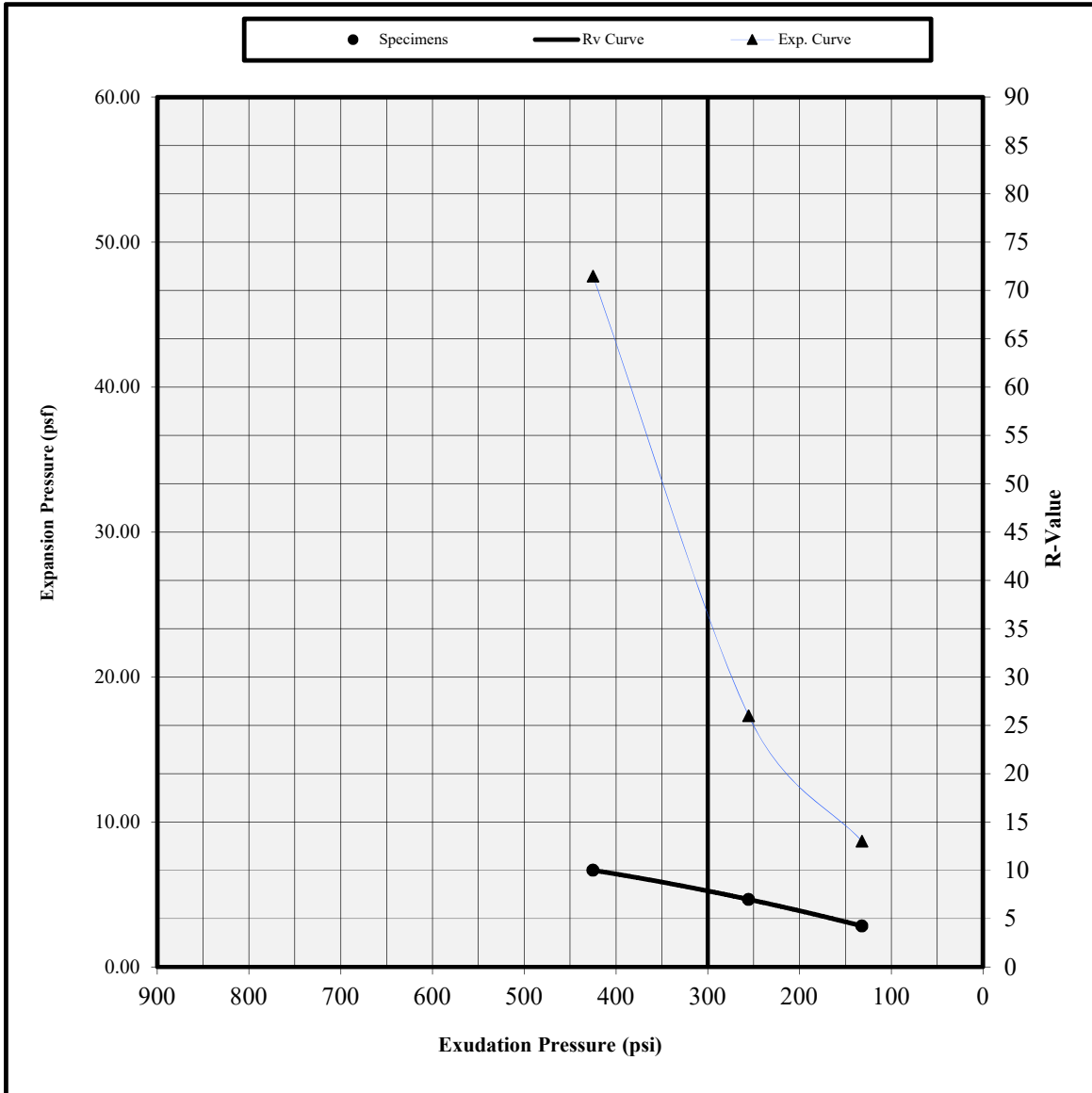
EXHIBIT "B" (Geotechnical Exploration)

Tested By: L. Santo Domingo

Checked By: M. Quasem

Test Location: 3420 Fostoria Way, Suite E, Danville, CA 94526

**R VALUE TEST REPORT
CTM-301**



Sample ID/Location: 1-B1

Description: See Exploration Logs

Test remarks:

Specimen	Specimen 1	Specimen 2	Specimen 3
Exudation Pressure (p.s.i.)	425	255	132
Expansion dial (0.0001")	11	4	2
Expansion Pressure (p.s.f.)	48	17	9
Resistance Value, "R"	10	7	4
% Moisture at Test	13.3	14.7	16.9
Dry Density at Test, p.c.f.	119.3	114.7	110.4
"R" Value at Exudation Pressure of 300 psi.	7		
Expansion Pressure (psf) at Exudation Pressure of 300 psi.	25		

PROJECT NAME: City of Goleta Design for Train Station

PROJECT NUMBER: 16370.000.000

CLIENT: Anil Verma Associates, Inc.

PHASE NUMBER: REIM

DATE: 08/23/19

EXPLORATION (Geotechnical Exploration)

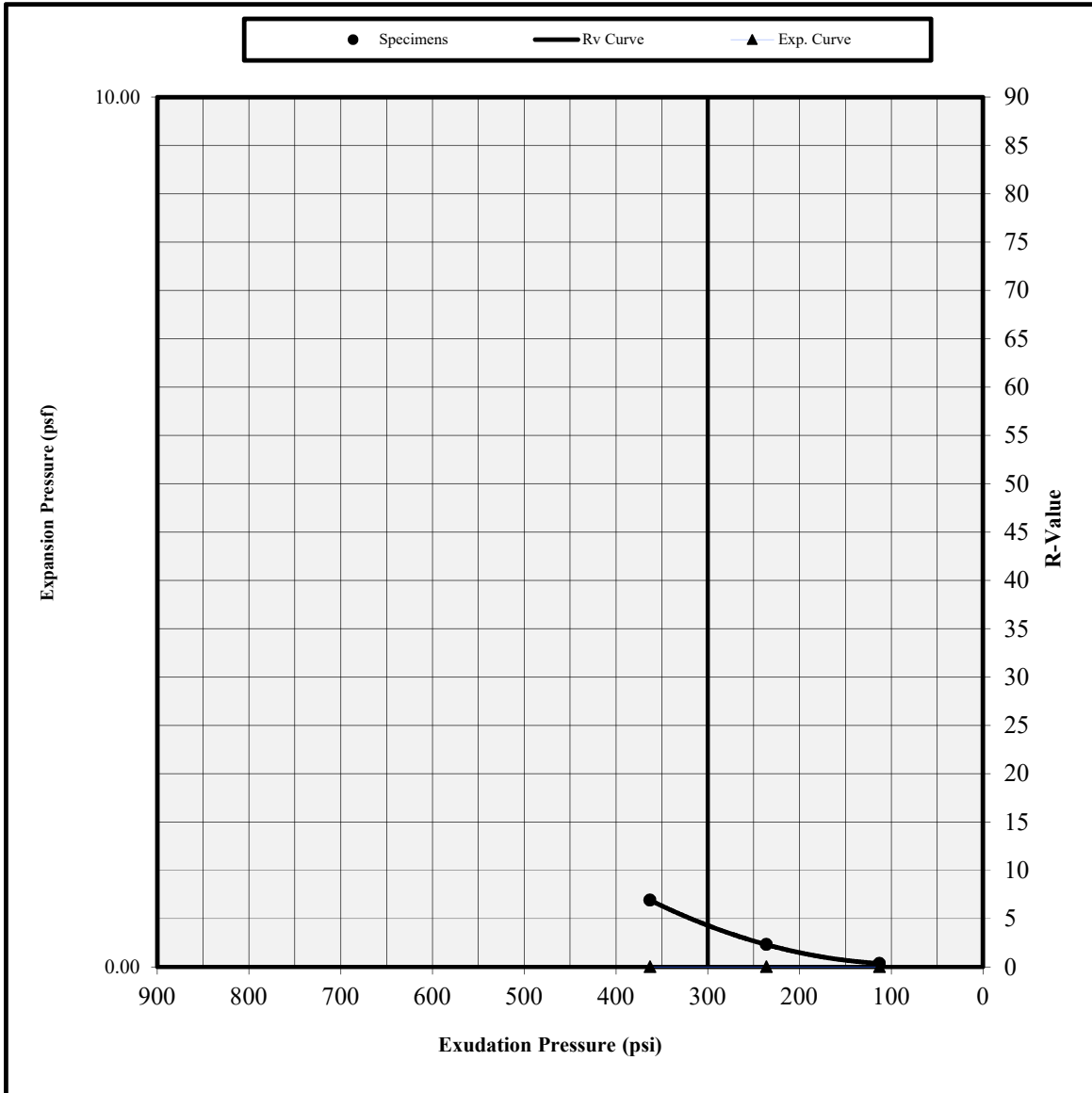


Tested by: W. Miller

Reviewed by: G. Criste

Lab Address : 3420 Fostoria Way, Suite E, Danville, CA 94526

**R VALUE TEST REPORT
CTM-301**



Sample ID/Location: 1-B4

Description: See Exploration Logs

Test remarks:

Specimen	Specimen 1	Specimen 2	Specimen 3
Exudation Pressure (p.s.i.)	363	236	113
Expansion dial (0.0001")	0	0	0
Expansion Pressure (p.s.f.)	0	0	0
Resistance Value, "R"	7	2	0
% Moisture at Test	10.8	15.0	16.9
Dry Density at Test, p.c.f.	119.9	113.8	112.6
"R" Value at Exudation Pressure of 300 psi.	Less Than 5		
Expansion Pressure (psf) at Exudation Pressure of 300 psi.	0		

PROJECT NAME: City of Goleta Design for Train Station
PROJECT NUMBER: 16370.000.000

CLIENT: Anil Verma Associates, Inc.

PHASE NUMBER: REIM

DATE: 08/24/19

EXPLORATION (Geotechnical Exploration)

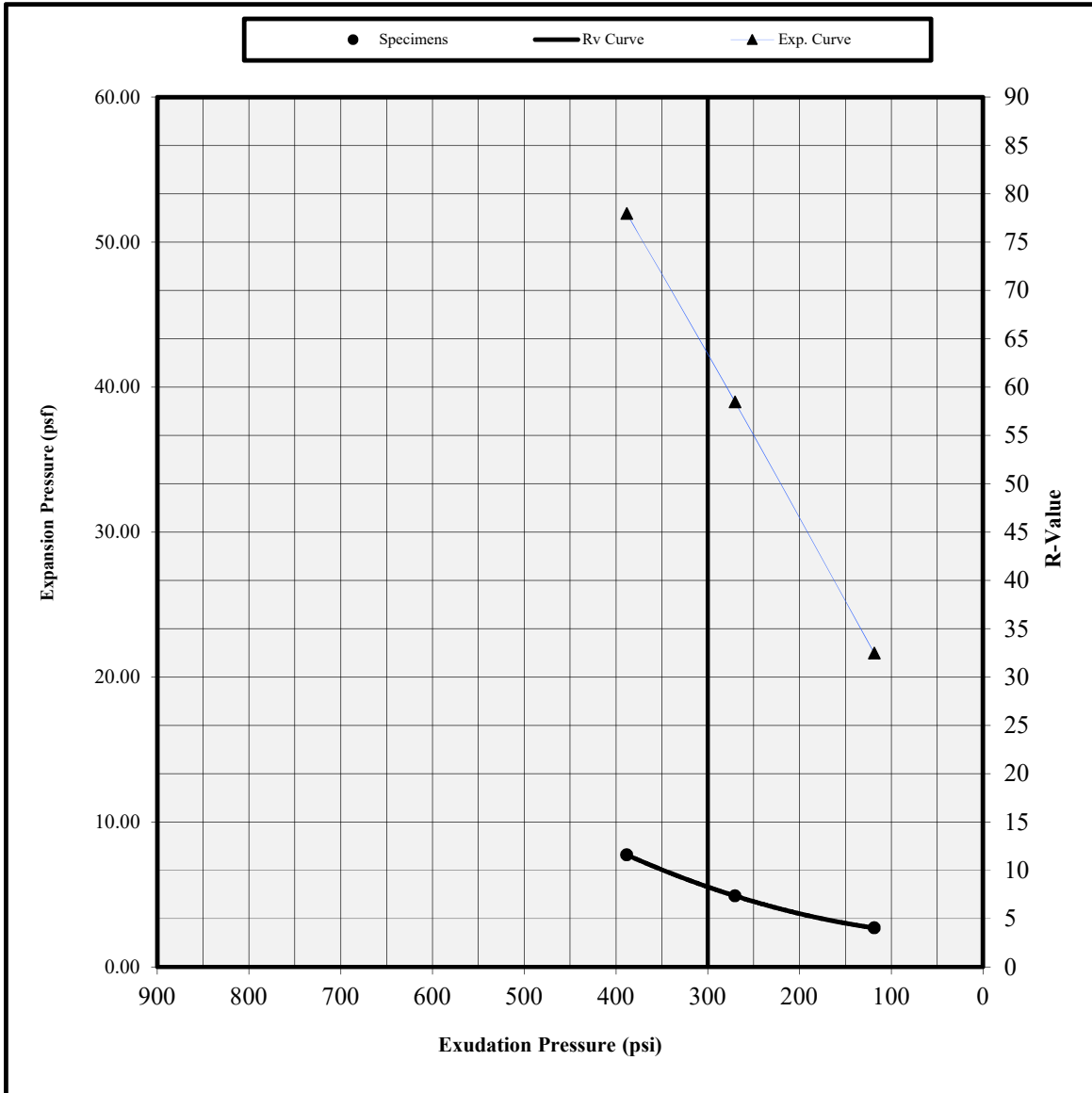


Tested by: W. Miller

Reviewed by: G. Criste

Lab Address : 3420 Fostoria Way, Suite E, Danville, CA 94526

**R VALUE TEST REPORT
CTM-301**



Sample ID/Location: 1-B5

Description: See Exploration Logs

Test remarks:

Specimen	Specimen 1	Specimen 2	Specimen 3
Exudation Pressure (p.s.i.)	388	270	119
Expansion dial (0.0001")	12	9	5
Expansion Pressure (p.s.f.)	52	39	22
Resistance Value, "R"	12	7	4
% Moisture at Test	15.5	17.4	18.9
Dry Density at Test, p.c.f.	112.6	109.3	106.6
"R" Value at Exudation Pressure of 300 psi.	8		
Expansion Pressure (psf) at Exudation Pressure of 300 psi.	43		

PROJECT NAME: City of Goleta Design for Train Station
PROJECT NUMBER: 16370.000.000
CLIENT: Anil Verma Associates, Inc.
PHASE NUMBER: REIM

DATE: 08/24/19

EXPLORATION (Geotechnical Exploration)



Tested by: W. Miller

Reviewed by: G. Criste

Lab Address : 3420 Fostoria Way, Suite E, Danville, CA 94526

4 September, 2019

Job No. 1908138
Cust. No. 13096

Mr. Randy Hildebrant
ENGEO Inc.
2646 Santa Maria Way, Suite 107
Santa Maria, CA 93455

Subject: Project No.: 16370.000.000
Project Name: Goleta, CA
Corrosivity Analysis – ASTM Test Methods

Dear Mr. Hildebrant:

Pursuant to your request, CERCO Analytical has analyzed the soil samples submitted on August 19, 2019. Based on the analytical results, this brief corrosivity evaluation is enclosed for your consideration.

Based upon the resistivity measurements, Samples No.001 & No.002 are classified as “corrosive” and Sample No.003 is classified as “moderately corrosive”. All buried iron, steel, cast iron, ductile iron, galvanized steel and dielectric coated steel or iron should be properly protected against corrosion depending upon the critical nature of the structure. All buried metallic pressure piping such as ductile iron firewater pipelines should be protected against corrosion.

The chloride ion concentrations reflect none detected with a reporting limit of 15 mg/kg.

The sulfate ion concentrations ranged from 25 to 43 mg/kg and are determined to be insufficient to damage reinforced concrete structures and cement mortar-coated steel at these locations.

The pH of the soils ranged from 7.71 to 8.85, which does not present corrosion problems for buried iron, steel, mortar-coated steel and reinforced concrete structures.

The redox potentials ranged from 180 to 210-mV. Sample No.001 is indicative of potentially “moderately corrosive” soils and the remaining samples are indicative of potentially “slightly corrosive” soils resulting from anaerobic soil conditions.

This corrosivity evaluation is based on general corrosion engineering standards and is non-specific in nature. For specific long-term corrosion control design recommendations or consultation, please call *JDH Corrosion Consultants, Inc.* at (925) 927-6630.

We appreciate the opportunity of working with you on this project. If you have any questions, or if you require further information, please do not hesitate to contact us.

Very truly yours,
CERCO ANALYTICAL, INC.



J. Darby Howard, Jr., P.E.
President

JDH/jdl
Enclosure

EXHIBIT "B" (Geotechnical Exploration)



Client: ENGEO Incorporated
 Client's Project No.: 16370.000.000
 Client's Project Name: Goleta, CA
 Date Sampled: 13-Aug-19
 Date Received: 19-Aug-19
 Matrix: Soil
 Authorization: Signed Chain of Custody

Date of Report: 4-Sep-2019

Job/Sample No.	Sample I.D.	Redox (mV)	pH	Conductivity (umhos/cm)	Resistivity			Sulfate (mg/kg)*
					(100% Saturation) (ohms-cm)	Sulfide (mg/kg)*	Chloride (mg/kg)*	
1908138-001	1-B2 @ 1-3'	180	8.85	-	1,900	-	N.D.	30
1908138-002	1-B3 @ 1-3'	200	7.87	-	1,400	-	N.D.	43
1908138-003	1-B4 @ 1-3'	210	7.71	-	4,400	-	N.D.	25

Method:	ASTM D1498	ASTM D4972	ASTM D1125M	ASTM G57	ASTM D4658M	ASTM D4327
Reporting Limit:	-	-	10	-	50	15
	29-Aug-2019	29-Aug-2019	-	50-Aug-2019	-	3-Sep-2019

Cheryl McMillen
 Cheryl McMillen
 Laboratory Director

* Results Reported on "As Received" Basis
 N.D. - None Detected

Chain of Custody

Concord, CA 94520-1006
925 462 2771
Fax: 925 462 2775



Job No. 105738 CU# Client Project I.D. 16370.000.000
 Full Name Randy Hildebrant Phone 925-338-4110 X
 Fax

Company and/or Mailing Address
ENBEO, 2676 Site 107, Santa Maria, CA 93455
 Sample Source Golets, CA

Lab No.	Sample I.D.	Date	Time	Matrix	Contain.	Size	Preserv.	Qty.
1	B2e1-3A+	8/13	11:30am	Soil	1	2g		1
2	B3e1-3A+	8/13	9:00	Soil	1	1g+		1
3	B4e1-3A+	8/13	11:02	soil	1	1g		1

Redox Potential	PH	ANALYSIS				ASTM			
		Sulfate	Chloride	Resistivity-100% Saturated	Brief Evaluation				
X	X	X	X	X	X				
X	X	X	X	X	X				
X	X	X	X	X	X				

MATRIX
 DW - Drinking Water
 GW - Ground Water
 SW - Surface Water
 WW - Waste Water
 Water
 SL - Sludge
 S - Soil
 Product

ABBREVIATIONS
 HB - Hosebib
 PV - Petcock Valve
 PT - Pressure Tank
 PH - Pump House
 RR - Restroom
 GL - Glass
 PL - Plastic
 ST - Sterile

SAMPLE RECEIPT
 Total No. of Containers
 Rec'd Good Cond/Cold
 Conforms to Record
 Temp. at Lab. °C
 Sampler

Relinquished By: [Signature] Date 8/19/19 Time 2:07
 Received By: [Signature] Date 8/19/19 Time 8:30
 Relinquished By: [Signature] Date 8/19/19 Time
 Received By: [Signature] Date Time
 Relinquished By: [Signature] Date Time
 Received By: [Signature] Date Time

HERE IS AN ADDITIONAL CHARGE FOR EXTRUDING SOIL FROM METAL TUBES
 mail Address r.hildebrant@engeo.com



APPENDIX C

PERCOLATION TEST DATA

EXHIBIT "B" (Geotechnical Exploration)

Location 1-P1

Date 8/14/2019
 Job # 16370.000.000
 Job Name Goleta Train Station

Hole diameter (in) 5
 Perf pipe diam (in) 4
 Depth of hole (ft) 4.5
 Gravel thickness ~2"

Saturated water level Surface
 Saturation date & time 8/13/2019 12:00pm

Percolation Test Measurements

	Notes	Time	Depth to Water from Reference Point (ft)	Total Head (in)	Elapsed Time (min.)	Change in Water Level (ft)	Prec. Rate (m.p.i)
1	12" Starting head	8:53 AM	4.16	12			
2		9:42 AM	4.13	12.4	49	-0.03	-
3		10:03 AM	4.13	12.4	21	0	-
4		10:23 AM	4.12	12.5	20	-0.01	-
5		10:43 AM	4.12	12.5	20	0	-
6		11:03 AM	4.11	12.6	20	-0.01	-
7		11:23 AM	4.11	12.6	20	0	-
8		12:23 PM	4.1	12.7	60	-0.01	-
9		12:53 PM	4.08	13.0	30	-0.02	-
10		1:23 PM	4.08	13.0	30	0	-
11		2:00 PM	4.08	13.0	37	0	-
12		2:30 PM	4.07	13.1	30	-0.01	-
13		3:00 PM	4.07	13.1	30	0	-
14		3:30 PM	4.07	13.1	30	0	-
15		4:00 PM	4.07	13.1	30	0	-
16		4:30 PM	4.07	13.1	30	0	-
17		5:00 PM	4.07	13.1	30	0	-
18		5:30 PM	4.07	13.1	30	0	-
19	8/15/2019	8:24 AM	4.12	12.5	894	0.05	1490

Comments:

Water standing in hole, excess water removed to establish 12 inches of water at start of test

EXHIBIT "B" (Geotechnical Exploration)

Location 1-P2

Date 8/14/2019
 Job # 16370.000.000
 Job Name Goleta Train Station

Hole diameter (in) 5
 Perf pipe diam (in) 4
 Depth of hole (ft) 4
 Gravel thickness ~2"

Saturated water level Surface
 Saturation date & time 8/13/2019 12:20pm

Percolation Test Measurements

Notes	Time	Depth to Water from Reference Point (ft)	Total Head (in)	Elapsed Time (min.)	Change in Water Level (ft)	Prec. Rate (m.p.i)
12" Starting head	9:20 AM	4.01	12			
	9:47 AM	3.95	12.72	27	-0.06	-
	10:05 AM	3.95	12.72	18	0	-
	10:32 AM	3.95	12.72	27	0	-
	10:52 AM	3.95	12.72	20	0	-
	11:12 AM	3.96	12.6	20	0.01	-
	11:32 AM	3.96	12.6	20	0	-
	12:31 PM	3.94	12.84	59	-0.02	-
	1:01 PM	3.95	12.72	30	0.01	-
	1:31 PM	3.94	12.84	30	-0.01	-
	2:04 PM	3.94	12.84	33	0	-
	2:34 PM	3.95	12.72	30	0.01	-
	3:04 PM	3.94	12.84	30	-0.01	-
	3:34 PM	3.95	12.72	30	0.01	-
	4:04 PM	3.94	12.84	30	-0.01	-
	4:34 PM	3.94	12.84	30	0	-
	5:04 PM	3.94	12.84	30	0	-
	5:34 PM	3.95	12.72	30	0.01	-
8/15/2019	8:41 AM	4.03	11.76	907	0.08	945

Comments:

Water standing in hole, excess water removed to establish 12 inches of water at start of test

EXHIBIT "B" (Geotechnical Exploration)



Location 1-P3

Date 8/14/2019
 Job # 16370.000.000
 Job Name Goleta Train Station

Hole diameter (in) 5
 Perf pipe diam (in) 4
 Depth of hole (ft) 4.35
 Gravel thickness ~2"

Saturated water level Surface
 Saturation date & time 8/13/2019 12:10pm

Percolation Test Measurements

	Notes	Time	Depth to Water from Reference Point (ft)	Total Head (in)	Elapsed Time (min.)	Change in Water Level (ft)	Prec. Rate (m.p.i)
1	12" Starting head	8:23 AM	4.02	12			
2		9:39 AM	4.02	12	76	0	-
3		10:00 AM	4.04	11.76	21	0.02	87
4		10:28 AM	4.06	11.52	28	0.02	117
5		10:48 AM	4.06	11.52	20	0	-
6		11:08 AM	4.07	11.4	20	0.01	167
7		11:28 AM	4.07	11.4	20	0	-
8		12:28 PM	4.09	11.16	60	0.02	250
9		12:58 PM	4.09	11.16	30	0	-
10		1:28 PM	4.09	11.16	30	0	-
11		2:02 PM	4.1	11.04	34	0.01	283
12		2:32 PM	4.11	10.92	30	0.01	250
13		3:02 PM	4.11	10.92	30	0	-
14		3:32 PM	4.12	10.8	30	0.01	250
15		4:02 PM	4.12	10.8	30	0	-
16		4:32 PM	4.13	10.68	30	0.01	250
17		5:02 PM	4.13	10.68	30	0	-
18		5:32 PM	4.14	10.56	30	0.01	250
19	8/15/2019	7:49 AM	4.3	8.64	857	0.16	446

Comments:

Water standing in hole, excess water removed to establish 12 inches of water at start of test

EXHIBIT "B" (Geotechnical Exploration)

Lot # 1-P4

Date 8/14/2019
 Job # 16370.000.000
 Job Name Goleta Train Station

Hole diameter (in) 7.5
 Perf pipe diam (in) 4
 Depth of hole (ft) 4.05
 Gravel thickness ~2"

Saturated water level Surface
 Saturation date & time 8/12/2019 4:00pm

Percolation Test Measurements

	Notes	Time	Depth to Water from Reference Point (ft)	Total Head (in)	Elapsed Time (min.)	Change in Water Level (ft)	Prec. Rate (m.p.i)
1	12" Starting head	9:34 AM	4.15	12			
2		9:54 AM	4.15	12	20	0	-
3		10:14 AM	4.17	11.76	20	0.02	83
4		10:37 AM	4.18	11.64	23	0.01	192
5		10:57 AM	4.19	11.52	20	0.01	167
6		11:17 AM	4.19	11.52	20	0	-
7		11:37 AM	4.2	11.4	20	0.01	167
8		12:34 PM	4.22	11.16	57	0.02	238
9		1:04 PM	4.24	10.92	30	0.02	125
10		1:34 PM	4.25	10.8	30	0.01	250
11		2:08 PM	4.27	10.56	34	0.02	142
12		2:38 PM	4.28	10.44	30	0.01	250
13		3:08 PM	4.28	10.44	30	0	-
14		3:38 PM	4.29	10.32	30	0.01	250
15		4:08 PM	4.3	10.2	30	0.01	250
16		4:38 PM	4.31	10.08	30	0.01	250
17		5:08 PM	4.32	9.96	30	0.01	250
18		5:38 PM	4.33	9.84	30	0.01	250
19	8/15/2019	9:13 AM	4.53	7.44	935	0.2	390

Comments:

EXHIBIT "B" (Geotechnical Exploration)

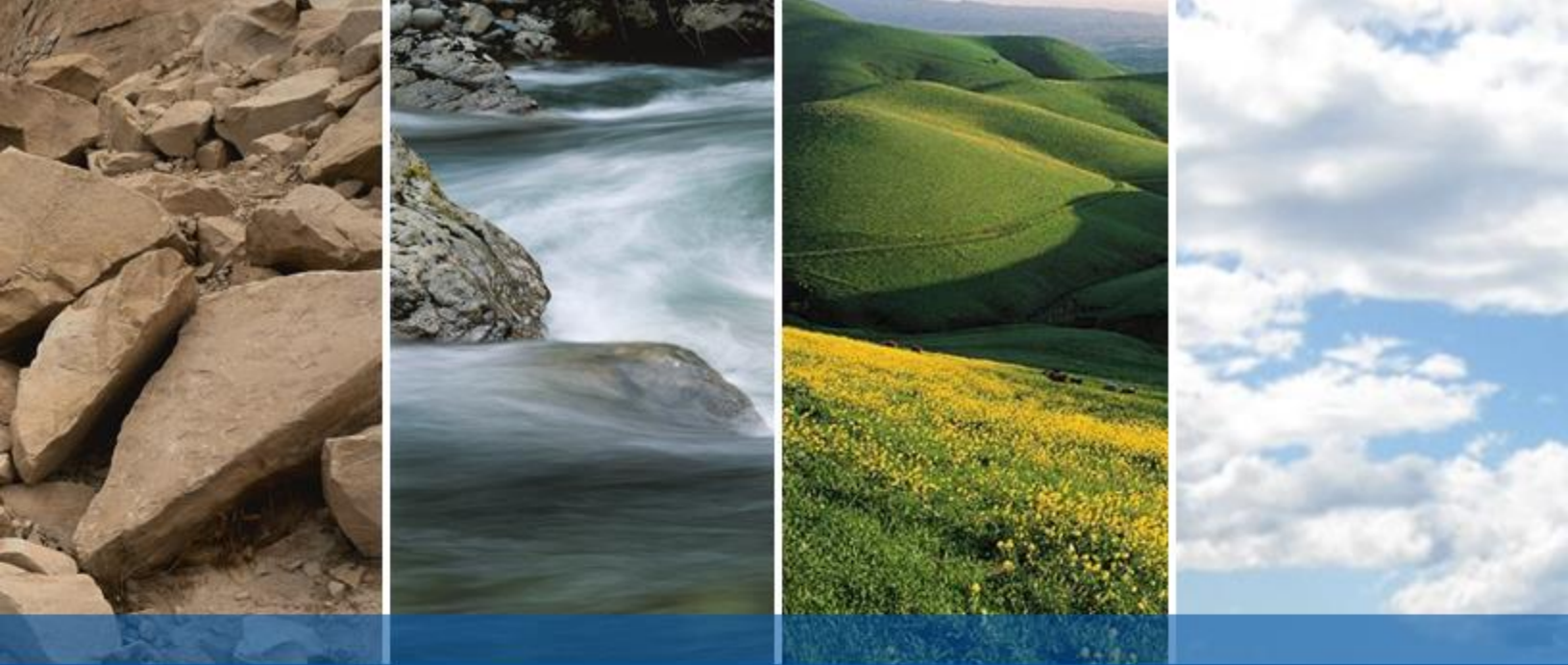


EXHIBIT "B" (Geotechnical Exploration)



EXHIBIT C

STORM WATER POLLUTION PREVENTION CONTROL PLAN (SWPPP)

PREPARED BY ENGEO, INC.

DATED OCTOBER 26, 2023



**STORMWATER POLLUTION PREVENTION PLAN (RISK LEVEL 2)
WDID NO. _____**

**GOLETA TRAIN DEPOT
27 SOUTH LA PATERA LANE
GOLETA, CALIFORNIA**

OWNER/DEVELOPER

City of Goleta
Department of Neighborhood Services and Public Safety
130 Cremona Drive, Suite B
Goleta, CA 93117
Contact Jaime Valdez, 805-961-7568

**VOLUME 1 OF 2
(THROUGH APPENDIX N)**

PREPARED BY

ENGEO Incorporated
2010 Crow Canyon Place, Suite 250
San Ramon, CA 94583
Jonathan Buck/JAM, QSD/P 00230
928-866-9000

October 26, 2023

**PROJECT NO.
16370.000.000**

EXHIBIT "C" (Stormwater Pollution Prevention Plan)

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STORMWATER POLLUTION PREVENTION PLAN (RISK LEVEL 2)
WDID NO. _____

GOLETA TRAIN DEPOT
27 SOUTH LA PATERA LANE
GOLETA, CALIFORNIA

OWNER/DEVELOPER:
City of Goleta
Department of Neighborhood Services and Public Safety
130 Cremona Drive, Suite B
Goleta, CA 93117
Contact Jaime Valdez, 805-961-7568

VOLUME 2 OF 2
(APPENDICES O THROUGH S)

PREPARED BY:
ENGEO Incorporated
2010 Crow Canyon Place, Suite 250
San Ramon, CA 94583
Jonathan Buck/JAM, QSD/P 00230
928-866-9000

October 26, 2023

PROJECT NO.
16370.000.000

EXHIBIT "C" (Stormwater Pollution Prevention Plan)

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ENGEO
— Expect Excellence —

**STORMWATER POLLUTION
PREVENTION PLAN**

(RISK LEVEL 2)

**GOLETA TRAIN DEPOT
GOLETA, CALIFORNIA**

WDID NO. _____

Legally Responsible Person (LRP):

Mr. Jim Keenan
Anil Verna Associates
(949) 510-5096

Site Stormwater Manager:

Project Address:

27 South La Patera Lane, Goleta CA

Estimated Project Dates:

Start of Construction: 03/01/2024
Completion of Construction: 11/01/2024





Jonathan Buck, GE QSD/P 00230

EXHIBIT "C" (Stormwater Pollution Prevention Plan)

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EXHIBIT "C" (Stormwater Pollution Prevention Plan)

CONTACT INFORMATION

ROLE	NAME	PHONE NUMBER	LICENSE OR CERTIFICATION NUMBER, IF APPLICABLE
Qualified SWPPP Developer (QSD) (SWPPP/ESCP Preparation)	Jonathan Buck	925-570-7980	00230
Qualified SWPPP Developer (QSD) (During Implementation)			
Qualified SWPPP Practitioner (QSP) (During Implementation)			
Qualified SWPPP Practitioner (QSP) (During Implementation)			
QSP Delegate			
QSP Delegate			
QSP Delegate			
QSP Delegate			

EXHIBIT "C" (Stormwater Pollution Prevention Plan)

0.0 SWPPP CERTIFICATIONS

Certifications of the authorized representatives for this SWPPP are provided in Sections 0.1, 0.2, 0.3, and 0.4 below, with executed signature pages inserted herein and in Appendix B. A list of authorized representatives is also provided in Appendix J.

0.1 OWNER'S CERTIFICATION

The development of this SWPPP was guided by the requirements of Order No. 2022-0057-DWQ (General Permit). I certify under penalty of law that this document and the incorporated attachments were prepared under my direction or supervision in accordance with a system designed to allow qualified personnel to properly gather and evaluate the information submitted.

Based on my inquiry of the person(s) who manage the system, or those persons directly responsible for gathering the information, the information submitted is to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

City of Goleta
Department of Neighborhood Services and Public Safety
Mr. Jaime Valdez
130 Cremona Drive, Suite B
Goleta, CA 93117

Signed: _____ Date: _____

EXHIBIT "C" (Stormwater Pollution Prevention Plan)

0.2 SITE STORMWATER MANAGER CERTIFICATION

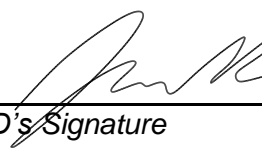
The Site Stormwater Manager's (SSWM) role was guided by the requirements of Order No. 2022-0057-DWQ (General Permit). I certify under penalty of law that this SWPPP will be implemented under my direction or supervision in accordance with the General Permit. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Signed: _____ Date: _____

EXHIBIT "C" (Stormwater Pollution Prevention Plan)

0.3 QUALIFIED SWPPP DEVELOPER'S (QSD) CERTIFICATION

I have prepared the enclosed Storm Water Pollution Prevention Plan (SWPPP) using the best available information regarding the Order No. 2022-0057-DWQ , (General Permit). I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.



QSD's Signature



Jonathan Buck, GE, QSD/P 00230
Print Name

October 26, 2023
Date

ENGEO / Associate
Company and QSD Title

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0.4 QUALIFIED SWPPP PRACTITIONER'S (QSP) CERTIFICATION

I will implement the enclosed Storm Water Pollution Prevention Plan (SWPPP) in accordance with the monitoring and sampling requirements of Order No. 2022-0057-DWQ (General Permit). I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

QSP's Signature

Date

Print Name

Company and QSP Title

EXHIBIT "C" (Stormwater Pollution Prevention Plan)

0.5 AMENDMENT LOG

TABLE 0.5-1: Amendment Log

Project Name: Goleta Train Depot, Goleta, CA

WDID Number: _____

AMENDMENT NO.	DATE	BRIEF DESCRIPTION OF AMENDMENT (INCLUDE SECTION AND PAGE NUMBER)	PREPARED AND APPROVED BY

The SWPPP will be revised when:

- There is a 2022 CGP violation (2022 CGP Section VI.Q.1).
- There is a reduction or increase in total disturbed acreage (2022 CGP Section III.F.2. and F.4).
- BMPs are not effective and are not resulting in a reduction or elimination of pollutants in stormwater discharges and authorized non-stormwater discharges (2022 CGP Section VI.Q.1 and Attachment E Section III.C.5).
- There is a change in the project duration that changes the project Risk Type (2022 CGP Section III.F.1).
- Dischargers with projects where all construction activities (including passive treatment, active treatment systems, and/or active equipment) will be suspended for 30 days or more (2022 CGP Section III.G).
- There is a change in construction or operations that may affect the discharge of pollutants to surface waters, groundwater(s), or a municipal separate storm sewer system (MS4) (2022 CGP Sections IV.O. and VI.Q.1); or

When deemed necessary by the QSD, the QSD has determined that the changes listed in Table 0.5-1 can be field determined by the QSP. All other changes will be made by the QSD as formal amendments to the SWPPP. Note that the 2022 CGP requires that the QSD revise the SWPPP to address potential problems identified by visual inspections, sampling data, comments from a QSP, or their own site observations (2022 CGP Section V.C.2.). SWPPP Amendment QSD Certifications are located in Appendix C.

EXHIBIT "C" (Stormwater Pollution Prevention Plan)

1.0 SWPPP REQUIREMENTS

1.1 INTRODUCTION

The Goleta Train Depot project is to be constructed on an approximately 2.48-acre site located in Goleta, California (Vicinity Map, Appendix B). The site is bordered on the north by land owned by Union Pacific Railroad, which includes the existing train station platform. The lot south of the proposed train station depot site includes multiple buildings and their associated parking lots. The train depot site is bounded by an existing warehouse to the west and South La Patera Lane to the east. Improvements are proposed for South La Patera Lane from the existing train station extending to Hollister Avenue.

The project involves the demolition of an existing warehouse building and parking lot and replacement with a new train depot building, lobby, ticketing area, waiting room, café, community room, restrooms/showers, parking lot, and bioretention facility (post-construction BMP).

This Stormwater Pollution Prevention Plan (SWPPP) has been prepared to comply with California's General Permit for Storm Water Discharges Associated with Construction and Land Disturbance Activities (2022 CGP), State Water Resources Control Board (State Water Board) Order No. 2022-0057-DWQ (NPDES No. CAS000002) for a Risk Level 2 site (Appendix A). As required, the discharger shall ensure that the SWPPP is developed and amended or revised by a Qualified SWPPP Developer (QSD).

This project is considered a traditional construction project.

In accordance with the 2022 CGP, Section IV.O, this SWPPP is designed to address the following.

1. Control pollutants and their sources, including sources of sediment associated with construction, construction site erosion and other activities associated with construction activity.
2. Where not otherwise required to be under a Regional Water Quality Control Board (RWQCB) permit, non-stormwater discharges are identified and either eliminated, controlled, or treated.
3. Site BMPs are effective and result in the reduction or elimination of pollutants in stormwater discharges and authorized non-stormwater discharges from construction activity to the Best Available Technology/Best Control Technology (BAT/BCT) standard.
4. Calculations and design details as well as BMP controls for site run-on are complete and correct.
5. Stabilization BMPs installed to reduce or eliminate pollutants after construction is completed.
6. Identify post-construction BMPs, which are those measures to be installed during construction that are intended to reduce or eliminate pollutants after construction is completed (post-construction BMPs are required for all sites by Section IV.N). Note that post-construction BMPs should be developed early in the project planning/design process and reports or drawings related to permanent BMP design should be referenced as needed.
7. Identify and provide methods to implement BMP inspection, visual monitoring, and Construction Site Monitoring Program (CSMP) requirements to comply with the General Permit.

EXHIBIT "C" (Stormwater Pollution Prevention Plan)

1.2 PERMIT REGISTRATION DOCUMENTS

To obtain coverage under the General Permit, project-related Permit Registration Documents (PRDs) must be submitted to the SWRCB via the Stormwater Multi Application and Report Tracking System (SMARTS) by the Legally Responsible Person (LRP).

The project-specific PRDs, provided in Appendix B, include (2022 CGP Section III.A):

- Notice of Intent (NOI) Form Printout
- Receipt of NOI (once issued)
- Risk Assessment (Site Sediment and Receiving Water Risk Determination)
- Vicinity Map/Site Plan
- Erosion and Sediment Control Plan
- Signed Certification Statement

Additional PRDs may be required depending on the construction type and location, including:

1. Post-construction water balance calculation if not within an MS4 area.
2. Active Treatment System (ATS) plan.
3. Dischargers proposing an alternate (site-specific) K-factor and LS-factor risk justification must submit topographic validation and/or a soil particle size analysis in accordance with General Permit requirements.

This SWPPP is also required to be filed electronically through the SWRCB SMARTS site as a Project PRD.

1.3 SWPPP AVAILABILITY AND IMPLEMENTATION

The General Permit (Section IV.O.1) requires the SWPPP be available at the construction site during working hours while construction is occurring and shall be made available upon request by a State or Municipal inspector. A current copy of the site-specific SWPPP and site inspection reports required by the 2022 CGP may be kept in electronic format at the site so long as the information requested by a federal, state, or municipal inspector can be made available during an inspection. Legible maps (Appendix B) in hard copy must be available at the site (2022 CGP Section IV.O.1.).

When the original SWPPP is retained by a crewmember in a construction vehicle and is not currently at the construction site, current copies of the BMPs and map/drawing will be left with the field crew and the original SWPPP shall be made available via a request by radio/telephone.

The SWPPP must be implemented at the appropriate level to protect water quality at all times throughout the life of the project. The SWPPP must remain on the site during construction activities, commencing with the initial mobilization and ending with the termination of coverage under the 2022 CGP.

1.4 SWPPP AMENDMENTS

The General Permit requires that the SWPPP be amended or revised by a QSD (Section V.A.2) and that the SWPPP include a listing of the date of initial preparation and the date of each

EXHIBIT C (Stormwater Pollution Prevention Plan)

amendment. SWPPP changes or amendments will be uploaded through SMARTS within 30 calendar days. Amendments must be signed by a QSD (Section V.A.2) and certified by the LRP or an Approved Signatory (AS).

This SWPPP will be updated:

1. Whenever there is a change in construction or operations that may affect the discharge of pollutants to surface waters, groundwater, or a municipal separate storm sewer system (MS4).
2. If any condition of the General Permit (see below) is violated or the general objective of reducing or eliminating pollutants in stormwater discharges has not been achieved. If the RWQCB determines that a Permit violation has occurred, the SWPPP shall be amended and implemented within 14 calendar days after notification by the RWQCB.
3. For a new phase of the project or Change of Information (COI) for the project. For on-going construction activity involving a change of property ownership, the new owner shall review the existing SWPPP and amend or develop a new SWPPP within 30 calendar days. See Section 1.5 for additional information regarding COIs.
4. The RWQCB or local agency with concurrence of the RWQCB may require the discharger to amend the SWPPP, particularly if there has been a failure of a BMP and the exceedance of downstream water quality standards.

The following items will be included in each amendment/update:

- The name of the person/firm requesting the update.
- The reason for the amendment/update.
- A description of the original BMPs and the modification(s) proposed.
- The location of the amended Best Management Practices (BMPs) on site.

The amendments for the SWPPP should be logged into Appendix C using the Amendment Log form provided.

1.5 CHANGES TO PERMIT COVERAGE

The Change of Information (COI) in the General Permit allows a permittee to reduce (Section III.F.2.a) or increase (Section III.F.4.a) the total acreage covered under the General Permit when:

1. A portion of the project is complete and/or conditions for termination of coverage have been met,
2. Ownership of a portion of the project is sold to a different entity, or
3. New acreage is added to the project.

To change the acreage covered, the permittee must electronically file the COI in accordance with requirements of the General Permit within 30 days of a reduction or increase in total disturbed area. This shall include modifications to PRDs including revised NOI, site map, SWPPP revisions as appropriate, and certification that new landowners have been notified of applicable requirements to obtain permit coverage (including name, address, phone number, and e-mail address of new landowner), as appropriate.

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Additionally, a COI may be filed by the permittee for changes in the construction timeline or a change in ownership. COI filings for changes in the start and end dates of construction must be submitted at least 14 days prior to the date that was modified.

SWPPP Amendments should be inserted into Appendix C and updates to PRDs submitted via SMARTS (<http://smarts.waterboards.ca.gov/>) should be inserted into Appendix D.

1.6 RETENTION OF RECORDS

The General Permit requires that all dischargers maintain a paper or electronic copy of all required records for 3 years from the date generated or date submitted, whichever is last. These records must be available at the construction site until construction is completed.

The discharger shall furnish the RWQCB, SWRCB, or US Environmental Protection Agency (EPA), within a reasonable time, any requested information to determine compliance with this General Permit. All documentation should be kept in the SWPPP or in a separate binder stored with the SWPPP. RWQCBs may require records to be retained for longer periods.

1.7 REQUIRED NON-COMPLIANCE REPORTING

The General Permit identifies several areas of non-compliance to report. It is the responsibility of the permittee to properly document reportable discharges or other violations of the General Permit. Exceedances and violations should be reported using the SMARTS system and include the following:

1. Numeric Action Level (NAL) exceedances for Risk Levels 2 and 3 sites.
2. Self-reporting of any other discharge violations or to comply with RWQCB enforcement actions for all Risk Levels.
3. Discharges that contain a hazardous substance in excess of reportable quantities established in 40 CFR §§117.3 and 302.4, unless a separate NPDES Permit has been issued to regulate those discharges for all Risk Levels.

In the event of an NAL exceedance for Risk Level 2 or 3 sites, document the subsequent site evaluation in the SWPPP. NAL exceedance site evaluations should be archived in Appendix R.

1.8 ANNUAL REPORT

The 2022 CGP requires that all permittees prepare, certify, and electronically submit an Annual Report no later than September 1 each year the permit is active through the SMARTS site (<http://smarts.waterboards.ca.gov/>). Reporting requirements are identified in 2022 CGP Section VI.P. and include (but are not limited to) providing a summary of:

- Sampling/analysis results, including laboratory reports, analytical methods, and reporting limits.
- Corrective actions and compliance activities, including those not implemented.
- Violations of the General Permit.
- Date, time, place, and name(s) of the inspector(s) for sampling, inspections, and field activities.

EXHIBIT "C" (Stormwater Pollution Prevention Plan)

- Visual observation and sample collection exception records.
- Training documentation of all personnel responsible for General Permit compliance activities.

1.9 NOTICE OF TERMINATION

To terminate coverage under the General Permit, a Notice of Termination (NOT) must be submitted electronically by the LRP via SMARTS (<http://smarts.waterboards.ca.gov>). A final site map and photos are required to be submitted with the NOT. Filing a NOT certifies that all General Permit requirements have been met. The NOT is submitted when the construction project is complete and within 90 days of meeting all General Permit requirements for termination and final stabilization (Section III.H).

The definition of “complete” is in accordance with the General Permit as follows.

- For purposes of “final stabilization,” the site will not pose any additional sediment discharge risk than it did prior to the commencement of construction activity.
- There is no potential for construction-related stormwater pollutants to be discharged into site runoff.
- Final stabilization has been reached.
- Construction materials and wastes have been disposed of properly.
- Compliance with the Post-Construction Standards in Section IV.N of this General Permit has been demonstrated.
- Post-construction stormwater management measures have been installed and a long-term maintenance plan has been established.
- All construction-related equipment, materials, and any temporary BMPs no longer needed are removed from the site.

The discharger shall certify that final stabilization conditions are satisfied in their NOT. Failure to certify shall result in continuation of permit coverage and annual billing.

In addition, the NOT must demonstrate through photos, RUSLE or RUSLE2, or results of testing and analysis that the site meets all of the conditions of Section III.H of the General Permit and the final stabilization condition in Section III.H.4 of the General Permit is attained by one of the following methods.

- “70% final cover method,” no computational proof required
OR:
- “RUSLE or RUSLE2 method,” computational proof required
OR:
- “Custom method”, the discharger shall demonstrate in some other manner than a or b, above, that the site complies with the “final stabilization” requirement in Section III.H.4.

According to the 2022 CGP, the NOT will be automatically approved within 30 calendar days after the date the NOT was submitted, unless, within the 30 calendar days the Regional Water Board notifies the discharger through SMARTS that the Notice of Termination has been denied, returned, or accepted for review (2022 CGP Section III.H.7).

EXHIBIT "C" (Stormwater Pollution Prevention Plan)

The discharger is required to retain records of monitoring information, copies of reports required by the General Permit, and records of data used to complete the NOI for construction activities to be covered by the General Permit for a period of at least 3 years from the date generated. This period may be extended by request of the SWRCB and/or RWQCB. With the exception of reporting noncompliance to the appropriate RWQCB, dischargers are not required to submit the records, except upon specific request by the RWQCB.

1.10 INSTRUCTIONS TO FIELD PERSONNEL

The Site Stormwater Manager (SSWM) for this project is hereby authorized to uphold, certify, and maintain this SWPPP and to make available to all subcontractors. Appendix J provides a letter of acknowledgement delegating the responsibility to the SSWM by the LRP.

Appendix I is a Training Report Form for project subcontractors, field personnel and their assigns to understand and accept responsibility to follow the requirements described in this SWPPP and any alterations thereof made at the time and in the manner herein specified, and in all respects according to its intent and meaning.

2.0 PROJECT INFORMATION

2.1 PROJECT AND SITE DESCRIPTION

The Goleta Train Depot project is to be constructed on an approximately 2.48-acre site located in Goleta, California (Vicinity Map, Appendix B). The site is bordered on the north by land owned by Union Pacific Railroad, which includes the existing train station platform. The lot south of the proposed train station depot site includes multiple buildings and their associated parking lots. The train depot site is bounded by an existing warehouse to the west and South La Patera Lane to the east. Improvements are proposed for South La Patera Lane from the existing train station extending to Hollister Avenue.

The property presently has a vacant warehouse slated for demolition, sparse vegetation within commercial planters, and paved parking areas and hardscape. Based on the grading and drainage plans for the project prepared by RailPros (August 22, 2022 Draft 100%), existing site grades slope from the east, from a high of about Elevation 36.5 feet at the northeast corner of the property to a low of about Elevation 31.5 feet in the southwestern corner of the property. The site upon completion will drain to planned bioretention facilities. The driveway at the eastern portion of the site will drain to the city storm drain network along South La Patera Lane.

The project involves the demolition of an existing warehouse building, parking lot, and hardscape, and construction of a new train depot building, lobby, ticketing area, waiting room, café, community room, restrooms/showers, parking lot, hardscape, and bioretention areas (post-construction BMPs).

The proposed post-development slopes from the northeast towards the southwest generally matching pre-development (existing) drainage patterns. Planned site drainage consists of sheet flow from roof, parking lot, and hardscape areas into bioretention areas. After on-site treatment, the storm drain system for the project will outfall into the city storm drain network which connects locally with Carneros Creek, which drains into Goleta Slough, which in turns drains to the Pacific Ocean.

EXHIBIT "C" (Stormwater Pollution Prevention Plan)

2.2 STORMWATER RUN-ON FROM OFF-SITE AREAS

Based on site conditions and topography, site run-on from adjacent properties is unlikely to occur.

2.3 SITE RISK LEVEL

The General Permit includes a project risk level determination based upon the project sediment risk and the receiving water risk. Depending upon the project's sediment risk and the receiving waters, the project will be assigned a risk level that will be utilized during the project construction. Each risk level yields a minimum set of BMPs, monitoring, and possibly stormwater sampling/testing requirements. A summary of the risk level determination is presented below.

2.3.1 Project Sediment Risk

The following risk factors were calculated for the site based on the project location and construction schedule provided:

- The R factor is **20.43**
- The K factor is **0.32**
- The LS factor is **0.60**
- The watershed erosion estimate (soil loss) in tons/acre is **3.92**

The sediment risk is **LOW**

A copy of the sediment risk worksheets, analyses, and calculation printouts are included in Appendix B.

2.3.2 Receiving Water Risk

The site drains into the City of Goleta's permitted MS4 storm drain system. The storm drain system appears to be connected with Carneros Creek which is approximately 0.25-miles from the site. This water body discharges into Tecolito Creek then to Goleta Slough, which discharges into the Pacific Ocean.

Carneros Creek has designated beneficial uses of COLD, and SPWN. However, Carneros Creek connects with Goleta Slough downstream approximately 1.5-miles from the site. The Goleta Slough has several designated beneficial uses including COLD, MIGR (Migratory) and SPWN (Spawning). This combination creates a High Receiving Water Risk. Carneros Creek is not designated as a 303(d)-listed waterbody impaired by sediment.

The Receiving Water Risk is **HIGH**. A copy of the receiving water risk worksheets and printouts are included in Appendix A.

2.3.3 Project Risk Level

Based on the **LOW** sediment risk and **HIGH** receiving water risk information collected (Appendix B) and reported in above Sections 2.3.1 and 2.3.2:

This project is a combined **RISK LEVEL 2**.

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2.4 CONSTRUCTION SCHEDULE

The preliminary construction schedule is summarized in the following timeline:

1. Project Start: March 1, 2024.
2. File Annual Report: September 1 annually.
3. Project Complete and Final Stabilized: November 1, 2024.
4. File NOT when construction is complete: November 1, 2024.

Construction schedules and updates can be found in Appendix E. Implement BMP, stormwater and non-stormwater monitoring year-round.

2.5 POTENTIAL NON-SEDIMENT POLLUTANT SOURCES

An inventory of construction activities with potential non-sediment pollutant sources is provided in the following section. Non-sediment sources of pollution can be generated by equipment and construction materials used on site. Stormwater runoff may be affected by runoff from stored building materials, improper handling and/or washing of materials, chemical spills, herbicides/pesticides applied to landscape areas, and the improper disposal of paints, thinners, and other building materials.

Toxic materials include chemicals listed in the Code of Federal Regulations (40 CFR 372) requiring reporting on the EPA Form R, and oil or hazardous substances in excess of reportable quantities as specified in 40 CFR 110, 117, and 302. Table 2.5-1 lists the materials possibly used for construction that are considered pollutants.

The table is also included in Appendix F.

TABLE 2.5-1: Potential Pollutant Sources

POLLUTANT	SOURCES
Petroleum Products	<ul style="list-style-type: none"> • Oil and grease from machinery, heavy equipment • Hydraulic fluid • Paving operations, asphalt emulsion • Tar and gravel roofing
Lime Products	<ul style="list-style-type: none"> • Concrete: application and finishing • Drywall • Masonry • Plaster
Metal Products	<ul style="list-style-type: none"> • Some paints • Drywall • Galvanized metal • Grinding and polishing of metal surfaces • Colored finishing compounds
Chlorinated solvents	<ul style="list-style-type: none"> • Thinners and strippers • Degreasing agents • Solvents, cleaners
Fertilizers, pesticides, herbicides	<ul style="list-style-type: none"> • Landscaping
Other	<ul style="list-style-type: none"> • Epoxy, silicone
Trash	<ul style="list-style-type: none"> • From all phases of construction

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2.6 IDENTIFICATION OF NON-STORMWATER DISCHARGES

The General Permit requires (Section XIV.A.2) that dischargers identify all non-stormwater discharges (where not otherwise required to be under a Regional Water Quality permit) and that discharges be eliminated, controlled, or treated.

2.6.1 Authorized Non-Stormwater Discharges

All efforts are to be made to minimize non-stormwater discharges. On-site inspections will include observations for non-stormwater discharges and activities with *a potential to cause discharges*.

Authorized non-stormwater discharges include the following:

1. Discharges from fire-fighting activities.
2. Fire hydrant flushing.
3. Waters used to wash vehicles where detergents are not used, if preapproved.
4. Water used to control dust.
5. Potable water including uncontaminated water line flushing, if preapproved.
6. Routine external building wash down that does not use detergents, if preapproved.
7. Wash waters where spills or leaks of toxic or hazardous materials have not occurred (unless all spilled material has been removed) and where detergents are not used, if preapproved.
8. Uncontaminated air conditioning or compressor condensate.
9. Uncontaminated groundwater or spring water.
10. Foundation or footing drains where flows are not contaminated with process materials such as solvents.
11. Uncontaminated excavation dewatering, if preapproved.
12. Landscape irrigation.

The discharge of non-stormwater will only be allowed if the following conditions are met:

1. The discharge does not cause or contribute to a violation of any water quality standard.
2. The discharge does not violate any provision of the General Permit.
3. The discharge is not prohibited by the applicable Basin Plan.
4. The SWPPP includes and implements BMPs required by the General Permit to prevent or reduce the contact of the non-stormwater discharge with construction materials or equipment.
5. The discharge does not contain toxic constituents in toxic amounts or (other) significant quantities of pollutants.
6. The sampling information is reported in the Annual Report.

Table 2.6.1-1 is a list of potential non-stormwater discharges that apply to the site along with associated BMPs to be incorporated:

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TABLE 2.6.1-1: Non-Stormwater Discharges and Appropriate BMPs

SOURCES OF NON-STORMWATER DISCHARGE	BMP FOR NON-STORMWATER DISCHARGES
Vehicles on muddy pads.	Park subcontractor vehicles in the street or in a stabilized or paved parking lot. Vehicles should not be allowed on muddy lots to avoid tracking soil from pad to pavement.
Irrigation runoff.	Regularly inspect irrigation equipment to allow proper functioning. Check for and repair leaking equipment, and misdirected or damaged sprinkler heads.
Unpolluted groundwater and other discharges resulting from excavation dewatering/subdrains.	Discharge to temporary basin, as applicable. Allow fines to settle or use filter sock before discharging.
Pipe flushing and testing.	Grassy swales and a storm treatment unit at the site could be used to handle filtration prior to discharge into the storm drain system. It is very important that the system function properly to prevent pollutants from entering the system.
Application of water for dust abatement.	Water will be sprayed at non-erosive rates from a mobile tank truck with mounted sprinkler, as applicable.
Regular cleaning of equipment used by subcontractors on the project.	If on-site cleaning must be done, position equipment in a designated wash area on unpaved surface (preferably graveled), away from creek channels, storm drains or other stormwater conveyance facilities.
Sanitary wastes from portable toilets.	Collect and remove untreated raw wastewater from site.
Washing of aggregate and other surfaces for proper finishing.	Wash fresh aggregate onto designated areas capable of absorbing and controlling runoff. Do not dispose of washout into the storm drain system. Contain wash water in a temporary area on the building pad adjacent to the construction site for later removal. Collect dried material and recycle, or dispose.

If any of the above conditions are not satisfied, the discharge is not authorized by the General Permit and not permitted by this SWPPP. Notify the RWQCB of any anticipated non-stormwater discharges not already authorized by the General Permit or another NPDES permit, to determine whether a separate NPDES permit is necessary.

2.7 TMDL REQUIREMENTS

Based on the project’s receiving waters and the pollutant source assessment, the project does not have TMDLs that are identified in the 2022 CGP, Attachment H.

2.7.1 Authorized Non-Stormwater Discharges

All efforts are to be made to minimize non-stormwater discharges. On-site inspections will include observations for non-stormwater discharges and activities with *a potential to cause discharges*.

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3.0 BEST MANAGEMENT PRACTICES

3.1 EROSION AND SEDIMENT CONTROL

Erosion and Sediment BMPs available and considered appropriate for the project are listed below and are also shown and discussed graphically in Appendix G. Additional BMPs may be considered for the project as necessary. The California Stormwater Quality Association (CASQA) includes a numbering system for erosion control (EC), wind erosion (WE), sediment control (SE), and tracking control (TC) BMPs as follows.

TABLE 3.1-1: Erosion and Sediment Control BMPs

EROSION AND SEDIMENT CONTROL BMPs			
• EC-1	Scheduling	• SE-2	Sediment Basin
• EC-2	Preservation of Existing Vegetation	• SE-3	Sediment Trap
• EC-3	Hydraulic Mulch	• SE-4	Temporary Gravel Check Dams
• EC-4	Hydroseeding	• SE-5	Straw/Fiber Rolls
• EC-5	Soil Binders	• SE-6	Gravel Bag Berm
• EC-6	Straw Mulch	• SE-7	Street Sweeping and Vacuuming
• EC-7	Erosion Control Fabric	• SE-8	Sand Bag Barrier
• EC-8	Wood Mulching	• SE-9	Straw Bale Barrier
• EC-9	Earth Dikes and Drainage Swales	• SE-10	Storm Drain Inlet Protection
• EC-10	Velocity Dissipation Devices	• SE-11	Active Treatment System
• EC-11	Slope Drains	• SE-12	Temporary Silt Dike
• EC-12	Streambank Stabilization	• SE-13	Compost Socks and Berms
• EC-14	Compost Blanket	• SE-14	Biofilter Bags
• EC-15	Soil Preparation/Roughening	• WE-1	Wind Erosion Control
• EC-16	Non-Vegetative Stabilization	• TC-1	Stabilized Construction Entrance/Exit
• SE-1	Silt Fence	• TC-2	Stabilized Construction Roadway
• SE-2	Sediment Basin	• TC-3	Entrance/Outlet Tire Wash

Additional measures should be implemented by the contractor as approved by the SSWM and QSP if conditions warrant to protect water quality at and in the vicinity of the site for the duration of project construction.

3.1.1 Erosion Control

Under the General Permit, minimum Erosion Control BMP requirements for a Risk Level 2 site are as follows.

1. Dischargers shall implement effective wind erosion control.
2. Dischargers shall provide effective soil cover for inactive¹ areas and all finished slopes, open space, utility backfill, and completed pads. Inactive construction areas may be stabilized with erosion control fabric, hydromulch/hydroseed, plastic, rock, turf, and/or non-toxic soil stabilizers as detailed in Appendix G if sediment control measures are not functioning effectively.

¹ Inactive areas of construction are areas of construction activity that have been disturbed and are not scheduled to be re-disturbed for at least 14 days.

- Dischargers shall limit the use of plastic materials when more sustainable, environmentally friendly alternatives exist. Where plastic materials are deemed necessary, the discharger shall consider the use of plastic materials resistant to solar degradation.

3.1.2 Sediment Control

Under the General Permit, minimum Sediment Control BMP requirements for a Risk Level 2 site are as follows:

- Establish and maintain effective perimeter controls and stabilize all construction entrances and exits to sufficiently control erosion and sediment discharges from the site.
- On sites where sediment basins are to be used, dischargers shall design sediment basins according to the method provided in CASQA’s Construction BMP Guidance Handbook.
- Dischargers shall implement appropriate erosion control BMPs (runoff control and soil stabilization) in conjunction with sediment control BMPs for areas under active² construction.
- Dischargers shall apply linear sediment controls along the toe of the slope, face of the slope, and at the grade breaks of exposed slopes to comply with sheet flow lengths³ in accordance with Table 3.1.2-1.

TABLE 3.1.2-1: Critical Slope/Sheet Flow Length Combinations

SLOPE PERCENTAGE	SHEET FLOW LENGTH NOT TO EXCEED
0-25%	20 feet
25-50%	15 feet
Over 50%	10 feet

- Dischargers shall ensure that construction activity traffic to and from the project is limited to entrances and exits that employ effective controls to prevent offsite tracking of sediment.
- Dischargers shall ensure that all storm drain inlets and perimeter controls, runoff control BMPs, and pollutant controls at entrances and exits (e.g., tire washoff locations) are maintained and protected from activities that reduce their effectiveness.
- Dischargers shall inspect all immediate access roads daily. At a minimum daily and prior to any rain event, the discharger shall remove any sediment or other construction activity-related materials that are deposited on the roads (by vacuuming or sweeping).
- Dischargers shall effectively manage all run-on, all runoff within the site, and all runoff that discharges off the site. Run-on from offsite shall be directed away from all disturbed areas or shall collectively be in compliance with the effluent limitations in this General Permit.
- Implement measures as needed to protect the water quality at and in the vicinity of the project for the duration of project construction, to adequately address proposed project impacts and mitigation to Waters of the State and to address public safety concerns in a responsible way.

² Active areas of construction are areas undergoing land surface disturbance. This includes construction activity during the preliminary stage, mass grading stage, streets and utilities stage and the vertical construction stage.

³ Sheet flow length is the length that shallow, low velocity flow travels across a site.

3.2 GOOD SITE MANAGEMENT “HOUSEKEEPING”

Dischargers shall implement good site management (i.e. “housekeeping”) measures for construction materials, waste management, vehicle storage and maintenance, and landscaping materials as presented in Attachment D of the General Permit, which is attached in Appendix A of this SWPPP.

3.3 NON-STORMWATER AND MATERIALS MANAGEMENT

Non-stormwater and materials management BMPs considered appropriate for the project are listed below and are also shown and discussed graphically in Appendix G. Additional BMPs may be considered for the project as necessary. CASQA includes a numbering system for non-stormwater (NS) and waste management (WM) BMPs as follows.

TABLE 3.3-1: Non-Stormwater and Materials Management BMPs

NON-STORMWATER AND MATERIALS MANAGEMENT BMPS	
• NS-1 Water Conservation Practices	• NS-14 Material Over Water
• NS-2 Dewatering Operations	• NS-15 Demolition Adjacent to Water
• NS-3 Paving and Grinding Operations	• WM-1 Material Delivery and Storage
• NS-4 Temporary Stream Crossing	• WM-2 Material Use
• NS-5 Clear Water Diversion	• WM-3 Stockpile Management
• NS-6 Illicit Connection/Illegal Discharge Detection	• WM-4 Spill Prevention and Control
• NS-7 Potable Water/Irrigation	• WM-5 Solid Waste Management
• NS-8 Vehicle & Equipment Cleaning	• WM-6 Hazardous Waste Management
• NS-9 Vehicle & Equipment Fueling	• WM-7 Contaminated Soil Management
• NS-10 Vehicle & Equipment Maintenance	• WM-8 Concrete Waste Management
• NS-11 Pile Driving Operations	• WM-9 Sanitary/Septic Waste Management
• NS-12 Concrete Curing	• WM-10 Liquid Waste Management
• NS-13 Concrete Finishing	

The following practices and procedures should be implemented at the project to minimize the risk of non-sediment pollution.

- Do not allow water used for cleaning or construction to enter drainages. Water used during construction should be used at rates such that it either evaporates or percolates into the soil.
- Maintain secondary containment items available, such as drain pans and drop cloths, to capture leaks. Use appropriate BMPs to avoid the release of contaminants to surface runoff.
- Site subcontractors are responsible for spill prevention and cleanup. An appropriately trained individual from each subcontractor shall be designated to be responsible for prevention and cleanup activities. Should a spill occur on site, the QSP and SSWM shall be notified immediately.
- Hazardous materials used or stored on the construction site shall be stored in covered containers and protected from rainfall runoff and vandalism. A suitable storage location shall be identified and shown on the Erosion and Sediment Control Plans. The storage area shall have secondary containment.

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- Only the amounts of hazardous materials absolutely needed for immediate use shall be stored on site. Excessive amounts shall not be stockpiled or stored on site.
- The Contractor, with direction from the QSP and SSWM, must add additional BMPs if conditions warrant.
- Septic tanks, including all drain fields and other lines, if encountered, shall be totally removed.
- The direct discharge of waste to surface waters or surface water drainage courses must be avoided.
- The discharge of oil, gasoline, diesel fuel, any petroleum derivative, any toxic chemical, or hazardous waste is prohibited.
- Surplus or waste earthen materials shall not be placed in surface drainage courses, or in such a manner as to allow the discharge of such materials onto adjacent undisturbed land or to any surface water drainage course except as authorized by the General Permit.
- Materials other than stormwater cannot be discharged to waters of the State.
- In accordance with Section 13620 of the California Water Code, the Discharger shall file a report with the Regional Water Quality Control Board (RWQCB) of any material change or proposed change in the character, location, or volume of discharge. Any such proposed material change should be reported to the Executive Officer of the RWQCB at least 30 days in advance of implementation of any such proposal. This shall include, but need not be limited to, all significant new soil disturbances, all proposed expansion of development, or any change in drainage characteristics at the project site.
- The discharger shall immediately notify the RWQCB by telephone whenever an adverse condition occurs as a result of a discharge. An adverse condition includes, but is not limited to, a violation or threatened violation, significant spill of petroleum products or toxic chemicals, or damage to control facilities that could affect compliance. Pursuant to Section 13267(b) of the California Water Code, a written notification of the adverse condition shall be submitted to the RWQCB within 5 days of occurrence. The written notification shall identify the adverse condition, describe the actions necessary to remedy the condition, and specify a timetable, subject to the modifications of the Board, for the remedial actions.

Table 3.3-2 summarizes BMPs and procedures for non-sediment control, and is also included in Appendix F.

TABLE 3.3-2 : Construction Non-Sediment Control Best Management Practices and Procedures

CONSTRUCTION ACTIVITY	PRACTICES AND PROCEDURES
1. Pre-Construction	<ul style="list-style-type: none"> • Construction entrances and exits should be installed to accommodate transitions from dirt surfaces to paved surfaces. • Perimeter control BMPs, such as silt fence and straw wattles, should be installed to indicate the limits of disturbance. • Existing on-site and nearby off-site drain inlets will be protected as directed by the Erosion and Sediment Control Plan

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CONSTRUCTION ACTIVITY	PRACTICES AND PROCEDURES
2. Concrete, Stucco and Masonry	<ul style="list-style-type: none"> • Locate washout area at least 50 feet from storm drains inlets, open ditches, or water bodies if site conditions permit. • Contain wash water in a temporary area on the building pad adjacent to the construction site where the waste can harden for later removal. • Pump washout materials and excess into another truck if possible. Do not dispose of excess or washout into the storm drain system. • Discuss concrete waste management with the concrete supplier before delivery. See also Appendix G, WM-8.
3. Building Construction	<ul style="list-style-type: none"> • Designate areas of the construction site for material delivery and storage. • Store dry chemicals and bagged materials on covered pallets. • Designated trash/debris disposal containers should be used. Containers should be emptied by the local disposal company on an as needed basis. • Cover scrap material that may contain water-soluble pollutants when rain is forecast. Store petroleum products out of the rain. • Store plasters, powders, sheetrock and other construction raw materials inside a shelter, garage or under a temporary roof or tarp, away from creek channels and stormwater conveyance facilities, during the rainy season or if rain is forecast. All material storage must also comply with local fire codes. • Potentially toxic liquid waste and chemicals must not be disposed of in dumpsters designated for construction debris. Store waste materials in secured containers for removal from site and disposal at designated disposal facilities at appropriate intervals. See also Appendix G, WM-1. • Keep metal shavings and filings out of storm runoff by containing on the pad and/or disposing of in construction dumpster. • Apply BMPs for building materials stored on site and during the application and storage of tar and gravel roofing materials.
4. Painting and Drywall	<ul style="list-style-type: none"> • Store paints, solvents, enamels, sealers, bonding agents, and other chemicals inside or in a covered area and protect from vandalism. See also Appendix G, WM-2. • Use a designated washout area to clean equipment. Do not clean brushes or paint containers on dirt or into streets, gutters, storm drains, or streams. "Paint out" brushes as much as possible. Recycle oil or water-based paint if feasible. If not, dispose of excess oil-based paints and sludge as hazardous waste.
5. Equipment Storage, Cleaning and Maintenance	<ul style="list-style-type: none"> • Perform maintenance and repairs and store equipment at a designated area away from storm drains or other stormwater conveyance facilities. Prevent leaks of machinery fluids; routinely inspect equipment. • Employ drip pans and properly dispose of fluids. Use EVAC equipment to capture oils and store for removal from site. • If repairs need to be made on the project or in the field, use appropriate BMPs to protect the release of contaminants to surface runoff. Use drip pans or absorbent drop cloths to capture spills. • Do not wash equipment where effluent can flow into storm drains. • Recycle spent fluids whenever possible; store fluids in separate containers. Note that some spent fluids may be considered hazardous; recycling may avoid the disposal expenses and administrative difficulties associated with hazardous materials disposal. • Conduct vehicle fueling at equipment storage areas, if applicable. Locate on-site petroleum fuel tanks in protected areas, with earth berms constructed to contain spills and absorbent materials available to clean up spills.

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CONSTRUCTION ACTIVITY	PRACTICES AND PROCEDURES
6. Paving	<ul style="list-style-type: none"> Apply pre-treatments such as lime, finish concrete, finish asphalt and seal coats during dry weather. Storm drain inlets must be covered when applying seal coat, tack, slurry seal, or other asphalt materials. Residue must be shoveled or vacuumed for removal from the project. Pavers must be parked, cleaned and maintained over drip pans or absorbent materials. Collect and properly dispose of excess materials. Avoid paving during wet weather. See also Appendix G, NS-3.
7. Landscaping	<ul style="list-style-type: none"> Minimize use of fertilizers, pesticides and herbicides. The use of excessive amounts of fertilizer can create a nutrient overdose for natural aquatic systems and lead to oxygen depletion in the water. Do not use pesticides, herbicides and fertilizers in streambank and riparian areas. Carefully follow manufacturer's procedures when using all herbicides, pesticides and fertilizers.

3.4 POST-CONSTRUCTION STORMWATER MANAGEMENT MEASURES

The development and implementation of a long-term BMP program is a major feature of the General Permit. Post-construction BMPs are intended to:

- Effectively maintain implementation of the stormwater program.
- Identify and eliminate illicit connections and illicit discharges to the storm drain system.
- Reduce stormwater impacts associated with the development project.
- Reduce stormwater quality impacts associated with public activities.
- Increase public knowledge about the impacts of stormwater pollution and about actions that can be taken to prevent pollution.
- Increase public knowledge and understanding about the quality, quantity, sources, and impacts of suburban runoff.
- Evaluate the effectiveness of the stormwater management programs.

Post-Construction BMPs for the project include the reduction of land disturbance and impervious surfaces, treatment of stormwater runoff using bioretention areas, the use of efficient irrigation systems, and appropriately designed and constructed energy dissipation devices. Additional potential long-term BMPs include street sweeping, and storm drain stenciling.

3.5 SCHEDULE FOR BMP IMPLEMENTATION

The project erosion and sediment control measures are designed to minimize sediment transported outside the perimeter of the construction area. These measures have two goals: (1) reducing erosion; and (2) retaining sediment on site. Erosion and sediment control measures are needed throughout the year on the project. In particular, preserving existing vegetation, stockpile protection, wind erosion control, installation of perimeter sediment controls, and catch basin protection must occur year-round. Consideration was given to both site-specific and seasonal conditions when designing the control practices. Excerpts from the California Stormwater Quality BMP Handbook discussing the recommended BMPs for the Project are included in Appendix G with additional discussions in Sections 3.1, 3.2, 3.3, and 3.4 above.

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BMPs specific to construction will be implemented, including proper material storage and disposal. Erosion and sediment control measures previously installed will be monitored and maintained year-round. Additional measures will be implemented as active construction areas are completed or turn inactive (defined as dormant for 14 days or greater). No water will be allowed to discharge in an uncontrolled manner.

The construction schedule noted in Section 2.4 will span over different construction phases as outlined below. During each phase, a custom set of BMPs should be implemented to provide appropriate erosion and sediment protection as discussed below.

1. Pre-Construction – During the pre-construction, BMPs are designed to prevent sediment and pollutants from exiting the site. Construction entrances and exits should be installed to accommodate transitions from dirt surfaces to paved surfaces. Perimeter control BMPs, such as silt fence and straw wattles, should be installed to indicate the limits of disturbance. All existing on-site and nearby off-site drain inlets will be protected as directed by the Erosion and Sediment Control Plan.
2. Demolition - BMPs will be primarily designed to mitigate the movement of sediment and pollutants off site. BMPs during demolition are designed to protect temporary stockpile(s) from soil excavations, prevent soil from washing off site, and tracking of soil and pollutants off site or into nearby drainage corridors by vehicles, rain and wind. Linear protection around the boundary of the project, and inlet protection for existing inlets will be provided, and soil stabilization measures should be installed on disturbed areas within 14 days of site inactivity.
3. Grading/Land Development – BMPs will be primarily designed to mitigate the movement of sediment and pollutants off site by a phased approach to earthwork scheduling. BMPs during construction are designed to prevent soil from washing off graded areas, and tracking of soil and pollutants off site or into nearby drainage corridors by vehicles, rain and wind. In addition, linear protection around the boundary of the project and inlet protection for existing inlets will be provided. As land disturbance activities progress, soil stabilization measures will be installed within the 14 days of finished grading or site inactivity.
4. Streets/Utility Construction – BMPs during street/pavements and utility construction are designed to prevent soil from entering into inlets, and prevent tracking of soil and pollutants off site by vehicles and wind. Other BMPs prevalent during this phase of construction include active stockpile protection, linear perimeter protection, soil stabilization in inactive areas, storage yard protection, and preventing discharge of any other movement of pollutants from the project in this interim construction phase.
5. Vertical Construction – BMPs during vertical construction are designed to properly store non-visible pollutants in construction yards and around the job site, to prevent soil and construction products (stucco, concrete, gunite, sawdust, etc.) from washing off graded areas or becoming airborne, and to prevent tracking of soil and pollutants off site by vehicles and any other movement of pollutants from the project.
6. Final Landscaping/Stabilization – Post-construction permanent BMPs will maintain and improve the erosion control measures established during the construction.
7. Inactive Construction – BMPs during inactive construction primarily include soil stabilization, sediment traps, check dams, slope drains, and other linear protection to hinder wind and storm erosion on lots, slopes, and streets, and polluted stormwater discharges. An inactive area is defined as an area that has gone dormant for at least 14 days.

Additional guidelines for sequencing BMP installation and monitoring are provided below.

3.5.1 Pre-Construction

- Install construction entrances/exits at points of entry/exit for the site as detailed on the Erosion and Sediment Control Plan (Appendix B) and in accordance with County and City specifications to accommodate transitions from graded surfaces to paved surfaces. All construction traffic entering or exiting must cross this entrance. The construction entrances should consist of roughly an 8-inch-thick layer of 3- to 6-inch-size coarse stone extending for a minimum distance of 50 feet at each vehicle access point from existing paved streets. Alternatively, rumble plates may be used at the construction entrance for low traffic areas. Moisture conditioning/spraying for dust control should not be undertaken for an additional 50 feet from the gravel entrance to reduce tracking of wet soil. The entrance shall be maintained in a condition that will prevent tracking or flowing of sediment onto public right-of-ways.
- Designate the equipment parking and material/waste storage area(s).
- Install perimeter silt fence/straw wattle to indicate the limits of grading during construction and/or as shown on the Erosion and Sediment Control Plan attached as Appendix B to this SWPPP.
- Protect all existing on-site and nearby off-site drain inlets, and identify on the Erosion and Sediment Control Plan attached as Appendix B to this SWPPP.
- Initiate year-round BMP and non-stormwater monitoring program.

3.5.2 During Construction

- All paved access roads, parking areas and staging areas will be monitored, and swept or shoveled clean daily.
- Install erosion and sediment controls as detailed on the Erosion and Sediment Control Plan attached in Appendix B to this SWPPP on inactive or finished areas (areas not receiving activity in 14 days or greater). Fiber rolls and silt fence should be dug in and firmly staked in accordance with the manufacturer's instructions.
- During grading, protect existing soil stabilization (vegetation, aggregate, pavement, etc.) and reduce large areas of soil disturbance. Maintain perimeter sediment controls around edge of work area to divert run-on, and maintain erosion and sediment controls outside active work areas.
- Moisture condition/spray graded areas as necessary to avoid wind-blown soil erosion year-round.
- Install gravel bag check dams along access streets/ramps once rough graded and post-paving.
- Extend construction entrance to and including the equipment parking area and material storage area. Reapply gravel to construction entrance(s) and equipment parking as necessary.
- Surround all stockpiles with silt fence or straw rolls/wattles. Cover completely at end of each work day and when not in use.
- Stockpile emergency straw rolls/wattles, gravel bags, erosion control fabric and silt fence on site.

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- Protect all on-site drain inlets as they are constructed and show on the Erosion and Sediment Control Plan attached in Appendix B to this SWPPP. As a minimum, storm drain inlets should be protected with silt-sacks, gravel bags or another form of barrier that provides protection. Monitor and maintain these barriers such that sediment does not enter the storm drain system. Collected sediment should be removed and placed where it will not cause erosion or contribute to sediment loading.
- At least 48 hours prior to a forecasted rain event per NOAA (50 percent chance or greater), hydroseed, tackify, or place erosion control fabric or equivalent BMP as practicable on exposed, un-vegetated and/or active or inactive areas at a rate that provides adequate coverage to reduce potential erosion. Re-application may be necessary prior to the next storm event if disturbance occurs.
- Slopes should be graded so that water is directed away from the slope face at the end of each working day.
- Additional BMPs shall be added/implemented as necessary to comply with the General Permit under the direction of the SSWM, QSD, and QSP. Disturbed areas should be protected as soon as possible and not be left exposed during rainy weather.
- Additional silt fence, gravel bags, straw rolls or other erosion control measures should be installed to prevent silt runoff to public roadways.
- Excavating, filling, backfilling and grading work must not be performed during unfavorable weather conditions. When work is interrupted by rain, excavating, filling, and backfilling must not be resumed until site and soil conditions are such that soil mobilization to off-site areas does not occur.
- As applicable, rills that develop on finished or inactive areas shall be repaired as soon as practicable and protected/mulched with erosion control fabric or hydroseed, straw and tackifier or equivalent upon repair.
- Run-on and runoff shall be diverted away from denuded areas or newly planted areas. Earth ditches or slope drains can be used to direct runoff across graded areas or into sediment traps/basins. If earth ditches are used, they should be lined with rock or erosion control fabric.
- The contractor shall take the necessary measures to prevent erosion of freshly filled, backfilled and graded areas until such time as permanent drainage and erosion control measures have been installed. This includes applying temporary straw mulch and tackifier, plastic or other BMPs and devices even if not specified on the plans.

3.5.3 Post-Construction

- Maintain existing BMPs until permanent soil stabilization measures are installed.
- Continue with all other BMPs and monitoring until landscape installation and construction is completed.
- Remove BMPs along roadways as upstream vertical construction and landscaping is completed.

Adjustments and modifications to the BMPs identified in this SWPPP need to be implemented by the Contractor in accordance with instructions from the QSD, QSP, and SSWM as necessary to maintain the construction site in accordance with the provisions of the General Permit.

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4.0 TRAINING

4.1 CONTRACTOR/SUBCONTRACTOR NOTIFICATION/TRAINING

Prior to project startup, employees and subcontractors performing activities on site should participate in a pre-project stormwater pollution prevention training tailgate meeting to discuss appropriate sections in this SWPPP. The meeting will focus on implementation, monitoring and maintenance of stormwater best management practices, procedures and controls. A copy of the training logs must be filed in Appendix I.

4.2 QSD QUALIFICATIONS AND TRAINING

The Qualified SWPPP Developer (QSD) shall be responsible for preparing and updating the project SWPPP. The QSD shall have one of the following registrations or certifications.

- A California registered professional civil engineer.
- A California registered professional geologist or engineering geologist.
- A California registered landscape architect.
- A professional hydrologist registered through the American Institute of Hydrology.
- A Certified Professional in Erosion and Sediment Control (CPESC).
- A Certified Professional in Storm Water Quality (CPSWQ).
- A professional in erosion and sediment control registered through NICET.

4.3 QSP QUALIFICATIONS AND TRAINING

The Qualified SWPPP Practitioner (QSP) is responsible for non-stormwater and stormwater visual observations, sampling and analysis. The QSP shall either be a QSD or have one of the following qualifications and certifications.

- A Certified Erosion, Sediment and Storm Water Inspector (CESSWI).
- A Certified Inspector of Sediment and Erosion Control (CISEC).
- A Certified Erosion and Sediment Control inspector through NICET.

4.4 STORMWATER SAMPLING TRAINING

All sampling personnel will be trained in accordance with the Surface Water Ambient Monitoring Program's (SWAMP) guidelines.

5.0 RESPONSIBLE PARTIES AND OPERATORS

5.1 RESPONSIBLE PARTIES

Certifications of the authorized representatives for this SWPPP are provided in Section 0 and below. A list of authorized representatives is also provided in Appendix J.

EXHIBIT "C" (Stormwater Pollution Prevention Plan)

The Legally Responsible Person (LRP) for this project is:

City of Goleta
Department of Neighborhood Services and Public Safety
Jaime Valdez
130 Cremona Drive, Suite
Goleta, CA 93117

The Site Stormwater Manager (SSWM) for this project is:

The Qualified SWPPP Developer (QSD) during SWPPP/ESCP Preparation for this project is:

Jonathan Buck
ENGEO Incorporated
925-866-9000

The Qualified SWPPP Developer (QSD) during Implementation for this project is:

The Qualified SWPPP Practitioner (QSP) during Implementation for this project is:

The SWPPP Delegate representative, supervised and trained by the QSP, for this project is:

5.2 CONTRACTOR AND SUBCONTRACTOR LIST

The General Permit requires that the SWPPP include a list of names of all contractors, subcontractors, and individuals who will be directed by the SSWM and QSP. This list is to be updated regularly.

Appendix K contains a sample subcontractor notification letter, a copy of the subcontractor/contractor list, and blank forms that can be used to document contractor notification of their obligation to uphold applicable portions of this SWPPP.

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6.0 CONSTRUCTION SITE MONITORING PROGRAM

The General Permit requires that a written site-specific Construction Site Monitoring Program (CSMP) be developed prior to the commencement of construction activities and be revised as necessary to reflect project revisions and that the CSMP be included with the SWPPP. The purpose of the CSMP is to describe specific requirements and objectives of the General Permit for the project's Risk Level. The project CSMP is described in the following sections with relevant monitoring, sampling, and activity forms located in Appendices H, M, and N. Submitted forms are to be inserted in Appendixes O, P, Q, and R.

This CSMP has been developed by the QSD and is a guide for the QSP and/or qualified individual(s) supervised by the QSP for monitoring and sampling procedures and instructions. The QSP, in coordination with the QSD, is to determine whether BMPs included in the SWPPP are effective, if immediate actions are needed and/or SWPPP revisions are necessary to reduce pollutants in stormwater and authorized non-stormwater discharges.

6.1 EFFLUENT STANDARDS AND DISCHARGE PROHIBITIONS

6.1.1 Narrative Effluent Standards

This Risk Level 2 site is subject to narrative effluent standards as follows.

1. Stormwater discharges and authorized non-stormwater discharges regulated by the General Permit shall not contain a hazardous substance equal to or in excess of reportable quantities established in 40 C.F.R. §§117.3 and 302.4, unless a separate NPDES Permit has been issued to regulate those discharges.
2. Dischargers shall minimize or prevent pollutants in stormwater discharges and authorized non-stormwater discharges through the use of controls, structures, and management practices that achieve BAT for toxic and non-conventional pollutants and BCT for conventional pollutants.

6.1.2 Numeric Action Level (NAL)

Risk Level 2 dischargers are subject to the following numeric action levels (NALs):

- Storm event daily average pH below 6.5 or above 8.5.
- Storm event daily average turbidity greater than 250 NTU.

6.1.3 TMDL Requirement Standards

This Risk Level 2 site does not discharge to any waterbody or watershed listed for Region 3 in Table H-2 of the 2022 CGP. No TMDL NAL or Numeric Effluent Limit (NEL) is applicable for this site.

6.1.4 Discharge Prohibitions

1. Unless granted an exception by the State Water Board, discharges from this site shall not violate any prohibitions contained in the applicable Basin Plan or statewide water control

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plans. Waste discharges to Areas of Special Biological Significance (ASBS) are prohibited by the California Ocean Plan.

2. The General Permit prohibits the discharge of pollutants other than stormwater and non-stormwater discharges authorized by this General Permit or another NPDES permit (see authorized non-stormwater discharges and conditions for discharges in Section 5). The Regional Board will be notified if the QSP or site management directed by the QSP anticipates any non-stormwater discharges not already authorized by this General Permit or another NPDES Permit. The Regional Board will determine if a separate NPDES permit will be necessary.
3. Debris⁴ resulting from construction activities is prohibited from being discharged from construction sites.

6.2 MONITORING LOCATIONS

Sampling locations are based on proximity to planned stormwater run-on and runoff (discharge) locations, non-visible pollutant storage, occurrence or use; accessibility for sampling, personnel safety; and other factors in accordance with the applicable requirements in the General Permit.

Sampling locations are to be determined by the QSP or QSD based on site progress during construction and run-off patterns until final grades are established. Proposed sampling locations are shown on the Erosion and Sediment Control Plan in Appendix B.

If an operational activity or stormwater monitoring event conducted 48 hours prior to or during a rain event identifies (1) the presence of a material storage, waste storage, or operations area with spills; or (2) the potential for the discharge of non-visible pollutants to surface waters or a storm drain system that was an unplanned location, non-sediment sampling locations will be selected using the same rationale as that used to identify sediment sampling locations.

6.3 SAFETY

Site monitoring and sampling should be performed by the QSP, and/or a person trained in proper SWPPP management and water quality sampling protocol under the direction of the QSP. Anticipated site hazards during monitoring and sampling activities include the following.

- Traffic and noise
- Construction equipment
- Excavations and trenches
- Miscellaneous slip, trip and fall hazards
- Various chemical hazards

Accordingly, personal protective equipment for monitoring and sampling personnel should include the following, as applicable.

- Hard hat
- Safety boots
- Safety vest

⁴ Litter, rubble, discarded refuse, and remains of destroyed inorganic anthropogenic (derived from human activities) waste.

- Hearing protection
- Safety glasses
- Nitrile gloves

6.4 INSPECTIONS

6.4.1 Frequency and Procedures

QSD, QSP(s), and QSP Delegates are identified for the project are identified in Appendix J.

The **QSD** will have primary responsibility for assessing how construction activities will affect sediment transport, erosion, and other discharges of pollutants in stormwater runoff throughout the project. The QSD is required to revise the SWPPP to address potential problems identified by visual inspections, sampling data, comments from a QSP, or their own site observations. The QSD is required to perform the following on-site visual inspections:

- Within 30 days of construction activities commencing on site;
- Within 30 days when a new QSD is assigned to the project;
- Twice annually, once August through October and once January through March;
- Within 14 calendar days after a numeric action level exceedance; and
- Within the time period requested in writing from Regional Water Board staff.

The **QSP** will have primary responsibility and significant authority for the implementation, maintenance, and inspection/monitoring of SWPPP requirements. The QSP will be available at all times throughout the duration of the project. The QSP duties include but are not limited to:

- Implementing all elements of the 2022 CGP and SWPPP, including, but not limited to:
 - Performing the following on-site visual inspections:
 - One inspection per calendar month; other weekly inspections in the month can be delegated to a trained QSP Delegate under the specific direction of the QSP.
 - Within 72 hours prior to a forecasted Qualifying Precipitation Event⁵ (QPE) from the National Oceanic and Atmospheric Administration (NOAA) National Weather Service, to inspect any areas of concern and to verify the status of any deficient BMPs, or other identified issues at the site. If extended forecast precipitation data (greater than 72 hours) is available from the *National Weather Service*, then the Pre-Precipitation Event inspection may be done up to 120 hours in advance.
 - Within 14 days after a NAL exceedance, the QSP shall visually inspect the drainage area for exceedance and document any areas of concern.
 - Prior to the submittal for the NOT or COI (for acreage changes) for all or part of the site.

⁵ Qualifying Precipitation Event (QPE): Any weather pattern that is forecast to have a greater than or equal to 50% probability of precipitation (POP) and greater than or equal to ½ inches of Quantitative Precipitation Forecast (QPF) within a 24-hour period. POP is the likelihood of a measurable amount (greater than or equal to 0.01 inches) of precipitation. QPF is a spatial and temporal precipitation forecast that will predict the potential amount of future precipitation for a specified area.

- Ensuring that all BMPs are implemented, inspected, and properly maintained;
- Ensure that the SMARTS generated WDID Number Notification form is posted on-site, in a location viewable by the public or readily available upon request, and the dates are correct and match the dates listed in SMARTS.
- Implementing non-stormwater management, and materials and waste management activities such as: monitoring discharges; general Site clean-up; vehicle and equipment cleaning, fueling and maintenance; spill control; ensuring that no materials other than stormwater are discharged in quantities which will have an adverse effect on receiving waters or storm drain systems, etc.
- Ensuring elimination of unauthorized discharges.
- Authorized by the LRP to mobilize crews in order to make immediate repairs to the control measures.
- Coordinating with the Contractor(s) to assure the necessary corrections/repairs are made immediately and that the project complies with the SWPPP, the 2022 CGP, and approved plans at all times.
- Notifying the LRP or Duly Authorized Representative immediately of off-site discharges or other non-compliance events.
- Providing foundation and site-specific training to QSP Delegates and overseeing QSP Delegate work. Tasks that may be delegated to appropriately trained QSP-delegates include:
 - Performing non-stormwater and stormwater visual observations and inspections;
 - Performing stormwater sampling and analysis, as required; and
 - Performing routine inspections and observations.

TABLE 6.4.1: QSP and QSP Delegate Authorized Inspections

	WEEKLY BMP AND NSW	PRE-QPE	DAILY-QPE VISUAL INSPECTIONS	POST-QPE VISUAL INSPECTIONS	POST NAL EXCEEDANCES	MONTHLY BMP AND NSW	NOT
QSP*	X	X	X	X	X	X	X
QSP Delegate	X		X	X			

* or QSD

Recordkeeping:

For weekly, pre-storm event, extended storm event, post storm event, and quarterly non-stormwater inspections:

- Completely fill out and sign the inspection report to document the conditions found during the inspection.
- Describe any actions needed and the location of the action in the corrective action log and include a description of any additional BMPs that need to be installed.
- Review previous inspection reports that may have open corrective action items to confirm they have been completed.

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- Upon completion of a repair or maintenance items, the inspector will initial and date when corrective actions began and when they were completed on the corrective action log of the inspection form(s). All actions needed must begin within 72 hours of identification and be completed as soon as possible.

Update the Site Map:

Document and update the site map as site conditions or locations change during construction including:

- Current and up-to-date boundaries of operational control
- Drainage areas
- Discharge locations
- Areas of soil disturbance (cut or fill)
- Locations of sensitive habitats, watercourses, or other features which are not to be disturbed
- Run-on and run-off BMPs
- Sediment and erosion controls
- Temporary and permanent stabilization
- Waste disposal areas including dumpsters and portable toilets
- Material storage
- Vehicle/equipment storage areas
- Fueling and water storage, water transfer for dust control and compaction
- Stockpiles and protection
- Active and inactive inlets and protection
- Stabilized entrances or exits
- Sampling locations
- Construction trailers

Track Dates of:

- Start of major grading activity
- Completion of major grading activity
- Temporary and final stabilization
- Addition or reduction in acreage
- Change in ownership
- Date and initial all changes, additions, and or deletions to the site map

The site map will be kept as a permanent record. If a site map becomes too cluttered with documentation, a new site map will be developed and updated and the old site map will be kept as a permanent record in the SWPPP. The old site map is not to be discarded under any circumstances.

Annual Reporting:

By September 1 each year the WDID is active, an Annual Compliance Report will be electronically submitted to the State Water Resources Control Board via the SMARTS website. A copy of the annual report is to be kept in Appendix S of the SWPPP. The Annual Compliance Report will include:

- A summary and evaluation of sampling and analysis results, including laboratory reports.

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- The analytical method(s), method reporting unit(s), and method detection limit(s) of each analytical parameter (analytical results that are less than the method detection limit shall be reported as "less than the method detection limit").
- A summary of all corrective actions taken during the compliance year.
- Identification of any compliance activities or corrective actions that were not implemented.
- A summary of all violations of the General Permit.
- The names of individual(s) who performed the facility inspections, sampling, visual observation (inspections), and/or measurements.
- The date, place, time of facility inspections, sampling, visual observation (inspections), and/or measurements, including precipitation (rain gauge).
- The visual observation and sample collection exception records and reports.
- Documentation of all training for individuals responsible for all activities associated with compliance with this General Permit.
- Documentation of all training for individuals responsible for BMP installation, inspection, maintenance, and repair.
- Documentation of all training for individuals responsible for overseeing, revising, and amending the SWPPP.

6.5 QUALIFYING PRECIPITATION EVENT TRIGGERED OBSERVATIONS AND INSPECTIONS

Visual observations of the site and inspections of BMPs are required prior to a qualifying precipitation event; following a qualifying precipitation event, and every 24-hour period during a qualifying precipitation event. Pre-Qualifying Precipitation Event inspections will be conducted after reviewing NOAA (National Weather Service) and determining that a precipitation event with a 50 percent or greater Probability of Precipitation (PoP) and a Qualifying Precipitation Forecast (QPF) of 0.5 inch or more precipitation within a 24-hour period has been predicted by the National Weather Service Forecast Office.

6.5.1 Visual Observations Prior to a Forecasted Qualifying Precipitation Event

Within 72 hours prior to a qualifying precipitation event or up to 120 hours prior, if extended forecast precipitation data is available, a stormwater visual monitoring site inspection will include observations of the following locations:

- All stormwater drainage areas to identify leaks, spills, or uncontrolled pollutant sources and when necessary, implement appropriate corrective actions.
- All BMPs to identify whether they have been properly implemented per the SWPPP and implement appropriate corrective actions, as necessary.
- All stormwater storage and containment areas to detect leaks and check for available capacity to prevent overflow.

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The QSP must conduct the inspection prior to the qualifying precipitation event. Consistent with the requirements for a qualifying precipitation event, pre-rain BMP inspections and visual monitoring will be triggered by a NOAA forecast that indicates a 50 percent or greater probability of 0.5 inch of precipitation or more in a 24-hour period in the project area.

6.5.2 BMP Inspections During a Qualifying Precipitation Event

During an extended qualifying precipitation event, BMP inspections will be conducted at least once every 24 hours. Qualifying precipitation events are extended for each subsequent 24-hour period forecast to have at least 0.25 inch of precipitation. The BMP inspections are to identify and record:

- If BMPs were adequately designed, implemented and effective.
- BMPs that require repair or replacement due to damage.
- Additional BMPs that need to be implemented and revise the SWPPP accordingly.

If the construction site is not accessible during the rain event, the visual inspections shall be performed at all relevant outfalls, discharge points, downstream locations. The inspections should record any projected maintenance activities.

6.5.3 Visual Observations Following a Qualifying Precipitation Event

Within 96 hours following the end of a qualifying precipitation event a stormwater visual monitoring site inspection is required to observe:

- If BMPs were adequately designed, implemented and effective.
- BMPs that require repair or replacement due to damage.
- Additional BMPs that need to be implemented and revise the SWPPP accordingly.

6.6 STORMWATER DISCHARGE WATER QUALITY SAMPLING

For this Risk Level 2 project, the General Permit requires effluent monitoring subject to NALs for stormwater discharges. The monitoring is triggered for Qualifying Precipitation Events, defined in Section 6.4 and 6.5. During rain events producing run-off, the QSP or their designated personnel will collect stormwater grab samples from designated sampling locations.

Periodically, it will be necessary to re-evaluate sample locations as site conditions change. The sample location(s) must be representative of current site conditions with respect to disturbed areas and construction phase(s).

Risk Level 2 dischargers shall electronically submit daily average storm event sampling results to the SWRCB SMARTS site during the reporting year. This documentation is required as part of the Annual Report.

6.6.1 Stormwater Analytical Methods

The following analytical methods will be implemented at the site.

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- pH: perform pH analysis on site with a field pH meter.
- Turbidity: perform turbidity analysis with a field turbidity meter or by collecting a sample and delivering to an accredited laboratory for turbidity testing.

An example of the pH and turbidity sampling form is located in Appendix H. Once the form is completed, retain these records in the SWPPP in Appendix Q.

6.6.2 Stormwater Sampling Protocol

- Collect one sample per day of discharge from each discharge location during the qualifying event.
- Analyze effluent samples for pH and turbidity.
- Ensure samples are representative of effluent for entire disturbed area.
- Monitor, sample, and report site run-on from surrounding areas if there is reason to believe through visual observation that run-on may contribute to an exceedance of NALs.
 - Document findings on the sample log and inspection report.
- Physical sampling is not required if:
 - There are dangerous weather conditions such as flooding and electrical storms.
 - Rain event duration is outside of scheduled business hours.
- If no required visual observation (inspection) or sampling are collected, include an explanation in the SWPPP and in the Annual Report documenting why the sampling or inspections were not conducted.

6.6.3 Stormwater Sampling Locations

- Collect effluent samples at all discharge points where stormwater is discharged offsite from disturbed areas. Consult the site map for locations.
- Collect samples of stored or contained stormwater during a qualifying rain event. Consult the site map for location(s).
- Collect samples within designated drainage areas on the site map that are representative of current or recent construction activities that were exposed to stormwater prior to reaching the discharge location⁶.
 - Locations will be determined based on current construction activities
- If non-visible or visible non-stormwater pollutants other than pH or sediment or the potential of these pollutants are observed due to material or waste exposure to stormwater, follow non-visible and/or non-stormwater sampling protocol in Sections 6.7 or 6.8 (as necessary).

⁶ For example if there is there has been recent concrete work exposed to stormwater, a pH sample shall be taken of drainage from this area.

6.6.4 Stormwater Sample Collection, Handling, and Testing Instructions

6.6.4.1 Stormwater Sample Collection

- Label the collection bottle with the site number, date, and time.
- Remove the cap from the bottle just before sampling. Avoid touching the inside of the bottle or the cap. If you accidentally touch the inside of the bottle, use another one.
- Work from downstream to upstream locations to avoid contamination of downstream samples.
- Try to disturb as little bottom sediment as possible. In any case, be careful not to collect water that has sediment from bottom disturbance. Stand facing upstream. Collect the water sample on your upstream side, in front of you. You may also tape your bottle to an extension pole to sample from deeper water.
- Hold the bottle near its base and plunge it (opening downward) below the water surface. If you are using an extension pole, remove the cap, turn the bottle upside down, and plunge it into the water, facing upstream. Collect a water sample mid-way between the surface and the bottom. If necessary, clean gravel bags can be used to pond water for collection in low flow. Carefully place the bags in a semi-circle taking care to not stir up sediment.
- Turn the bottle underwater into the current and away from you. In slow-moving stream reaches, push the bottle underneath the surface and away from you in an upstream direction.
- Leave a 1-inch air space. Do not fill the bottle completely (so that the sample can be shaken just before analysis). Recap the bottle carefully, remembering not to touch the inside.
- Fill in the bottle number and/or site number on the appropriate field data sheet.

6.6.4.2 Stormwater Sample Handling/Testing

Turbidity Determination (Laboratory)

If a California-accredited Laboratory will perform the analysis, test methods must be either Standard method 2130 or USEPA method 180.1.

- Using containers provided by the laboratory to collect samples, sample bottles will be capped and labeled, then placed in a cooler with ice to maintain 4°C for transport to the lab.
- Chain of Custody form will be completed.
- Within 24 hours of sampling (unless otherwise required by the laboratory), samples will be delivered to an accredited lab such as:

Laboratory Name: CAPCO Analytical Services, Inc.
Address: 2978 Seaborg Avenue, Suite 4
Ventura, CA 93003
Telephone Number: 805-644-1095
Email Address: rhernandez@capcoenv.com

Turbidity Determination (Field Meter)

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Use the following steps to determine the turbidity of your sample:

- Prepare the turbidity meter for use according to the manufacturer's directions.
- Calibrate the meter using the turbidity standards provided with the meter. Make sure it is reading accurately in the range in which you will be working.
- Shake the sample vigorously and wait until the bubbles have disappeared. You might want to tap the sides of the bottle gently to accelerate the process.
- Use a lint-free cloth to wipe the outside of the sampling cell (cell) into which the grab sample will be poured. Be sure not to handle the cell below the line where the light will pass when the cell is placed in the meter.
- Pour the sample water into the cell. Wipe off any drops on the outside of the cell.
- Set the meter for the appropriate turbidity range. Place the cell in the meter and read the turbidity measurement directly from the meter display.
- Record the result on sampling activity log sheet.
- Repeat Steps 3-7 for each sample.

pH Determination (Field Meter)

Since samples for pH must be analyzed onsite within 2 hours of sample collection, we anticipate a calibrated portable field meter will be utilized in lieu of an accredited laboratory. Use the following steps to determine the pH of your sample:

- Prepare the pH meter for use according to the manufacturer's directions.
- Calibrate the meter using the standards provided with the meter. Make sure it is reading accurately in the range in which you will be working.
- Rinse the electrode well with deionized water.
- Place the pH meter or electrode into the sample.
- Depress the dispenser button once to dispense electrolyte.
- Read and record the temperature and pH in the appropriate column on the data sheet.
- Rinse the electrode well with deionized water.
- Measure the pH of the 4.0 and 7.0 buffers periodically to ensure that the meter is not drifting off calibration. If it has drifted, recalibrate it.

The pH meter should be calibrated prior to sample analysis and according to the instructions that come with them. If you are using a laboratory grade meter, use at least two pH standard buffer solutions: 4.0 and 7.0 (Buffers can be purchased from test kit supply companies, such as Oakton, Hach, or LaMotte). Following are notes regarding buffers.

- The buffer solutions should be at room temperature when you calibrate the meter.
- Do not use a buffer after its expiration date.
- Always cap the buffers during storage to prevent contamination.

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- Because buffer pH values change with temperature, the meter must have a built-in temperature sensor that automatically standardizes the pH when the meter is calibrated.
- Do not reuse buffer solutions.

The following field instruments will be used to analyze the following constituents:

TABLE 6.6.4.2-1: Field Instruments

FIELD INSTRUMENT	CONSTITUENT
Oakton ECOTestr pH2+, or equivalent	pH
LaMotte 2020we Turbidimeter, or equivalent	Turbidity

For samples collected for field analysis, collection, analysis and equipment calibration will be in accordance with field instrument manufacturer's specifications.

- The instruments will be maintained in accordance with manufacturer's instructions.
- The instrument(s) will be calibrated per manufacturer's guidelines prior to sampling.
- Maintenance and calibration records will be maintained with the SWPPP.

6.6.5 NAL Exceedance

If an individual sample of pH measured in the field are less than 6.5 or greater than 8.5, or if an individual sample of turbidity measured is in excess of 250 NTUs, the permitted NAL has been exceeded. In this event, the QSP should perform the following:

- Conduct inspection for run-on source(s) or onsite construction activities such as but not limited to erosion, rilling, uncovered stockpiles, concrete, lime, mortar or masonry activities that may have contributed to the exceedance.
- Fill out the sampling activity log and document:
 - The sources of the pollutants suspected to be causing the exceedance of the NAL
 - Whether additional BMPs are required to:
 - Meet BAT/BCT requirements
 - Reduce or prevent pollutants in stormwater discharges from causing exceedance of receiving water objectives and determine what corrective action(s) were taken or will be taken with a description of the schedule for completion.
 - If applicable, report and document if the sources of pollutants were related to run-on associated with the construction site and whether additional BMPs are required to:
 - Meet BAT/BCT requirements
 - Reduce or prevent pollutants in stormwater discharges from causing exceedance of receiving water objectives and
 - Determine what corrective action(s) were taken or will be taken with a description of the schedule for completion
- Implement appropriate BMPs as needed according to the schedule described in the exceedance report.

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6.6.6 NAL Exceedance Reporting

In the event of an NAL exceedance, the QSD shall prepare an NAL exceedance report that is submitted to the LRP and filed into Appendix R.

Either the QSD or LRP/AS will also electronically report all qualifying storm event sampling results to the State Water Board through the SMARTS system within 10 days after the conclusion of the storm event. If the Regional Board notifies the LRP that an NAL Exceedance Report is required, authorized personnel will submit the already prepared report into the SMARTS system.

6.7 NON-STORMWATER DISCHARGE WATER QUALITY SAMPLING

If at any time during BMP inspections non-stormwater discharge(s) are observed going offsite through inlets or at outfall locations, sample the discharge at all points where it leaves the site. See the pollutant lists in Appendix N for potential pollutants and follow sampling and handling protocols in Section 6.6.4. Send all samples to the certified lab identified in Section 6.6.4.2 and document sampling results in Appendix M.

Indicate on the inspection report if run-on from surrounding areas is contributing to non-stormwater discharges that may cause or contribute to an exceedance of receiving water standards, or may exceed NALs. If NAL exceedance is measured for pH or Turbidity from run-on, document and report per Section 6.6.6.

6.8 NON-VISIBLE POLLUTANT SAMPLING

6.8.1 Non-Visible Sampling Schedule

If applicable, during the first 2 hours of rain events, samples for non-visible pollutant(s) and a sufficiently large uncontaminated background sample shall be collected during business hours and rain events that generate run-off. Samples shall be collected regardless of the time of year or status of the construction site. In conformance with the SWRCB definition, a minimum of 48 hours of dry weather will be used to distinguish between separate rain events.

Collection of discharge samples for non-visible pollutant monitoring will be triggered when any of the following conditions are observed during the required inspections conducted before or during rain events:

- Materials or wastes containing potential non-visible pollutants are not stored under watertight conditions. Watertight condition is defined as:
 - storage in a watertight container,
 - storage under a watertight roof or within a building, or
 - protected by temporary cover and containment that prevents stormwater contact and run-off from the storage area.
- Materials or wastes containing potential non-visible pollutants are stored under watertight conditions, but
 - a breach, leakage, malfunction, or spill is observed,
 - the leak or spill is not cleaned up prior to the rain event, and
 - there is the potential for discharge of non-visible pollutants to surface waters or a storm sewer system.

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- An operational activity with the potential to contribute non-visible pollutants:
 - was occurring just prior to the rain event,
 - applicable BMPs were observed to be breached, malfunctioning, or improperly implemented, and
 - there is the potential for discharge of non-visible pollutants to surface waters or a storm sewer system.
- Soil amendments/stabilizers that have the potential to alter pH levels or have unacceptable concentrations of non-visible pollutants have been applied, and there is the potential for discharge of non-visible pollutants to surface waters or a storm sewer system.
- Stormwater run-off from an area contaminated by historical usage of the site has been observed to combine with stormwater run-off, and there is the potential for discharge of non-visible pollutants to surface waters or a storm sewer system.

6.8.2 Non-Visible Sample Locations

If a visual inspection identifies any breach, malfunction, leakage or spill which could result in the discharge of non-visible pollutants to surface waters or a storm sewer system, the location(s) will be identified on the Site Map by the QSP or a qualified individual supervised by the QSP.

Sample locations shall include, at a minimum, the following areas and will be documented on the site map.

- All discharge location(s) downstream of the non-visible pollutant discharge that is safely accessible.
- A location upstream of the non-visible pollutant discharge where stormwater has not come into contact with the disturbed soils or material stored or used on site.

6.8.3 Non-Visible Sampling Preparation

In preparation of non-visible sampling, activities will include:

- Review hazardous materials inventory.
- Store sampling bottles, transport vessel, latex gloves and field equipment.
- Pre-print Chain of Custody, with date and time to be completed after sampling.
- Inspect hazardous materials storage areas for exposed, unsealed or damaged containers or spills.
- Identify run-off/discharge locations down grade of any breach, malfunction, leakage or spill observed which can result in the discharge of pollutants and sample the flow line.
- Identify run-off/discharge locations to take a representative background sample of flows known to be free of site materials with a potential to pollute.

6.8.4 Non-Visible Analytical Constituents

The following table lists the specific sources of and types of potential non-visible pollutants that may be found on the project and the applicable water quality indicator constituent(s) for that pollutant. Additional pollutants can be reviewed in Appendix N.

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TABLE 6.8.4-1: Potential Non-Visible Pollutants and Water Quality Constituent

POLLUTANT SOURCE	POLLUTANT	WATER QUALITY INDICATOR CONSTITUENT
Batteries - Staging, streets, and material storage areas	Sulfuric acid, Lead, pH	pH, Lead
Portland Concrete Cement, Stucco, Chemical Stabilization	pH	pH
Landscaping	TDS	TDS
Pulverized Asphalt Concrete, Equipment Fluids	PAH, TPH, Oil	PAH, TPH, Oil

For correct sample management and analysis, the following will be observed:

TABLE 6.8.4-2: Analytical Constituents

ANALYTE/CONSTITUENT*	CONTAINER	VOLUME	PRESERVATIVE	HOLD TIME
Total Dissolved Solids (TDS)	Plastic	500 ml	Cool 4°C	7 days
pH	Plastic	500 ml	Cool 4°C	Immediately
Salinity	Plastic	500 ml	Cool 4°C	28 days
Conductivity	Plastic	500 ml	Cool 4°C	48 hrs
Biological Oxygen Demand (BOD)	Plastic	500 ml	Cool 4°C	48 hrs
Oil & Grease	Glass	500 ml	HCl	28 days
Total Petroleum Hydrocarbons as Gasoline/BTEX (TPHg)	VOA	3-40 ml	HCl	14 days
Total Petroleum Hydrocarbons as Diesel (TPHd)	Glass	2-1 L	Cool 4°C	14 days
Polynuclear Aromatic Hydrocarbons (PAH)	Plastic	500 ml	Cool 4°C	48 hrs
Chlorinated Volatile Organic Compounds (CVOC)	VOA	3-40 ml	HCl	14 days
Polychlorinated Biphenyls (PCB)	Glass	2-1 L	Cool 4°C	7 days
Metals (Lead)	Plastic	500 ml	HNO ₃	6 mos
Dissolved Oxygen	VOA	2-50 ml	H ₂ SO ₄	8 hrs

* For additional constituents and details see Appendices M and N

6.8.5 Non-Visible Sample Collection and Handling

6.8.5.1 Non-Visible Sample Collection

Samples of non-visible discharge(s) and an uncontaminated sample will be collected at the locations determined during visual inspections. Grab samples will be collected and preserved in accordance with the methods identified in the "Sample Collection, Preservation and Analysis for Monitoring Non-Visible Pollutants" table provided above and in Appendix M. Only personnel trained in proper water quality sampling will collect samples. Samples will be collected by placing a separate lab-provided sample container directly into a stream of water downgradient and within close proximity to the potential non-visible pollutant discharge location. This separate lab-provided sample container will be used to collect water, which will be transferred to sample bottles for laboratory analysis. The upgradient and uncontaminated background samples shall be collected after collecting the downgradient contaminated sample to minimize cross-contamination. The sampling personnel will collect the water upgradient of where they are standing.

Once the separate lab-provided sample container is filled, the water sample will be poured directly into sample bottles provided by the laboratory for the analyte(s) being monitored. Sample bottles will be filled completely. To maintain sample integrity and prevent cross-contamination, sampling collection personnel will:

- Wear a clean pair of surgical gloves prior to the collection and handling of each sample at each location.
- Not contaminate the inside of the sample bottle by allowing it to come into contact with any material other than the water sample.
- Discard sample bottles or sample lids that have been dropped onto the ground prior to sample collection.
- Not leave the cooler lid open for an extended period of time once samples are placed inside.
- Not sample near a running vehicle where exhaust fumes may impact the sample.
- Not touch the exposed end of a sampling tube, if applicable.
- Avoid allowing rain water to drip from rain gear or other surfaces into sample bottles.
- Not eat, smoke, or drink during sample collection.
- Not sneeze or cough in the direction of an open sample bottle.
- Minimize the exposure of the samples to direct sunlight, as sunlight may cause biochemical transformation of the sample.
- Decontaminate sampling equipment prior to sample collection using a TSP-soapy water wash, distilled water rinse, and final rinse with distilled water.

6.8.5.2 Non-Visible Sample Handling Procedures

Immediately following collection, sample bottles for laboratory analytical testing will be capped, labeled, documented on a Chain-of-Custody form provided by the analytical laboratory, sealed in a re-sealable storage bag, placed in an ice-chilled cooler, at as near to 4 degrees Celsius as practicable, and either retrieved by or delivered within 24 hours to the following California state-certified laboratory:

Laboratory Name: CAPCO Analytical Services, Inc.
Address: 2978 Seaborg Avenue, Suite 4
Ventura, CA 93003
Telephone Number: 805-644-1095
Email Address: rhernandez@capcoenv.com

Immediately following collection, samples for field analysis will be tested in accordance with field instrument manufacturer's instructions and results recorded on the Sampling Activity Log (Appendix M).

6.8.5.3 Sample Documentation Procedures

All original data documented on sample bottle identification labels, Chain-of-Custody forms, Sampling Activity Logs, and Inspection Checklists will be recorded using ink. These will be considered accountable documents. If an error is made on an accountable document, the individual will make corrections by lining through the error and entering the correct information.

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The erroneous information will not be obliterated. All corrections will be initialed and dated. Copies of the Chain-of-Custody form and Sampling Activity Log are provided in Attachment M.

6.8.5.4 Sample Bottle Identification Labels

Sampling personnel will attach an identification label to each sample bottle. At a minimum, the following information will be recorded on the label, as appropriate:

- Project name
- Project number
- Unique sample identification number and location.
- Quality assurance/quality control (QA/QC) samples shall be identified similarly using a unique sample number or Collection date/time (No time applied to QA/QC samples)
 - Separate times for collected samples and QA/QC samples recorded to the nearest minute
- Analysis constituent
- Sampling Activity Logs: A log of sampling events will identify:
 - Sampling date
 - Unique sample identification number and location
 - Analysis constituent
 - Names of sampling personnel
 - Weather conditions (including precipitation amount)
 - Field analysis results
 - Other pertinent data
- Chain-of-Custody (COC) forms:
 - All samples to be analyzed by a laboratory will be accompanied by a COC form provided by the laboratory. Only the sample collectors will sign the COC form over to the lab. COC procedures will be strictly adhered to for QA/QC purposes.
- BMP Inspection Report: When applicable, the qualified stormwater inspector will document on the report that samples for non-visible pollutants were taken during a rain event.

6.8.6 Data Management and Reporting

Laboratory reports and COC forms will be reviewed for consistency between laboratory methods, sample identifications, dates, and times for both primary samples and QA/QC samples. All data, including COC forms and Sampling Activity Logs, shall be kept with the SWPPP document, which is to remain at the construction site at all times until a Notice of Termination has been submitted and approved.

6.8.7 Data Evaluation

Inspection results, site observations and comparative laboratory sample analysis of up and downstream locations (where applicable) will be evaluated for evidence of and potential for pollution. Once these are understood:

- Evaluate BMPs for their adequacy and effectiveness.
- If inadequate or not effective, BMPs will be changed to address the existing conditions.

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- If/when BMPs are overwhelmed, an immediate and effective response is required to correct potential issues.
- All changes will be documented in the SWPPP and on the Site Map.
- If different BMPs are needed not already designated in the SWPPP, the QSP will contact the QSD and an appropriate amendment will be made to the SWPPP.

6.8.8 Change in Conditions

Whenever SWPPP monitoring indicates a change in site conditions that might affect the appropriateness of sampling locations or introduce additional non-visible pollutants of concern, testing protocols will be revised accordingly. All such revisions will be recorded as amendments to the SWPPP by the QSD and filed in Appendix C.

6.9 SPILL RESPONSE PROCEDURES

6.9.1 Accidental Minor Spills

Minor spills involve small quantities of oil, gasoline, paint, etc., easily controlled by the first responder at the discovery of the spill. The practices followed for minor spills are to:

- Contain the spill.
 - Stop the spill from continuing and berm around spill area if necessary.
- Recover spilled materials.
 - Sweep up spilled dry materials. Do not wash them away with water or bury.
 - Recover liquid spills on paved or impermeable surfaces using dry absorbent materials such as cat litter, and/or rags.
- Clean the contaminated area and/or dispose of contaminated materials.
 - Cleanup rags may be considered hazardous waste that must be sent to a certified industrial laundry or dry cleaner, or disposed of properly. Place small, non-hazardous spill residues and materials inside a sealed container before discarding into garbage or dumpster.
 - Dispose of contaminated materials in a proper waste container. Toxic liquid wastes (used oils, solvents, and paints) and chemicals (acids, pesticides, additives, and curing compound) shall not be disposed of in dumpsters designated for construction materials.
 - Examine labels of spilled materials for proper waste disposal instructions.

6.9.2 Accidental Semi-Significant Spills

Semi-significant spills can be controlled by the first responder along with the aid of other personnel such as laborers, foremen, contractors, etc. Spills should be cleaned up immediately. Spill control measures should be consistent with those used for minor spills and as recommended in Appendix G, WM-4. In addition, the following actions should occur upon discovery of a semi-significant spill.

- If the spill occurs in a dirt area, contain the spill by constructing an earthen dike. Dig and properly dispose of all contaminated soil.

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- If the spill occurs on a paved or impermeable surface, clean up using “dry” methods, i.e. absorbent materials, cat litter and/or rags. Contain the spill by encircling with absorbent materials and do not let the spill spread.
- If the spill occurs during rain, cover the affected area if possible to avoid runoff.
- Notify the project foreman immediately.

6.9.3 Accidental Significant/Hazardous Spills

Significant or hazardous spills cannot be completely controlled by on-site personnel or are deemed too hazardous to control by on-site personnel. The following steps should be taken:

- Notify the local emergency response agency by dialing **911** and notify the proper City officials. All necessary emergency telephone numbers must be made available at the construction trailer.
- Notify the Governor’s Office of Emergency Services Warning Center at **(916) 845-8911**.
- For spills of federally reportable quantities, in conformance with the requirements in 40 CFR, notify the National Response Center at **(800) 424-8802**.
- Notification should first be made by telephone and followed with a written report as soon as possible.
- A spill cleanup contractor or Haz-Mat team should be contacted immediately. Construction personnel should not attempt to clean up until the appropriate qualified personnel have arrived and given instructions.
- Other agencies which may need to be consulted include but are not limited to the local Fire Protection District, the local police, the Highway Patrol, the State Department of Toxic Substance Control, the California Division of Oil and Gas, the California Department of Fish and Game and Cal/OSHA.

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7.0 REFERENCES

- Association of Bay Area Governments (ABAG), 1995, Manual of Standards for Erosion and Sediment Control Measures.
- Bay Area Stormwater Management Agencies Association (BASMA), 1999, *Start at the Source*, Design Guidance Manual for Stormwater Quality Protection.
- California State Water Resources Control Board, February 14, 2011, General Permit No. CAS000002, State Board Order No. 2010-0014-DWQ.
- California State Water Resources Control Board, September 1, 2023, General Permit No. CAS000002, State Board Order No. 2022-0057-DWQ .
- California Stormwater Quality Association, 2023, Stormwater Best Management Practice Handbook for Construction Projects.
- Goldman, S.J., Jackson, K., and Bursztynsky, T.A., 1986, Erosion and Sediment Control Handbook, McGraw-Hill.
- Gray, D. H., and A. Leiser, 1977, Biotechnical Slope Protection and Erosion Control, John Wiley and Sons, New York.
- International Erosion Control Association (ICEA), 1996, Advance Design Methods for Evaluating Sediment and Erosion Control BMPs.
- RailPros, 2022. 100 % Draft Civil Plans. August 26, 2022.

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APPENDIX A

Construction General Permit (Order No. 2022-0057 DWQ)

EXHIBIT "C" (Stormwater Pollution Prevention Plan)

CALIFORNIA STATE WATER RESOURCES CONTROL BOARD
1001 I Street Sacramento, CA 95814
<https://www.waterboards.ca.gov>

**NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES)
GENERAL PERMIT FOR STORMWATER DISCHARGES ASSOCIATED WITH
CONSTRUCTION AND LAND DISTURBANCE ACTIVITIES
(GENERAL PERMIT)**

ORDER WQ 2022-0057-DWQ
NPDES NO. **CAS000002**

This Order was adopted by the State Water Resources Control Board on:	September 8, 2022
This Order shall become effective on:	September 1, 2023
The statewide programmatic permitting option per Section III.B.4 of this Order shall become effective on:	December 17, 2022
This Order shall expire on:	August 31, 2028

IT IS HEREBY ORDERED that this Order supersedes Order 2009-0009-DWQ as amended by Order 2010-0014-DWQ and 2012-0006-DWQ except for: (1) the requirement to submit annual reports by September 1, 2023, (2) enforcement purposes, and (3) as set forth in Section III.C of this Order. The discharger shall comply with the requirements in this Order to meet the provisions contained in Division 7 of the California Water Code (commencing with § 13000) and regulations adopted thereunder, and the provisions of the federal Clean Water Act and regulations and guidelines adopted thereunder.

IT IS ALSO HEREBY ORDERED that on or after December 17, 2022, a discharger deploying Executive Order N-73-20 may obtain regulatory coverage through the statewide programmatic permitting option in Section III.B.4 under Order 2009-0009-DWQ as amended by Orders 2010-0014-DWQ and 2012-0006-DWQ until September 1, 2023.

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I, Jeanine Townsend, Clerk to the Board, do hereby certify that this Order with all attachments is a full, true, and correct copy of an Order adopted by the State Water Resources Control Board, on September 8, 2022.

AYE: Chair E. Joaquin Esquivel
Board Member Sean Maguire
Board Member Laurel Firestone
Board Member Nichole Morgan

NAY: None

ABSENT: Vice Chair Dorene D'Adamo

ABSTAIN: None


_____ for
Jeanine Townsend
Clerk to the Board

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EXHIBIT "C" (Stormwater Pollution Prevention Plan)

I. FINDINGS

The State Water Resources Control Board (State Water Board) finds that:

1. The Federal Water Pollution Control Act, also referred to as the Clean Water Act, prohibits certain discharges of stormwater containing pollutants to waters of the United States except in compliance with a National Pollutant Discharge Elimination System (NPDES) permit (Title 33 United States Code (U.S.C.) §§ 1311 and 1342(p); also referred to as Clean Water Act §§ 301 and 402(p)). The United States Environmental Protection Agency (U.S. EPA) promulgates federal regulations to implement the Clean Water Act's mandate to control pollutants in stormwater runoff discharges. (Title 40 Code of Federal Regulations (CFR) Parts 122, 123, and 124). The federal statutes and regulations require discharges to waters of the United States comprised of stormwater associated with construction activity to obtain NPDES permit coverage (except operations that result in disturbance of less than one acre of total land area and that are not part of a larger common plan of development or sale). Construction activity includes, but is not limited to, clearing, demolition, grading, excavation, and other land disturbance activities. The NPDES permit shall require implementation of Best Available Technology Economically Achievable (BAT) and Best Conventional Pollutant Control Technology (BCT) to reduce or eliminate pollutants in stormwater runoff. The NPDES permit shall also include any additional requirements necessary to achieve applicable water quality standards.
2. Consistent with Water Code, § 13374, this NPDES permit also serves as waste discharge requirements for discharges of pollutants in stormwater runoff (stormwater discharges) associated with construction and land disturbance activities and is hereinafter referred to as General Permit.
3. A "discharger" is a person, as defined in Water Code § 13050(c), which includes companies and governmental bodies, subject to this General Permit who is responsible for compliance with this General Permit. The discharger designates the Legally Responsible Person(s) to serve as a primary signatory when required to sign, certify, and submit documents or information for this General Permit. The Legally Responsible Person(s) may also designate a Duly Authorized Representative(s) to sign, certify, and submit documents or information for this General Permit. "Discharger" and the designated "Duly Authorized Representative" are further defined in Attachment B of this General Permit.
4. This General Permit regulates discharges to waters of the United States from stormwater and authorized non-stormwater associated with construction activity from sites that disturb one or more acres of land surface, or that are part of a common plan of development or sale that disturbs more than one acre of land surface.
5. This General Permit regulates discharges to waters of the United States from stormwater and authorized non-stormwater associated with construction activities

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from all linear underground and overhead projects resulting in the disturbance of greater than or equal to one acre (Attachment E).

6. This General Permit does not preempt or supersede the authority of local stormwater management agencies to prohibit, restrict, or control stormwater discharges to municipal separate storm sewer systems or other watercourses within their jurisdictions.
7. This action to adopt a general NPDES permit is exempt from the provisions of Chapter 3 of the California Environmental Quality Act (Public Resources Code § 21100, et seq.), pursuant to § 13389 of the California Water Code.
8. Regional Water Quality Control Boards (Regional Water Boards) establish water quality standards in water quality control plans. The State Water Board establishes water quality standards in various statewide water quality control plans, including the California Ocean Plan and the forthcoming Inland Surface Waters, Enclosed Bays, and Estuaries of California Plan. U.S. EPA establishes water quality standards in the National Toxic Rule and the California Toxic Rule.
9. Pursuant to 40 Code of Federal Regulations § 131.12 and State Water Board Resolution No. 68-16 (antidegradation policy), which incorporates applicable requirements of § 131.12, in high quality waters, discharges may not unreasonably affect beneficial uses, result in water quality less than the quality specified by water quality objectives, or cause a pollution or nuisance, except as allowed under the antidegradation policy. The federal antidegradation policy requires that “existing instream uses and the level of water quality necessary to protect the existing uses” are maintained and protected. If the baseline quality of a waterbody for a given constituent “exceeds levels necessary to support propagation of fish, shellfish, and wildlife and recreation in and on the water, that quality shall be maintained and protected” through the requirements of this Order unless the State Water Board makes findings that: (1) any lowering of the water quality is “necessary to accommodate important economic or social development in the area in which the waters are located”; (2) “water quality adequate to protect existing uses fully” is assured; and (3) “the highest statutory and regulatory requirements for all new and existing point sources and all cost-effective and reasonable best management practices for nonpoint source control” are achieved. For high quality waters, Resolution No. 68-16 requires findings that any lowering of water quality is “consistent with the maximum benefit to the people of the State” and “will not unreasonably affect present and anticipated beneficial use of such water and will not result in water quality less than that prescribed in the policies” and further that the discharge is subject to “waste discharge requirements which will result in the best practicable treatment or control of the discharge.”
10. The State Water Board finds that the permitted discharges authorized by this Order are consistent with the antidegradation provision of 40 CFR §131.12 and State Water Board Resolution No. 68-16, as set forth in Section I.H.2 in the Fact Sheet.

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11. This General Permit serves as an NPDES permit in compliance with Clean Water Act § 402 and will be effective on September 1, 2023, except for the statewide programmatic permitting option per Section III.B.4 of this Order which will go into effect on December 17, 2022, provided the Regional Administrator of the U.S. EPA has no objection. If the U.S. EPA Regional Administrator objects to its issuance, this General Permit will not become effective until such objection is withdrawn.
12. The Regional Water Boards and the State Water Board, collectively referred to as the Water Boards, shall enforce the provisions herein following adoption and upon the effective date of this General Permit.
13. Stormwater discharges from dredge spoil placement that occur outside of waters of the state (upland sites) and that disturb one or more acres of land surface from construction activity are covered by this General Permit. This General Permit does not cover the discharge of dredged or fill material to waters of the state. Construction projects that include the discharge of dredged or fill material to waters of the state should contact the applicable Regional Water Board to obtain authorization for the discharge of dredged or fill material to waters of the state.
14. The discharge of dredged or fill material to a water of the United States is regulated by the United States Army Corps of Engineers under Clean Water Act § 404, and by the Water Boards under Clean Water Act § 401. The discharge of dredged or fill material to a water outside of federal jurisdiction may be regulated by the Water Boards under the Porter-Cologne Water Quality Control Act. This General Permit does not authorize discharges of fill or dredged material regulated by the U.S. Army Corps of Engineers under CWA § 404 and does not constitute a waiver of water quality certification under CWA § 401.
15. Compliance with requirements contained in this General Permit does not supersede or constitute compliance with other regulatory requirements also applicable to discharges regulated by this General Permit, including waste discharge prohibitions in regional and statewide water quality control plans.
16. The State Water Board heard and considered all comments and testimony in a public hearing on August 4, 2021, as publicly noticed in accordance with state and federal laws and regulations. The State Water Board has prepared written responses to all significant comments.
17. The Homeland Security Act of 2002 (U.S. 116 STAT. 2135 and Title 6 U.S. Code Chapter 1 § 101) requires any information provided to the Water Boards per a regulatory action taken by the Water Boards shall comply with the Homeland Security Act and other federal law that address security in the United States; the discharger should not submit any information that does not comply.
18. The discharger is required to comply with this General Permit's conditions for all discharges associated with stormwater from construction activity and authorized non-stormwater discharges by this General Permit or another NPDES permit

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issued by the State Water Board or a Regional Water Board. All other discharges are prohibited by this General Permit.

19. Unauthorized non-stormwater discharges are prohibited, including improper dumping, spills, or leakage from storage tanks or transfer areas. Non-stormwater discharges may contribute significant pollutant loads to receiving waters.
20. All discharges which contain a hazardous substance in excess of reportable quantities established in 40 Code of Federal Regulations §§ 117.3 and 302.4, are prohibited unless a separate NPDES permit has been issued to regulate those discharges.
21. Stormwater that is exposed to by-products and waste products resulting from demolition activities may transport and discharge pollutants off-site and into receiving waters.
22. In 2008, the State Water Board and the California Stormwater Quality Association (CASQA) led a group of stakeholders in developing and establishing the Construction General Permit Training Team (CGPTT). Subsequently, the CGPTT developed the training program and certification process for Qualified Stormwater Pollution Prevention Plan (SWPPP) Developer (QSD) and the Qualified SWPPP Practitioner (QSP) conducting work required by this General Permit. In 2010, CASQA and the State Water Board entered into a Memorandum of Agreement to document their respective understandings, roles, and responsibilities for the implementation of the QSD/QSP training program. The Memorandum of Agreement notes that the CASQA QSD/QSP Training Program constitutes a State Water Board-approved training course pursuant to the Construction Stormwater General Permit. The Memorandum of Agreement also documents that CASQA will continue to lead the QSD/QSP training program, with guidance from the CGPTT.
23. Per the Memorandum of Agreement, CASQA is responsible for qualifying and overseeing Trainers of Record who deliver the official QSD/QSP training program curricula in a manner consistent with the standards established by the CGPTT.
24. All California professional engineering, land surveying, and geology work is licensed by the Board for Professional Engineers, Land Surveyors, and Geologists.¹ Pursuant to the Professional Engineers Act (Bus. and Prof. Code § 6700, et seq.), all engineering work is required to be performed by a California licensed professional engineer. Pursuant to the Profession Land Surveyor's Act (Bus. and Prof. Code §§ 8700 – 8805), all land surveying work is required to be performed by a California licensed profession land surveyor. Pursuant to the Professional Geologist and Geophysicist's Act (Bus. and Prof. Code §§ 7800 –

¹ [Department of Consumer Affairs, California Board for Professional Engineers, Land Surveyors, and Geologists website <https://www.bpelsg.ca.gov/>](https://www.bpelsg.ca.gov/) [as of July 2022]

7887), all geological work is required to be performed by a California licensed professional geologist.

25. Precipitation events can occur at any time of the year in California. On-site stormwater management is necessary throughout the entire year to ensure sites implement adequate erosion and sediment controls prior to the onset of a precipitation event, even if construction is planned only during the typically dry season.
26. Soil particles smaller than 0.02 millimeters (mm) (i.e., finer than medium silt) do not settle easily using conventional measures for sediment control (i.e., sediment basins). Fine particles discharged into surface waters cause downstream impacts to beneficial uses in the receiving water. Actively treating construction stormwater discharges with properly operated and maintained active treatment systems can reduce the turbidity level and sediment concentration in the discharge to levels that comply with receiving water limitations.
27. The State Water Board convened a Blue-Ribbon Panel (Panel) of stormwater experts that submitted a report entitled "The Feasibility of Numeric Effluent Limits Applicable to Discharges of Stormwater Associated with Municipal, Industrial and Construction Activities," dated June 19, 2006. The Panel concluded that numeric effluent limitations or numeric action levels are technically feasible to regulate construction stormwater discharges. The Panel concluded that numeric effluent limitations are feasible for discharges from sites that utilize an active treatment system. The Panel also concluded that numeric action levels are likely to be more commonly feasible. The previous permit (Order 2009-0009-DWQ, as amended by Orders 2010-0014-DWQ and 2012-0006-DWQ) includes numeric action levels for pH and turbidity, and specific numeric effluent limitations for active treatment system discharges. The Panel was not asked to address requirements specific to the implementation of Total Maximum Daily Loads (TMDL) with assigned waste load allocations for construction stormwater sources.
28. The purpose of numeric action levels and associated monitoring requirements is to provide operational information regarding the performance of the site control measures used to minimize the discharge of pollutants and to protect receiving water beneficial uses from the adverse effects of construction-related stormwater and authorized non-stormwater discharges. Upon exceedance of a numeric action level, the discharger must take necessary corrective actions, including but not limited to maintenance, replacement, and/or installation of new best management practices. This General Permit relies on dischargers to implement an iterative process for best management practice to protect water quality. Failure to implement corrective actions in response to a numeric action level exceedance is a violation of this General Permit.
29. This General Permit requires compliance with receiving water limitations based on water quality standards established in regional or statewide water quality control plans. One of the receiving water limitations requires that construction

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stormwater discharges and authorized non-stormwater discharges not cause or contribute to an exceedance of applicable water quality standards. Water quality standards apply to the quality of the receiving water, not the quality of the construction stormwater discharge. Therefore, compliance with the receiving water limitations generally cannot be determined solely by the effluent water quality characteristics. If any discharger's stormwater discharge causes or contributes to an exceedance of water quality standards, that discharger must implement additional BMPs or other control measures in order to attain compliance with the receiving water limitation. Compliance with water quality standards may, in some cases, require dischargers to implement controls that are more protective than controls implemented solely to comply with the technology-based requirements in this General Permit.

30. A Total Maximum Daily Load is the sum of the allowable loads of a single pollutant from all contributing point sources (waste load allocations) and non-point sources (load allocations), plus the contribution from background sources (40 Code of Federal Regulations § 130.2(i)). Discharges of stormwater from construction activities are considered point source discharges, and therefore must comply with NPDES permit requirements translated to be "consistent with the assumptions and requirements of any available waste load allocation for the discharge prepared by the state and approved by U.S. EPA pursuant to 40 Code of Federal Regulations § 130.7" (40 Code of Federal Regulations § 122.44 (d)(1)(vii)). In addition, Water Code § 13263, subdivision (a), requires that waste discharge requirements implement any relevant water quality control plans. Many TMDLs in water quality control plans include implementation requirements that may be translated into General Permit requirements and TMDL-specific numeric action levels and numeric effluent limitations.
31. Areas of Special Biological Significance are defined in the California Ocean Plan as "those areas designated by the State Water Board as ocean areas requiring protection of species or biological communities to the extent that alteration of natural water quality is undesirable." The California Ocean Plan prohibits the discharge of waste to Areas of Special Biological Significance unless identified in a State Water Board-approved exception.
32. The California Ocean Plan authorizes the State Water Board to grant an exception to California Ocean Plan provisions where the State Water Board determines that the exception will not compromise protection of ocean waters for beneficial uses and the public interest will be served.
33. On March 20, 2012, the State Water Board adopted Resolutions 2012-0012 and Resolution 2012-0031, which contain exceptions to the California Ocean Plan for specific discharges of stormwater and non-point sources. This resolution also contains the special protections that are to be implemented for those discharges to Areas of Special Biological Significance.
34. Dischargers are only allowed to discharge to an Area of Special Biological Significance when in compliance with Areas of Special Biological Significance

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specific requirements in a State Water Board-provided exception to the California Ocean Plan granted to the specific discharger.

35. On August 19, 2014, the U.S. EPA adopted regulations requiring all NPDES permits to include requirements to implement sufficiently sensitive test methods. This General Permit requires all laboratory analyses to be sufficiently sensitive and conducted according to test procedures under 40 Code of Federal Regulations Part 136. All analytical results less than the minimum level (reporting limit), as reported by the laboratory, will be assigned a value of zero (0) for any calculations required by this permit (e.g., numeric action level and numeric effluent limitation exceedance determinations), so long as a sufficiently sensitive test method was used as evidenced by the reported method detection limit and minimum level.
36. Specific types of passive treatment used in combination with other best management practices (BMPs) can prevent or reduce the discharge of fine particles from certain construction activities when implemented correctly.
37. Passive treatment is the application of natural or synthetic chemicals and products to reduce turbidity in discharges through coagulation and flocculation. Passive treatment does not rely on computerized, enclosed systems with pumps, filters, and real-time controls. Passive treatment may include pumps where they are necessary to move water around the site. The discharge of chemicals used in passive treatment can potentially cause or contribute to acute and chronic toxicity to aquatic life in receiving waters, potentially resulting in an exceedance of narrative or numeric water quality objectives in regional or statewide water quality control plans.
38. State Water Board Resolution 2005-0006, "Resolution Adopting the Concept of Sustainability as a Core Value for State Water Board Programs and Directing its Incorporation," and Resolution No. 2008-0030, "Requiring Sustainable Water Resources Management," include performance standards for post-construction BMPs. The standards include the use of permanent post-construction BMPs that manage stormwater runoff rates to match pre-construction project site hydrology, and to sustain and ensure the physical structure and biological integrity of aquatic ecosystems in the receiving waters. This "runoff reduction" approach is analogous in principle to low impact development and is proven to protect watersheds and waterbodies from hydrologic-based adverse changes and pollution impacts associated with the post-construction landscape.
39. Linear underground and overhead projects are not subject to post-construction requirements due to the nature of their construction to return project sites to pre-construction conditions.

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IT IS HEREBY ORDERED that all dischargers subject to this General Permit shall comply with the following conditions and requirements (including all conditions and requirements as set forth in the Attachments of this Order)²: State Water Board Order 2009-009-DWQ as amended by Orders 2010-0014-DWQ and 2012-0006-DWQ (previous permit) is superseded as of the effective date of this General Permit except for enforcement purposes, the Annual Report required to be submitted by September 1, 2023, and as set forth in Section III.C.

II. SCOPE OF GENERAL PERMIT COVERAGE

II.A. Traditional Construction Activities Subject to this General Permit

This General Permit covers construction projects that include construction or land disturbance activities that result in a disturbance of one or more acres, or less than one acre but are part of a larger common plan of development or sale that totals one or more acres of land disturbance, such as the following:

1. Construction activity that includes, but is not limited to, clearing, grading, excavation, stockpiling, and demolition activities that expose or disturb soil.
2. Construction activity related to residential, commercial, or industrial development on lands currently used for agriculture including, but not limited to, the construction of buildings related to agriculture that are considered industrial pursuant to U.S. EPA regulations, such as dairy barns or food processing facilities.
3. Construction activity associated with oil and gas exploration, production, processing, or treatment operations or transmission facilities pursuant to 40 Code of Federal Regulations § 122.26(c)(1)(iii), which:
 - a. Had a discharge of stormwater resulting in the discharge of a reportable quantity for which notification is or was required pursuant to 40 Code of Federal Regulations §§ 117.21 or 302.6 at any time since November 16, 1987;
 - b. Had a discharge of stormwater resulting in the discharge of a reportable quantity for which notification is or was required pursuant to Code of Federal Regulations § 110.6 at any time since November 16, 1987; or
 - c. Contributes to a violation of a water quality standard.

II.B. Traditional Construction Activities Not Subject to this General Permit

This General Permit does not apply to the following construction activity:

1. Routine maintenance. Routine maintenance is defined as activities intended to maintain the original line and grade, hydraulic capacity and/or purpose of

² The attachments are part of this General Permit; the attachments are not separate orders or documents that will be updated independently by the State Water Board.

- the facility. This General Permit further defines routine maintenance for road and highway projects as the replacement of the structural section, but not when the activity exposes the underlying soil or erodible subgrade. The road surface and base are not part of the subgrade. As such, those portions of a project that remove the paved road surface and base down to the erodible subgrade and/or underlying soil would not be considered routine maintenance.
2. Disturbances to land surfaces solely related to growing crops or agricultural operations such as disking, harrowing, terracing, and leveling, and soil preparation.
 3. Discharges of stormwater from areas on tribal lands; construction on tribal lands is regulated by a federal permit.
 4. Discharges of stormwater within the Lake Tahoe Hydrologic Unit. The Lahontan Regional Water Board has adopted its own permit to regulate stormwater discharges from construction activity in the Lake Tahoe Hydrologic Unit. Owners of construction sites in this watershed must apply for the Lahontan Regional Water Board permit rather than the statewide Construction Stormwater General Permit. Construction sites within the Lahontan region must also comply with the Lahontan Region Project Guideline for Erosion Control (R6T-2016-0010).³
 5. Construction activity that disturbs less than one acre of land surface, unless part of a larger common plan of development or the sale of one or more acres of disturbed land surface.
 6. Construction activity covered by an individual NPDES Permit for stormwater discharges.
 7. Construction activity that is subject to the Industrial Stormwater General Permit:
 - a. Landfill operations as described by Standard Industrial Classification (SIC) code 4953. Landfill operators typically enroll under the Construction Stormwater General Permit for initial construction and final closure of the landfill.
 - b. Concrete manufacturers of prefabricated products, ready-mix concrete, or slurries that are delivered to construction sites require enrollment in the Industrial Stormwater General Permit. Examples of this industrial activity are those facilities primarily engaged in manufacturing concrete building blocks and bricks, other concrete products not building blocks and bricks,

3 Lahontan Regional Water Quality Control Board, [Order R6T-2016-0010](#) (March 10, 2016),

https://www.waterboards.ca.gov/lahontan/water_issues/programs/storm_water/docs/r6t_2016_0010_cgp_combined.pdf [as of May 20, 2021]

or ready-mix concrete as categorized by Standard Industrial Classification (SIC) codes 3531, 3271, 3272, or 3273. Concrete manufacturing of prefabricated products, ready-mixed concrete, or slurries that are transported from construction sites where mixing occurs and delivered to a separate site require enrollment in the Industrial Stormwater General Permit.

8. Construction activity that discharges to combined sewer systems.
9. Discharges of stormwater identified in Clean Water Act § 402(l)(2), 33 USC § 1342(l)(2) (stormwater runoff from oil, gas, and mining operations) unless the discharge meets the conditions of 40 Code of Federal Regulations § 122.26(c)(1)(iii) as described in this General Permit.
10. Discharges of dredged or fill material to waters of the state. Those portions of the construction project that are located outside of waters of the state or waters of the United States are subject to this General Permit if the non-water portions disturb one or more acres of land.

II.C. Linear Underground and Overhead Projects Subject to this General Permit

1. Linear underground and overhead projects include, but are not limited to conveyance facilities, culverts, pipelines, or other linear corridors for:
 - a. The transportation of any gaseous, liquid, liquescent, and slurry material;
 - b. Cable line or wire for the transmission of:
 - i. Electrical energy; or
 - ii. Communications, including internet, telephone, telegraph, radio, or television messages.
 - c. Ancillary facilities and substructures such as new access roads, helicopter landing zones, laydown yards, staging areas, substations, valve stations, etc. that primarily function as support for linear underground and overhead project construction activities.⁴
2. Construction support activities associated with linear underground and overhead projects include, but are not limited to:
 - a. Activities necessary for the installation of underground and overhead linear facilities (e.g., conduits, substructures, pipelines, towers, poles, cables, wires, connectors, switching, regulating and transforming equipment, vegetative management, and associated ancillary facilities); and

⁴ Regional Water Board staff may require, in writing, that the discharger obtain coverage through a traditional construction notice of intent when the construction of ancillary facilities more closely resembles traditional construction activities.

- b. Activities including underground utility mark-out, potholing, concrete and asphalt cutting and removal, trenching, excavating, boring and drilling, access road and pole/tower pad and cable/wire pull station, substructure installation, construction of tower footings and/or foundations, pole and tower installations, pipeline installations, welding, concrete and pavement repair or replacement, and stockpile/borrow locations.

II.D. Linear Underground and Overhead Projects Not Subject to this General Permit

This General Permit does not apply to the following linear underground and overhead project construction activity:

1. Routine maintenance projects. Routine maintenance projects are projects associated with operations and maintenance activities that are conducted on existing lines and facilities and within existing right-of-way, easements, franchise agreements, or other legally binding agreements of the discharger granting access to land. Routine maintenance projects include, but are not limited to projects that are conducted to:
 - a. Maintain the original purpose of the facility or hydraulic capacity;
 - b. Update existing lines⁵ and facilities to comply with applicable codes, standards, and regulations regardless of if such projects result in increased capacity; and/or
 - c. Repair leaks.
2. Routine maintenance does not include construction of new lines or facilities resulting from compliance with applicable codes, standards, and regulations.
3. Routine maintenance projects do not include those areas of maintenance projects that are outside of an existing right-of-way, franchise, easements, or agreements. When a project must secure new areas, those areas may be subject to this General Permit based on the area of disturbed land outside the original right-of-way, easement, or agreement.
4. Linear underground and overhead project construction activity does not include field activities associated with the planning and design of a project (e.g., activities associated with route selection).
5. Tie-ins conducted immediately adjacent to “energized” or “pressurized” facilities by the discharger are not considered construction activities where all other linear underground and overhead project construction activities associated with the tie-in are covered by a Notice of Intent and SWPPP of a third party or municipal agency.

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⁵ Update existing lines includes replacing existing lines with new materials or pipes.

III. OBTAINING, REVISING, AND TERMINATING PERMIT COVERAGE

III.A. Obtaining Permit Coverage for Traditional Construction Projects

- III.A.1. The Discharger shall obtain a Waste Discharge Identification (WDID) number prior to the commencement of construction activity by electronically certifying and submitting the following Permit Registration Documents through the State Water Board Stormwater Multiple Application and Report Tracking System (SMARTS)⁶:
- a. Notice of Intent, including Risk Level determination as described in Attachment D.1;
 - b. Site Drawings and Maps;
 - c. Stormwater Pollution Prevention Plan (SWPPP) (see Section IV.O, below);
 - d. Applicable plans, calculations, and other supporting documentation for compliance with existing permitted Phase I or Phase II municipal separate storm sewer system post-construction requirements or the post-construction standards of this General Permit;
 - e. Annual fee per the current 23 California Code of Regulations Chapter 9 fee schedule for NPDES stormwater permits; and
 - f. All applicable additional Permit Registration Document information as required in Attachment D.2 of this General Permit.
- III.A.2. An applicant is considered to have General Permit regulatory coverage and can commence construction activity upon receipt of a WDID number generated by SMARTS. Dischargers shall post their site-specific WDID number in a site location that is viewable to the public or readily available upon request if unable to post publicly.
- III.A.3. In the case of a public emergency that requires immediate construction activities involving one acre or more of land disturbance, a discharger shall submit a brief description of the emergency construction activity to the applicable Regional Water Board within five calendar days of the onset of site construction. The discharger shall then submit the required Permit Registration Documents through SMARTS within 30 calendar days of commencing site activity.
- III.A.4. Failure to obtain General Permit coverage for stormwater and non-stormwater discharges covered by this General Permit to waters of the United States is a violation of the Clean Water Act and the California Water Code.

⁶ Dischargers are required to have a signed original Electronic Authorization Form on file with the State Water Board for each organization in SMARTS.

III.B. Obtaining Permit Coverage for Linear Underground and Overhead Projects

The discharger for a linear underground and overhead project shall designate a Legally Responsible Person for each of its WDIDs numbers. The discharger is responsible for enrollment under and compliance with this General Permit. The Legally Responsible Person, as defined in Attachment B of this General Permit, shall fulfill the electronic signature and certification requirements to obtain General Permit coverage (see Section VI.H, Electronic Signature and Certification Requirements.)

- III.B.1. A discharger for a linear underground and overhead project shall obtain General Permit coverage under one or more applications submitted through SMARTS, per the requirements in Attachment E of this General Permit.
- III.B.2. The Legally Responsible Person shall electronically certify and submit the following applicable Permit Registration Documents through SMARTS⁷ and obtain a WDID number prior to the commencement of any construction activities.
 - a. Notice of Intent, including linear underground and overhead project type determination as described in Attachment E.1;
 - b. Site-specific Stormwater Pollution Prevention Plan (SWPPP), Drawings, and Maps (see Section IV.O, below);
 - c. Annual fee per the current 23 California Code of Regulations Chapter 9 fee schedule for NPDES stormwater permits; and
 - d. All applicable additional Permit Registration Document information as required in Attachment E.2 of this General Permit.
- III.B.3. Regulatory Coverage for linear underground and overhead project segments
 - III.B.3.a. The discharger may separate a contiguous linear underground and overhead project into separately regulated segments. Linear underground and overhead project segments may consist of different risk types.
 - III.B.3.b. The discharger shall include a clear description in the Permit Registration Documents regarding how each segment relates to the overall linear underground and overhead project by identifying one or more of the following descriptions:
 - i. The segments are managed by separate contractors;
 - ii. The segments are constructed during distinct project phases; or
 - iii. The segments are located in different topography, watersheds, or jurisdictional boundaries.

⁷ Dischargers are required to have a signed original Electronic Authorization Form on file with the State Water Board for each organization in SMARTS.

- III.B.3.c. Dischargers with corresponding linear underground and overhead project segments that cross Regional Water Board(s) boundaries (e.g., different segments of same project located within different Regional Water Board jurisdictions) must file separate Permit Registration Documents.
- III.B.4. Programmatic Permitting Regulatory Coverage for linear underground and overhead projects
 - III.B.4.a. A discharger may submit one Notice of Intent requesting regional programmatic General Permit coverage for multiple non-contiguous linear underground and overhead projects, if the projects:
 - i. Are located within one Regional Water Board jurisdiction;
 - ii. Are a group of projects of similar scopes with common construction activities; and
 - iii. Have the same Legally Responsible Person.
 - III.B.4.b. Effective December 17, 2022, a discharger deploying Executive Order N-73-20, per the requirements and due dates of the executive order, or amendments therein, may submit one Notice of Intent requesting statewide programmatic General Permit coverage for multiple non-contiguous linear underground and overhead broadband projects, where the installation of the utilities is outside of a construction project that is otherwise regulated under this General Permit.
 - III.B.4.b.i. A discharger deploying Executive Order N-73-20 may apply for a statewide programmatic permit for regulatory coverage under Order 2009-0009-DWQ (as amended by Orders 2010-0014-DWQ and 2012-0006-DWQ), from December 17, 2022 until September 1, 2023, by submitting the information required by Attachment E.2.
 - III.B.4.c. Linear underground and overhead project dischargers with programmatic permitting coverage shall submit, prior to the commencement of any construction activities for each non-contiguous site, a:
 - i. Common SWPPP with the Notice of Intent covering all the activities common to the projects; and
 - ii. Linear Construction Activity Notification for each site describing site-specific information in accordance with Attachment E.2, Section II.A.2.
- III.B.5. An applicant is considered to have General Permit regulatory coverage and may commence construction activity upon receipt of a WDID number generated by SMARTS Dischargers shall post the project-specific WDID number in a site location that is visible to the public or readily available upon request if unable to post publicly.

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III.C. Regulatory Coverage under the Previous Permit

- III.C.1. Dischargers that obtain coverage under State Water Board Order 2009-0009-DWQ, as amended by Orders 2010-0014-DWQ and 2012-0006-DWQ, (previous permit) prior to the effective date of this permit, may continue coverage under the previous permit until its regulated project(s) receive an approved Notice of Termination from the Regional Water Board, up to two years after the effective date of this General Permit. Two years after September 1, 2023, all existing Notices of Intent subject to the previous permit will be administratively terminated.
- III.C.1.a. A discharger continuing regulatory coverage under the previous permit cannot increase a project's disturbed acreage through the Change of Information process, on or after the effective date of this General Permit; the discharger must submit a Notice of Intent for coverage under this General Permit for the increase in disturbed acreage.
- III.C.2. Dischargers with the previous permit's Small Construction Rainfall Erosivity waiver may continue to operate under a project's active waiver until it expires. Waivers granted under the previous permit cannot be modified or extended.
- III.C.3. Dischargers that submit a Notice of Termination for previous permit termination up to two years after the effective date of this General Permit and receive Notice of Termination approval from the Regional Water Board are not subject to this General Permit (unless the discharger subsequently submits new Permit Registration Documents).
- III.C.4. Dischargers with coverage under the previous permit that need regulatory coverage after September 1, 2025 under this General Permit, shall submit, in SMARTS, the following items by August 31, 2025:
- a. A certification of the discharger's intent to obtain regulatory coverage under this General Permit;
 - b. A revised Notice of Intent and other Permit Registration Documents, revised to address new or changed requirements per this General Permit, as applicable; and
 - c. The applicable fee.

III.D. Small Construction Rainfall Erosivity Waiver

- III.D.1. Dischargers are eligible for the Small Construction Rainfall Erosivity waiver (waiver) if:
- a. The site is between one and five acres; and
 - b. The construction activity will take place during a period when the calculated rainfall erosivity factor is less than five.

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- III.D.2. Dischargers with small sites that are part of a larger common plan of development, or dischargers that have programmatic permit coverage, do not qualify for a waiver unless the entire project qualifies for a waiver.
- III.D.3. To request a waiver, the Legally Responsible Person shall submit a waiver application through SMARTS, and pay the appropriate fee to the State Water Board. If approved by the State Water Board, SMARTS will electronically provide the discharger with the waiver and a unique waiver identification number. The waiver is effective on the date the waiver identification number is issued and valid between the construction start and end dates, as entered in the waiver application.
- III.D.4. A discharger qualifying for a waiver shall obtain a waiver identification number prior to starting any construction activities regulated by this General Permit.
- III.D.5. A waiver is valid only if the correct start and end dates of construction activities are entered (and updated if necessary) through the Change of Information process in SMARTS.
- III.D.6. The discharger may revise an original construction start date through the Change of Information process in SMARTS and shall provide documentation demonstrating the project had not started on the date originally submitted through SMARTS.
- III.D.7. The discharger shall update the project end date through the Change of Information process in SMARTS prior to expiration of the waiver if the project completion date is anticipated to extend past the waiver expiration date. If the updated project end date results in a rainfall erosivity factor of five or greater, the discharger shall obtain coverage under this General Permit. If the discharger fails to update the project end date prior to expiration of waiver, they shall immediately obtain coverage under this General Permit.
- III.D.8. The discharger shall post the unique waiver identification number in a site location that is visible to the public or readily available upon request if unable to post publicly.
- III.D.9. A waiver does not provide General Permit coverage. Dischargers with a waiver are not required to comply with post-construction, sampling, monitoring, or other SWPPP requirements in this General Permit.
- III.D.10. Regional Water Board staff may terminate a waiver if the Regional Water Board staff determines the discharge of stormwater runoff causes or contributes to an exceedance of a water quality standard or violates a prohibition in an applicable regional or statewide water quality control plan. The Regional Water Board Executive Officer or their delegate may require the discharger to obtain regulatory coverage under this General Permit or an NPDES permit issued by the Regional Water Board.

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III.E. Notice of Non-Applicability

- III.E.1. A discharger claiming “No Discharge” through a Notice of Non-applicability (NONA) as set forth in Water Code § 13399.30 shall meet the following eligibility requirement:
 - a. The site’s physical location is not hydrologically connected to waters of the United States.
- III.E.2. When claiming the “No Discharge” option, the discharger shall submit and certify via SMARTS both the NONA and a No Discharge Technical Report. The No Discharge Technical Report shall identify the site by address or parcel number and demonstrate that the site meets the eligibility requirement described above in Section III.E.1.a.
- III.E.3. The No Discharge Technical Report shall be signed (wet signature and license number) by a California licensed professional engineer or geologist with hydrological expertise.
- III.E.4. The Regional Water Board may require the No Discharge Technical Report to be reassessed if it determines that there are errors in the No Discharge Technical Report or if the site is hydrologically connected to waters of the United States.

III.F. Revising Permit Coverage Information

The discharger shall revise permit coverage information, as appropriate, to:

- III.F.1. Update Construction Start and End Dates
 - III.F.1.a. The discharger shall electronically certify and submit a revised Notice of Intent through a Change of Information in SMARTS, when the construction start or end date changes, recalculating sediment risk and revising the SWPPP as appropriate. The Change of Information shall be submitted at least 14 days prior to the date that was modified, unless infeasible due to unforeseen circumstances.
 - III.F.1.b. If the discharger is revising the construction start date to a later date than previously submitted, the Change of Information shall contain time-stamped photo documentation depicting that construction activities have not commenced for the entirety of the site.
- III.F.2. Reduce Acreage
 - III.F.2.a. When a portion of the site meets conditions for termination of coverage (Section III.H) or is sold/transferred to a new owner, the discharger may reduce the disturbed acreage covered under the General Permit. The discharger reducing disturbed acreage shall electronically certify and submit the following Permit Registration Document revisions in SMARTS, through a Change of Information, within 30 days of the reduction in acreage:

- i. A revised Notice of Intent indicating the new site size;

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- ii. Photos demonstrating final stabilization, if applicable;
 - iii. Revised site map(s) showing (as applicable) acreage currently under construction; acreage sold/transferred, and/or added; and acreage currently stabilized in accordance with the Conditions for Termination of Coverage in Section III.H below; and
 - iv. A revised SWPPP to match the change in acreage.
- III.F.2.b. For a larger common plan of development for residential use, the discharger may, through the Change of Information process, remove residential lots from permit coverage once the lot meets the following criteria:
- i. The residential lot has been sold to the individual homeowner(s) for residential use;
 - ii. A certificate of occupancy or equivalent document, is maintained on-site and can be made available during inspections;
 - iii. The lot is less than one acre of disturbance;
 - iv. All construction activity conducted on the lot by the discharger is complete; and
 - v. The discharger has temporarily stabilized any unfinished yard and landscaping areas with BMPs.
- III.F.2.c. The discharger shall upload, as an attachment in SMARTS, documentation of a contract (e.g., Covenants, Conditions, and Restrictions) requiring the individual homeowner to stabilize the yard and landscaping within one year and to maintain the temporary BMPs until the yard and landscaping are stabilized.
- III.F.2.d. The discharger shall maintain General Permit coverage for any site, parcel, or individual lot that has not received Change of Information or Notice of Termination approval from the Regional Water Board or obtained coverage under the new owner's Notice of Intent.
- III.F.3. Termination of Programmatic Permit Coverage for Linear Underground and Overhead Projects
- III.F.3.a. Upon completion of construction activities for a specific site with linear underground and overhead project programmatic permit coverage, the discharger shall submit a Linear Construction Termination Notification for each completed linear segment.
 - III.F.3.b. The site must meet the termination conditions in Section III.H.3 below.
 - III.F.3.c. The Linear Construction Termination Notification must include photos demonstrating final stabilization.
 - III.F.3.d. Regional Water Board approval of the Linear Construction Termination Notification terminates coverage for the specific site.

III.F.4. Increase Acreage

III.F.4.a. If the disturbed acreage of the site will increase, the discharger shall certify and submit the following Permit Registration Documents revisions in SMARTS, through a Change of Information, prior to the increase in disturbed acreage:

- i. A revised Notice of Intent indicating the new site size;
- ii. A revised site map(s) showing (as applicable) acreage currently under construction; acreage sold, transferred, and/or added; and acreage currently stabilized in accordance with the conditions for terminating coverage in Section III.H below; and
- iii. A revised SWPPP to match current site size.

III.F.4.b. The discharger shall submit the applicable fees, in accordance with the revised fee notification, within 14 calendar days of the notification date. The Change of Information will be returned if these fees are not received by the State Water Board within 14 calendar days of the notification date.

III.F.4.c. Regulatory coverage under this General Permit for the added acreage is not approved until the Regional Water Board approves the Change of Information.

III.F.4.d. If the increased acreage is greater than one-fourth mile from the existing site boundary and is an acre or larger, the discharger is required to submit a separate Notice of Intent.

III.F.5. Change in Ownership

III.F.5.a. Prior to a sale/transfer of a site, parcel, or individual lot (change of ownership), the existing discharger shall submit a Notice of Termination for change of ownership and a certification that the new owner has been notified of applicable requirements to obtain new General Permit for the qualifying activities. The existing discharger certification shall include the name, address, telephone number, and email address of the proposed new owner in the Notice of Termination submitted through SMARTS.⁸

III.F.5.b. General Permit coverage is not transferable to a new owner. The new discharger will need to submit their own Permit Registration Documents to obtain a new WDID number prior to continuing construction activities and/or installing final landscaping (including meeting conditions for termination of coverage). The new discharger shall enter the original project start date (initial date of disturbance) from the previous discharger(s).

⁸ Dischargers that are submitting a Notice of Termination for a change of ownership, where the new owner will obtain permit coverage to complete construction, are not required to comply with the requirements in Order Section III.H.

III.G. Inactive Projects

- III.G.1. Dischargers with projects where all construction activities (including passive treatment, active treatment systems, and/or active equipment) will be suspended for 30 days or more may submit a Change of Information through SMARTS to revise the SWPPP. The Change of Information shall include:
- a. Revised site map depicting the current status of construction; and
 - b. Photographs showing the temporary stabilization BMPs that were implemented.
- III.G.2. Upon Regional Water Board approval of the Change of Information, sampling may be suspended, and monitoring and inspections may be reduced as follows:
- III.G.2.a. A QSD shall visit the inactive project within 14 days of Regional Water Board approval of the Change of Information to verify that the SWPPP is being implemented accordingly. If necessary, the QSD shall amend the SWPPP to address all new conditions not previously considered through a Change of Information in SMARTS.
- III.G.2.b. A QSP or trained delegate shall visually inspect the inactive project at least once every calendar month and prior to any weather pattern that is forecasted to have a 50 percent or greater chance of 0.5 inches or more in a 24-hour period. Please refer to Attachments D and E Section III.C for information pertaining to visual inspection requirements.
- i. The QSP or trained delegate shall verify BMPs are functioning in accordance with the SWPPP and implement corrective actions where necessary.
- III.G.2.c. The above inspections are not required during dangerous weather conditions or when access to the site is infeasible (e.g., due to snow accumulation) or unsafe.
- III.G.3. Dischargers wishing to resume construction activities or the use of passive treatment, active treatment systems, and/or active equipment shall submit a Change of Information through SMARTS requesting to resume the project along with a revised site map based on current site conditions. Upon Regional Water Board approval of the Change of Information, the discharger is required to comply with all applicable requirements of this General Permit to resume construction activities at the site.

III.H. Terminating Permit Coverage

- III.H.1. To terminate General Permit coverage, the discharger shall electronically certify and submit the required documentation (Section III.H.2 below) to demonstrate compliance with all General Permit coverage termination requirements, including applicable post-construction BMPs and/or low impact development features.

- III.H.2. The discharger shall electronically certify and submit the following through SMARTS to be considered for General Permit coverage termination:
- a. A complete Notice of Termination;
 - b. QSP-prepared final Notice of Termination inspection with the QSP name and valid QSP certificate number;
 - c. A final site map; and
 - d. Photos demonstrating final stabilization and the implementation of applicable post-construction BMPs and/or low impact development.
- III.H.3. The discharger shall certify and submit a final site map, as part of the Notice of Termination documents through SMARTS. The Notice of Termination final site map shall, at minimum, include the following:
- a. Project boundaries and adjacent lands with labeled key features, such as roadways and waterbodies;
 - b. Developed drainage basin boundaries and discharge location points;
 - c. Site entrances and exits, lot boundaries, roads, structures, and features related to the project that may be used as a reference;
 - d. Specific permanent erosion control BMPs, post-construction BMPs, and low impact development features;
 - e. Individual erosion control BMPs (including final landscaping) identified using hatch patterns, symbols, or shading unique to each BMP;
 - f. Location and orientation of all photos used to document final site conditions and demonstrate compliance with post-construction requirements of this General Permit; and
 - g. If applicable, areas of the site being transferred to new ownership, and the name and contact information of the owner.
- III.H.4. The Regional Water Board will consider a site, parcel, or individual lot complete only when all portions of the site comply with all the following conditions:
- a. The discharger has completed all construction activity;
 - b. There is no greater potential for construction-related stormwater pollutants to be discharged into site runoff than prior to the construction activity;
 - c. Construction-related equipment and temporary BMPs have been removed from the site, except as set forth in Section III.F.2.b above;
 - d. Construction materials and wastes have been disposed of properly;
 - e. Soils disturbed by construction activities have been permanently stabilized (final stabilization), except as set forth in Section III.F.2.b above, using materials that:

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- i. Have a product life that support the full and continued stabilization of the site;
 - ii. Achieve stabilization without becoming trash or debris; and
 - iii. Minimize the risk of wildlife entrapment;
- f. The discharger has ensured the QSP completed on-site visual inspections and verified the site complies with all Notice of Termination requirements, including installation of post-construction stormwater runoff BMPs and/or low impact development features;
- g. The Legally Responsible Person has submitted the information in the Notice of Termination and has certified and submitted through SMARTS; and
- h. The discharger has demonstrated that the site complies with all Notice of Termination conditions above (Section III.H) and all final stabilization conditions by one of the following methods:
- i. **70 percent final cover method.** No computational proof required. Requires permanent vegetative cover to be evenly established over 70 percent of all disturbed and exposed areas of soil (non-paved or non-built). In areas that naturally have low vegetative coverage (e.g., deserts), 70 percent of natural conditions of local undisturbed areas is acceptable. Photos of all site areas are required to verify compliance with the 70 percent final cover requirement;
OR
 - ii. **Revised Universal Soil Loss Equation (RUSLE or RUSLE2) method.** Computational proof required. Site conditions shall match values used in method computation. Photos of all site areas are required to verify pre-construction and post-construction conditions used in the computations;
OR
 - iii. **Custom method.** The discharger may request approval from the Regional Water Board to use a method or analytical model other than Section III.H.4.h.i and 4.h.ii above to demonstrate that the site complies with the “final stabilization” requirements. Photos of all site areas are required to verify the custom method used.

III.H.5. The Notice of Termination photo documentation for General Permit compliance verification shall include photos of the site’s final site conditions; post-construction BMPs and/or low impact development features; a description of the corresponding location, and orientation of photos as indicated on the final site map.

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- III.H.6. The Notice of Termination shall include a long-term maintenance plan⁹ for the post-construction stormwater runoff BMPs and/or low impact development features being implemented.
- III.H.7. The Notice of Termination will be automatically approved 30 calendar days after the date of Notice of Termination is submitted, unless, within the 30 calendar days the Regional Water Board notifies the discharger through SMARTS that the Notice of Termination has been denied, returned, or accepted for review.
- III.H.8. All General Permit requirements remain in effect until the Notice of Termination is approved. The Legally Responsible Person will be notified through SMARTS communication when the discharger's General Permit coverage and corresponding WDID number are terminated.

IV. PERMIT REQUIREMENTS

IV.A. Authorized Non-Stormwater Discharges

- IV.A.1. Non-stormwater discharges from the following de-chlorinated potable and non-potable water sources are authorized if they comply with the requirements in Section IV.A.2 of this General Permit:
 - a. Fire-fighting activity;
 - b. Fire hydrant system flushing;
 - c. Irrigation of vegetative erosion control measures;
 - d. De-chlorinated potable water, including uncontaminated water line flushing;
 - e. Hydrostatic pipe flushing and testing water;
 - f. Air conditioning or compressor condensate;
 - g. Uncontaminated groundwater or spring water from construction dewatering activities in compliance with Attachment J; and
 - h. Water to control dust.
- IV.A.2. The above non-stormwater discharges are authorized under the following conditions:
 - a. The discharge is not routed through site areas with exposed soil, except for water used for dust control or to vegetation irrigation to stabilize areas;
 - b. The discharge does not cause or contribute to an exceedance of water quality standards in the receiving water;

⁹ For the purposes of this requirement, a long-term maintenance plan shall be designed for a minimum of five years, and describe the responsible party(ies), schedule, and procedures needed to ensure that post-construction features are adequately maintained and functional.

- c. The discharge complies with other applicable requirements of this General Permit including applicable action levels, effluent limitations, and monitoring and reporting requirements;
- d. The discharge is not prohibited by an applicable regional or statewide water quality control plan;
- e. The discharge is in accordance with other applicable State and Regional Water Board permits; and
- f. The discharge does not contain toxic constituents in toxic amounts and does not cause toxicity in the receiving water body.

IV.B. Discharge Prohibitions

- IV.B.1. Dischargers shall not violate any discharge prohibitions contained in applicable water quality control plans.
- IV.B.2. Discharges to Areas of Special Biological Significance (ASBS) are prohibited by the California Ocean Plan, unless granted an exception issued by the State Water Board.
- IV.B.3. All discharges are prohibited except for the stormwater and non-stormwater discharges specifically authorized by this General Permit or another NPDES permit. The discharger shall notify the Regional Water Board of existing or anticipated non-stormwater discharges not authorized by this General Permit, within 24 hours of the discharge, to determine if regulatory coverage is necessary through a separate NPDES permit.
- IV.B.4. All of the following discharges are prohibited:
 - a. Debris and trash, in accordance with State Water Board Resolution 2015-0019, the Trash Provisions of the Water Quality Control Plan for Ocean Waters of California and the Water Quality Control Plan for Inland Surface Waters, Enclosed Bays, and Estuaries of California, as applicable to construction stormwater discharges.
 - i. To comply with the Trash Provisions, dischargers shall implement, operate, and maintain trash management, treatment, and institutional controls to eliminate debris and trash from all stormwater discharges and authorized non-stormwater dischargers consistent with the prohibition of the discharge of debris and trash regulated by this General Permit. If the discharger is unable to comply with the prohibition of the discharge of debris and trash, the discharger must submit, for Regional Water Board Executive Office or designee approval, an amended Stormwater Pollution Prevention Plan addressing:
 - 1. A demonstration that the discharger is unable to comply with this outright prohibition of the discharge of debris and trash; and

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2. A demonstration that the discharger's chosen combination of trash management, treatment, and institutional controls achieves full capture system equivalency.
- b. Treatment chemicals except as authorized in Attachment F and G;
- c. Wastewater from washout or cleanout of areas, structures or equipment with concrete, grout, stucco, paint or other construction materials;
- d. Form-release oils and curing compounds;
- e. Fuels, oils, fluids, or other materials used in vehicle and equipment operation and maintenance;
- f. Soaps, solvents, or detergents (e.g., used in vehicle equipment washing or external building wash down); and
- g. Toxic or hazardous substances (e.g., asbestos, lead, mercury, or PCBs).

IV.C. Effluent Limitations and Action Levels

IV.C.1. Narrative Effluent Limitations

- IV.C.1.a. Stormwater discharges and authorized non-stormwater discharges regulated by this General Permit shall not contain a hazardous substance equal to or in excess of reportable quantities established in 40 Code of Federal Regulations §§ 117.3 and 302.4, unless a separate NPDES Permit has been issued to regulate those discharges.
- IV.C.1.b. Dischargers shall minimize or prevent pollutants in stormwater discharges and authorized non-stormwater discharges through the use of controls, structures, and management practices set forth in the order and attachments of this General Permit that achieve best available technology (BAT) for toxic and non-conventional pollutants and best conventional technology (BCT) for conventional pollutants.

IV.C.2. Numeric Effluent Limitations¹⁰

- IV.C.2.a. All dischargers implementing active treatment systems are subject to the numeric effluent limitations required in Attachment F.
- IV.C.2.b. All dischargers that are Responsible Dischargers for a TMDL with a waste load allocation that was translated into a TMDL-related numeric effluent limitation, are subject to the numeric effluent limitations as indicated by Table H-2 in Attachment H.

¹⁰ Refer to Attachment B of this General Permit for the definitions of numeric effluent limitations and numeric effluent limitation exceedances.

IV.C.3. Numeric Action Levels¹¹

- IV.C.3.a. All dischargers that are Responsible Dischargers for a TMDL with a waste load allocation that was translated into a TMDL-related numeric action level, are subject to the numeric action level as indicated by Table H-2 in Attachment H.
- IV.C.3.b. Dischargers with dewatering activities not subject to a separate NPDES permit are subject to the numeric action levels required in Attachment J.
- IV.C.3.c. For Risk Level 2 and 3 sites, refer to Attachment D, Section III.G. For Type 2 and 3 linear underground and overhead projects, refer to Attachment E, Section III.G. For stormwater and authorized non-stormwater discharges, the numeric action level for pH is provided as a range where the lower value is 6.5 pH standard units and the upper value is 8.5 pH standard units. The discharger shall report the field reading to two decimal places. A numeric action level exceedance for pH occurs when the reading, obtained per each discharge location per day of each qualifying precipitation event, is below the lower value or above the upper value, as shown in Table 1 of this Section.
- IV.C.3.d. Risk Level 2 and 3 sites, refer to Attachment D, Section III.G. For Type 2 and 3 linear underground and overhead projects, refer to Attachment E, Section III.G. For stormwater and authorized non-stormwater discharges the numeric action level for turbidity is 250 Nephelometric Turbidity Units (NTU). An exceedance of the turbidity numeric action level occurs when the field reading, obtained per each discharge location per day of each qualifying event, is over 250 NTU, as shown in Table 1 of this Section.

¹¹ Refer to Attachment B of this General permit for the definitions of numeric action levels and numeric action level exceedances.

Table 1. Numeric Action Levels, Test Methods, Detection Limits, and Reporting Units

Parameter	Test Method	Discharger Type	Method Detection Limit	Units	Numeric Action Level
TMDL-Related Pollutant	U.S. EPA-approved test method for specific pollutant parameter	Responsible Dischargers	Depends on the test method	mg/L	Refer to Table H-2 in Attachment H
pH	Field test with calibrated portable instrument using EPA approved procedures	Risk Level 2 and 3 Risk Type 2 and 3	0.2	pH Units	Lower Value= 6.5 Upper Value= 8.5
Turbidity	EPA 0180.1 and/or field test with calibrated portable instrument	Risk Level 2 and 3 Risk Type 2 and 3	1	NTU	250

IV.D. Receiving Water Limitations

- IV.D.1. The discharger shall ensure that stormwater discharges and authorized non-stormwater discharges to any surface or ground water will not adversely affect human health or the environment.
- IV.D.2. The discharger shall ensure that stormwater discharges and authorized non-stormwater discharges will not contain pollutants in quantities that threaten to cause pollution or a public nuisance.
- IV.D.3. The discharger shall ensure that stormwater discharges and authorized non-stormwater discharges will not contain pollutants that cause or contribute to an exceedance of any applicable water quality objectives or water quality standards contained in an applicable water quality control plan.
- IV.D.4. Responsible Dischargers shall comply with the applicable TMDL implementation requirements in Attachment H of this General Permit, including TMDL-specific additional BMPs and site pollutant modeling, numeric action levels, and/or numeric effluent limitations.

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IV.E. Linear Underground and Overhead Project Requirements

Dischargers with linear underground and/or overhead projects shall comply with the requirements included in Attachments E, E.1, and E.2 of this General Permit.

IV.F. Risk Level 1 Requirements

Risk Level 1 dischargers shall comply with the requirements included in Attachment D, D.1, and D.2 of this General Permit.

IV.G. Risk Level 2 Requirements

Risk Level 2 dischargers shall comply with the requirements included in Attachment D, D.1, and D.2 of this General Permit.

IV.H. Risk Level 3 Requirements

Risk Level 3 dischargers shall comply with the requirements included in Attachment D, D.1, and D.2 of this General Permit.

IV.I. Active Treatment System Requirements

Dischargers implementing an active treatment system shall comply with all of the requirements in Attachment F of this General Permit.

IV.J. Passive Treatment Requirements

Dischargers implementing passive treatment on-site shall comply with all the requirements in Attachment G of this General Permit.

IV.K. Total Maximum Daily Load Implementation Requirements

IV.K.1. Responsible Dischargers are dischargers who:

- a. Discharge stormwater and authorized non-stormwater directly, or through a municipal separate sewer system or other conveyance, to impaired water bodies or watersheds identified in a U.S. EPA approved total maximum daily load (TMDL) with a waste load allocation assigned to construction stormwater sources; and
- b. Have one or more TMDL-specific pollutant sources present on-site with the potential to enter construction stormwater discharge, which are required to be identified in the pollutant source assessment (refer to Section IV.O.2.i below).

IV.K.2. Responsible Dischargers shall comply with the applicable requirements in Attachment H of this General Permit.

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IV.L. Discharges Subject to the California Ocean Plan

IV.L.1. Discharges to Ocean Waters

IV.L.1.a. Dischargers that discharge directly into ocean waters that are subject to the model monitoring provisions of the California Ocean Plan shall be deemed in compliance with applicable California Ocean Plan model monitoring provisions when in compliance with monitoring requirements of this General Permit.

IV.L.1.b. The Regional Water Boards may require a discharger that discharges directly into ocean waters who has demonstrated non-compliance with this General Permit's monitoring requirements to develop and implement a monitoring plan in compliance with additional effluent and ocean monitoring provisions established pursuant to Water Code § 13383.

IV.L.2. Discharges Granted an Exception for Areas of Special Biological Significance (ASBS)

IV.L.2.a. Dischargers who were granted an exception to the California Ocean Plan prohibition of discharges of waste directly to an ASBS pursuant to Resolution 2012-0012 amended by Resolution 2012-0031 shall comply with the conditions and requirements set forth in Attachment I of this General Permit. Any discharger that applies for and is granted an exception to the California Ocean Plan prohibition after September 1, 2013, shall comply with the conditions and requirements set forth in the granted exception.

IV.M. Dewatering Requirements

IV.M.1. Dischargers with dewatering activities subject to a separate NPDES permit (e.g., de minimis and low threat discharges) are not subject to comply with the dewatering requirements of this General Permit as found in Attachment J and shall obtain coverage as required by the State or Regional Water Boards.

IV.M.2. Dischargers with dewatering activities not subject to a separate NPDES permit (e.g., de minimis and low threat discharges) shall comply with the dewatering requirements in Attachment J.

IV.N. Post-Construction Requirements

IV.N.1. All dischargers, other than linear underground and overhead project dischargers, shall implement BMPs to reduce runoff and pollutants in stormwater discharges that are reasonably foreseeable after all construction phases have been completed at the site (post-construction BMPs).

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- IV.N.2. Dischargers subject to the post-construction requirements of an existing NPDES Phase I or Phase II municipal separate storm sewer system permit are not subject to the post-construction requirements in Section IV.N.3 below, and shall submit the following items with their Permit Registration Documents through SMARTS:
- a. An attachment or web-source containing the applicable NPDES Phase I or Phase II municipal separate storm sewer system permittee's post-construction requirements; and
 - b. The post-construction plans and calculations submitted to, or approved by, the applicable NPDES Phase I or Phase II municipal separate storm sewer system permittee. If the discharger submitted preliminary post-construction plans and calculations as a Permit Registration Document, the discharger shall submit the approved plans and calculations within 14 days of approval by the municipal stormwater permittee, through a Change of Information in SMARTS. The discharger shall submit a Change of Information in SMARTS for any revisions to post-construction plans and calculations prior to submitting the Notice of Termination.
- IV.N.3. All dischargers, other than linear underground and overhead project dischargers or dischargers subject to the post-construction requirements of an existing NPDES Phase I or Phase II municipal separate storm sewer system permit, shall comply with the following post-construction runoff reduction requirements. The discharger shall comply with this General Permit's post-construction requirements if the Permit Registration Documents were submitted prior to the effective date of applicable post-construction requirements of the corresponding NPDES Phase I or Phase II municipal stormwater permit.
- IV.N.4. The discharger shall use non-structural and/or structural measures to replicate the pre-construction water balance (for this General Permit, defined as the volume of rainfall that ends up as runoff) for the smallest storms up to and including the 85th percentile, 24-hour precipitation event (or the smallest precipitation event that generates runoff, whichever is larger).
- IV.N.5. For sites with disturbed area exceeding two acres, the discharger shall preserve the pre-construction drainage density (miles of stream length per square mile of drainage area) for all drainage areas within the area serving a first order stream¹² or larger stream and ensure that post-project runoff time of concentration is equal to or greater than pre-project time of concentration.
- IV.N.6. The discharger shall certify and submit post-construction plans, calculations, and other supporting documentation as a Permit Registration Document in SMARTS. The discharger shall submit a Change of Information in SMARTS for

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¹² A first order stream is defined as a stream with no tributaries.

any revisions to post-construction plans and calculations prior to submitting the Notice of Termination.

- IV.N.7. Regional Water Board staff may review post-construction plans, calculations, and other supporting documentation to verify that the post-construction water balance is accurate; and may request that the discharger make revisions if necessary.
- IV.N.8. The discharger may use the contact information found online or in Attachment C to request Regional Water Board staff review post-construction plans, calculations, and other supporting documentation prior to and during construction.

IV.O. Stormwater Pollution Prevention Plan Requirements

- IV.O.1. The discharger shall ensure the site's SWPPP complies with the below conditions:
 - a. A site-specific SWPPP is developed, and amended as necessary, by a QSD. The discharger is responsible for keeping the SWPPP and associated documents updated in SMARTS to reflect current site conditions and construction activities.
 - b. Trained personnel and BMP materials are available at the site as required by this General Permit.
 - c. The SWPPP includes the implementation of BMPs that comply with BAT, BCT, and ensure compliance with water quality standards; additional BMPs based on input from the QSP to address numeric action level and numeric effluent limitation exceedances; and additional training needed for the QSP, Legally Responsible Person, or designated persons on-site.
 - d. The SWPPP is available at the site and made available upon request by a federal, State, or municipal inspector. A current copy of the site-specific SWPPP and any site inspection reports required by this General Permit may be kept in electronic format at the site so long as the information requested by a federal, State, or municipal inspector can be made available during an inspection. All maps are legible and available in hard copy at the site.
- IV.O.2. The SWPPP shall include:
 - a. Identification of all pollutants, their sources, and control mechanisms, including sources of sediment associated with all construction activities (e.g., sediment, paint, cement, stucco, cleaners, site erosion);

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- b. Pollutant source assessments, including a list of potential pollutant sources and identification of site areas where additional BMPs are necessary to reduce or prevent pollutants in stormwater and authorized non-stormwater discharges, per the following minimum requirements when developing the pollutant source assessment:
 - i. Consider all potential sources of pollutants, including non-visible pollutants which are known, or should be known to occur on-site including those that:
 - 1. Are used in construction activities;
 - 2. Are stored on-site;
 - 3. Were spilled or released during construction activities or past land use activities and not cleaned up; and
 - 4. Were applied to land as part of past land use activities.
 - ii. Consider all potential sources of pollutants associated with applicable TMDLs listed in Attachment H, and state whether or not sources of those pollutants are present on-site;
 - iii. Consider the quantity, physical characteristics (e.g., liquid, powder, solid), and locations of each potential pollutant exposed, source handled, produced, stored, recycled, or disposed of on-site;
 - iv. Consider the degree to which pollutants associated with those materials may be exposed to and mobilized by contact with stormwater; and
 - v. Consider the direct and indirect pathways that pollutants may be exposed to stormwater or authorized non-stormwater discharges. This shall include an assessment of past spills or leaks, non-stormwater discharges, and discharges from adjoining areas.
- c. Description of site-specific BMPs implemented to reduce or eliminate stormwater pollution, including the following, if applicable:
 - i. Minimum sediment and erosion control BMPs as outlined in Attachments D and E of this General Permit;
 - ii. Active treatment systems as included in an Active Treatment System Plan (as required in Section E.1 of Attachment F);
 - iii. Passive treatment technologies as included in a Passive Treatment Plan (as required in Section D.2 of Attachment G);
 - iv. BMPs implemented to address applicable TMDL implementation requirements (as required by Attachment H); and
 - v. Dewatering systems (as required by Attachment J).

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- d. Site-specific BMPs initialized immediately to temporarily stabilize an area disturbed by construction where construction activities will not be resumed within 14 days;
- e. Identification, elimination, control, or treatment information for all non-stormwater discharges from the site not regulated by this or another NPDES permit;
- f. Description of efforts and BMPs used to minimize and control pollutants discharged from equipment and vehicle washing, wheel wash water, and other wash waters. Wash waters must be captured and properly disposed of and/or treated to mitigate impacts to water quality;
- g. Description of efforts and BMPs used to minimize exposure of building materials, building products, construction wastes, trash, landscape materials, fertilizers, pesticides, herbicides, detergents, sanitary waste, and other materials present on the site to precipitation and to stormwater;
- h. Description of spill and leak prevention and response plan including:
 - i. Procedures that effectively address hazardous and non-hazardous spills in accordance with law;
 - ii. Spill and leak response equipment and materials to be available on-site, cleaned up immediately, and disposed of properly; and
 - iii. Personnel are assigned and trained for spill and leak prevention and response.
- i. Construction Site Monitoring Program that describes methods and procedures for monitoring discharges in accordance with the applicable Attachment D or E that includes the following:
 - i. Visual inspection locations, inspection procedures, and follow-up tracking procedures.
 - ii. Applicable sampling locations, collection, and handling procedures shall include detailed procedures for field analysis, sample collection, storage, preservation, and shipping to the laboratory to ensure consistent quality assurance and control is maintained.
 - iii. A copy of the Chain of Custody form used when handling and shipping samples.
 - iv. Identification of the analytical methods and related method detection limits (if applicable) for each parameter.
 - v. Watershed Monitoring Option:
 - 1. If the discharger is part of a qualified regional watershed-based monitoring program approved by the Regional Water Board Executive Officer or their delegate, the discharger may be eligible for relief from the monitoring requirements in the applicable

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Attachment D or E. The Regional Water Board may approve proposals to substitute a qualified watershed-based monitoring program if it determines the program will provide information to determine each discharger's compliance with the requirements of this General Permit.

- j. Title Sheet(s) with:
 - i. Project name;
 - ii. Project location (vicinity map);
 - iii. Preliminary schedule of activities;
 - iv. Site operating hours (hours when construction activities are occurring);
 - v. Index of attachments;
 - vi. Contact information for QSD(s), QSP(s), and trained delegates (name, phone numbers, license or certification number); and
 - vii. Signature of the QSD(s) who prepared the SWPPP.
- k. Pre-Earthwork Drawing with:
 - i. Site and project boundaries;
 - ii. Areas disturbed during geotechnical or other preconstruction investigation work;
 - iii. Existing roads and trails;
 - iv. Drainage areas;
 - v. Discharge locations;
 - vi. Existing storm drain system if applicable; and
 - vii. Proposed locations of storage areas for waste, construction materials, project staging areas, stockpiles, vehicles, equipment and vehicle maintenance, loading/unloading of materials, site access (entrance/exits), fueling, water storage, water transfer for dust control, demolition, and areas of other construction support activities.
- l. Construction and Earthwork Drawing(s) with:
 - i. Site layout (grading plans) including roads;
 - ii. Site and project boundaries;
 - iii. Drainage areas;
 - iv. Discharge locations;
 - v. Sampling locations;
 - vi. Areas of soil disturbance (temporary or permanent);
 - vii. Proposed active areas of soil disturbance (cut or fill);

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- vii. Proposed locations of erosion control BMPs;
- ix. Proposed locations of sediment control BMPs;
- x. Proposed locations of run-off BMPs;
- xi. Temporary and/or permanent run-on conveyance (if applicable);
- xii. Proposed locations of active treatment systems(s) (if applicable);
- xiii. Locations of storage areas for waste, construction materials, project staging areas, stockpiles, vehicles, equipment and vehicle maintenance, loading/unloading of materials, site access (entrance/exits), fueling, water storage, water transfer for dust control, demolition, and areas of other construction support activities; and
- xiv. Site-specific procedures to implement final stabilization BMPs as soon as reasonably practicable.

IV.P. Annual Reporting Requirements

- IV.P.1. The discharger shall electronically certify and submit an Annual Report through SMARTS by September 1st for the previous reporting period from July 1st through June 30th if a WDID number is active for at least 90 days within the reporting period.
- IV.P.2. The discharger shall retain an electronic copy or hard copy of each Annual Report for a minimum of three years after the date the Annual Report is certified.
- IV.P.3. The Annual Report shall consist of the following:
 - a. The summary of all stormwater sampling and monitoring reports and supporting documents (e.g., laboratory reports);
 - b. The summary of all corrective actions taken during the compliance year;
 - c. The identification and explanation of any compliance activities (e.g., missed sampling or visual inspections) or corrective actions that were not implemented;
 - d. The summary of all the General Permit violations;
 - e. The names of individual(s) who performed the site inspections, sampling, visual inspections, and/or measurements;
 - f. The date, place, time of site inspections, sampling, visual inspections, and/or measurements, including the amount of precipitation measured in inches; and
 - g. All visual inspection and sample collection exception records and reports.

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V. SITE ROLES AND PERSONNEL

V.A. Discharger Responsibilities

- V.A.1. The discharger, as defined in Attachment B, is responsible for all site activity affiliated with General Permit compliance and non-compliance including work done by QSDs, QSPs, and QSP delegates.
- V.A.2. The discharger shall ensure that the SWPPP and any required amendments are developed by a QSD. SWPPP changes or amendments shall be uploaded through SMARTS within 30 calendar days.
- V.A.3. The discharger shall ensure that all persons responsible for implementing this General Permit's requirements for a project shall be appropriately licensed or certified in accordance with this General Permit. For example, the discharger shall verify personnel serving as QSD(s) or QSP(s) have an active and current certificate, and engineering and/or geology work performed for the site is conducted by a California licensed professional.
- V.A.4. The discharger shall ensure that the correct construction start and end date are:
 - a. Used for each regulated construction project's risk determination;
 - b. Listed in SMARTS; and
 - c. Included on the unique WDID number notification form in a site location viewable by the public or readily available upon request if unable to post publicly.
- V.A.5. The discharger shall ensure project data and contact information is current in SMARTS.
- V.A.6. If a Legally Responsible Person changes, the discharger shall update the contact information for the Legally Responsible Person in SMARTS.

V.B. Legally Responsible Person

- V.B.1. When the discharger is required to sign, certify, and electronically submit any documents required by the General Permit, the State or Regional Water Board, or U.S. EPA, the signatory for the discharger is the Legally Responsible Person and must meet the definition of "Legally Responsible Person" set forth in Attachment B.
- V.B.2. The Legally Responsible Person may designate a Duly Authorized Representative, as defined in Attachment B, who may sign, certify, and electronically submit any documents, reports, or information required by this General Permit, the State or Regional Water Boards, or U.S. EPA. The Legally Responsible Person shall update the designation in SMARTS if there are any changes to the Duly Authorized Representative.
- V.B.3. The Legally Responsible Person and, if applicable, Duly Authorized Representative shall comply with the electronic signature and certification.

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requirements set forth in Section VI.H when submitting information required by the General Permit.

V.C. Discharger's Responsibilities for Qualified SWPPP Developer Performance

- V.C.1. The discharger shall retain a QSD from the beginning of the project through the Notice of Termination approval.
- V.C.2. A QSD is required to assess how construction activities will affect sediment transport, erosion, and other discharges of pollutants in stormwater runoff in the SWPPP design and implementation. The QSD is required to revise the SWPPP to address potential problems identified by visual inspections, sampling data, comments from a QSP, or their own site observations.
- V.C.3. A QSD is required to include in the SWPPP the name, email, and phone number of all the QSP-trained delegate(s).
- V.C.4. The discharger shall ensure that a QSD performs the following on-site visual inspections¹³:
 - a. Within 30 days of construction activities commencing on a site;
 - b. Within 30 days of a discharger replacing the QSD;
 - c. Twice annually, once August through October and once January through March;
 - d. Within 14 calendar days after a numeric action level exceedance; and
 - e. Within the time period requested in writing from Water Board staff.
- V.C.5. A QSD may perform the work of a QSP.

V.D. Discharger's Responsibilities for Qualified SWPPP Practitioner Performance

- V.D.1. The discharger shall ensure that a QSP reviews work performed by trained delegates including visual inspections, sampling, BMP implementation activities, and other required tasks listed in the SWPPP.
- V.D.2. The discharger shall ensure that a QSP performs the following on-site visual inspections¹⁴:
 - a. Once every calendar month;

13 These on-site visual inspection requirements are the minimum required and may be increased by the discharger or a QSD during times of high-risk construction activities, excessive site problems, or other conditions that warrant increased oversight by a QSD.

14 These on-site visual inspection requirements are the minimum requirements and may be increased by the discharger or a QSD during times of high-risk construction

- b. Within 72 hours prior to a forecasted Qualifying Precipitation Event to inspect areas of concern to verify the status of any deficiencies, BMPs, or other identified issues at the site. If extended forecast precipitation data (greater than 72 hours) is available from the National Weather Service, the pre-precipitation event inspection may be done up to 120 hours in advance;
- c. Within 14 days after a numeric action level exceedance the QSP shall visually inspect the drainage area of exceedance and document any areas of concern; and
- d. Prior to the submittal of General Permit Notice of Termination or Change of Information (for acreage changes) of all or part of a site.

V.D.3. The discharger shall ensure that a QSP verifies the following:

- a. All BMPs required in the SWPPP are implemented, correctly installed, inspected, and maintained;
- b. Track out of construction related material at site entrances and exits is controlled;
- c. The SMARTS generated WDID number notification form is in a site location viewable by the public or readily available upon request, kept up to date, and the start and end dates are correct and match the dates listed in SMARTS for the project;
- d. Sampling protocols for stormwater and non-stormwater discharges are correctly performed as described in the SWPPP by on-site trained personnel delegated by a QSP (including, but not limited to, taking representative samples of the runoff);
- e. Contact information including, name, phone number, and email address for the discharger, Legally Responsible Person, QSD(s), and QSP(s) is correct and updated in SMARTS within 90 days of a change); and
- f. Photo documentation of problem areas of erosion, new sediment deposition, unauthorized non-stormwater discharges, and/or failed BMPs is included in the SWPPP and are made available upon a regulatory inspector's request.

V.E. Discharger Responsibilities for Delegates' Performance

V.E.1. The discharger may authorize a QSP to delegate visual inspections, sampling, and/or SWPPP and BMP implementation activities to others (delegates) (e.g., superintendent, project manager, foreman, contractor, coworker) that have received training for their respective tasks. A QSP opting to delegate tasks to

activities, excessive site problems, or other conditions that warrant increased oversight of the site.

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others shall provide the following training based on the guidelines set by the Construction General Permit Training Team:

- a. Foundational training for all delegates regarding stormwater compliance roles and responsibilities, forecast information, and documentation and reporting procedures; and
- b. Site-specific training regarding visual inspections, sampling procedures, and/or SWPPP and BMP implementation activities relevant to the delegate's assigned responsibilities.

V.E.2. The discharger shall ensure the following for QSP-delegate(s):

- a. A QSP has determined the delegate(s) can perform and have a competent understanding of the visual inspection, sampling, and/or SWPPP and BMP implementation tasks prior to fully delegating the responsibility to the individual;
- b. The current delegate(s), including name, email, and phone number, are maintained in a training log, uploaded as an attachment to the SWPPP in SMARTS, prior to the delegate performing the delegated function; and
- c. The delegate(s) have a system used to record and report issues back to the QSP within 24 hours of when a corrective action is needed.

V.E.3. The delegate cannot perform the QSD and QSP inspections required in Section V.C.4 or Section V.D.2, respectively.

V.F. Becoming a Qualified SWPPP Developer (QSD) or Qualified SWPPP Practitioner (QSP)

V.F.1. All QSDs and QSPs shall have fundamental knowledge of erosion and sedimentation processes, best management practices, and their implementation to control pollutants in stormwater discharges.

V.F.2. California licensed professional engineers or geologists may self-certify their eligibility to serve as a QSD/QSP via the State Water Board Construction Stormwater Program website.

V.F.2.a. Consistent with Title 16, California Code of Regulations, § 475 Code of Professional Conduct, a California Board for Professional Engineers, Land Surveyors, and Geologists (CBPELSG) licensee shall provide service for a project in a manner that is consistent with the laws, codes, ordinances, and regulations applicable to that project. A CBPELSG licensee shall not misrepresent their scope of authority affiliated with their professional license.

V.F.2.b. The State Water Board expects that a CBPELSG licensee serving a discharger enrolled in this General Permit has thorough knowledge of the conditions and requirements of this General Permit and the required supporting documents and information.

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- V.F.3. A person can obtain a QSD or QSP certification through the CASQA by completing the following steps:
- Step 1: Complete a required prerequisite to take the QSD or QSP training course;
 - Step 2: Complete the QSD or QSP training course;
 - Step 3: Pass the QSD or QSP exam; and
 - Step 4: Register as a QSD or QSP through the CASQA website.
- V.F.4. A QSD applicant shall currently possess at least one of the following prerequisites:
- a. A California landscape architect registration;
 - b. A professional hydrologist registration through the American Institute of Hydrology;
 - c. A Certified Professional in Erosion and Sediment Control (CPESC)TM registration through EnviroCert International, Inc.;
 - d. A Certified Professional in Stormwater Quality (CPSWQ)TM registration through EnviroCert International, Inc.; or
 - e. Any prerequisite course approved by the State Water Board's Division of Water Quality Deputy Director in accordance with Section V.G.
- V.F.5. A QSP applicant shall currently possess at least one of the following prerequisites:
- a. A Certified Erosion, Sediment, and Stormwater Inspector (CESSWI) registered through Enviro Cert International, Inc.;
 - b. A certified inspector of sediment and erosion control registered through Certified Inspector of Sediment and Erosion Control (CISEC) Inc.;
 - c. A Construction Management degree from an accredited 4-year institution that includes coursework that covers the underlying principles of erosion and sediment control and practices of reducing pollution in stormwater; or
 - d. Any prerequisite course approved by the State Water Board's Division of Water Quality Deputy Director in accordance with Section V.H.
- V.F.6. To remain in good standing with their certification, QSDs and QSPs registered through CASQA shall:
- a. Complete 6 hours, annually, of continuing education on site assessment techniques, best management practice design and implementation, inspection techniques, or monitoring approaches. This requirement can be fulfilled in whole or in part by continuing education taken to maintain any of the approved underlying prerequisites; and

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- b. Complete the online QSD or QSP renewal process every two years, including a review of materials addressing permit implementation updates, clarifications, and experiences as provided by the Construction General Permit Training Team.

V.G. Pre-existing QSP and QSD qualification

- V.G.1. A QSD or QSP who maintained a valid certification as of the effective date of this General Permit shall remain in good standing.
 - V.G.1.a. Existing QSDs and QSPs certified through CASQA shall, prior to the expiration date of their current certificate, certify that they have maintained a valid underlying certification and complete the recertification review or refresher training through CASQA's renewal process.
 - V.G.1.b. Existing QSD/QSPs who have self-certified with the State Water Board that they are a California licensed professional engineer or California licensed professional geologist shall complete the recertification process through the State Water Board Construction Stormwater Program website and complete self-directed training required by the State Water Board before September 1, 2024.

V.H. QSP and QSD Prerequisite Course Qualification

- V.H.1. The State Water Board's Division of Water Quality Deputy Director may approve the qualification of additional prerequisite courses for QSD and QSP certification.
- V.H.2. Individuals may recommend additional prerequisite courses by emailing the [Stormwater Help Desk](mailto:stormwater@waterboards.ca.gov) (stormwater@waterboards.ca.gov). The course curriculum shall meet an acceptable level of training and require continuing education to maintain their certification.
- V.H.3. The Construction General Permit Training Team will review any recommended prerequisite courses and provide feedback for the State Water Board Division of Water Quality Deputy Director's consideration. If approved, the course will be listed on the [State Water Board's Construction Stormwater Program website](https://www.waterboards.ca.gov/water_issues/programs/stormwater/construction.html) (https://www.waterboards.ca.gov/water_issues/programs/stormwater/construction.html) as an approved prerequisite course.

V.I. Water Board Rescission of a QSP or QSD Certification

- V.I.1. The State Water Board Executive Director or a Regional Water Board Executive Officer may:
 - a. Suspend any QSD or QSP certification and require that additional training be completed as a condition of re-instatement if the Executive Director or Executive Officer finds, in writing, that the QSD or QSP in the course of acting as a QSD or QSP at one or more site(s) lacked adequate knowledge or training to perform duties required by the General Permit, and/or

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- b. Rescind any QSD or QSP certification if, after providing notice and an opportunity to be heard, the Executive Director or Executive Officer finds, in writing, that the QSD or QSP has in the course of acting as a QSD or QSP at one or more site(s), (1) willfully or negligently caused or allowed a violation of this General Permit; (2) submitted false or misleading information to the State Water Board or any Regional Water Board, (3) used fraud or deception; or (4) failed to use reasonable care and good judgment.

- V.I.2. An individual whose QSD or QSP certification has been rescinded may request the State Water Board to review the rescission. Any request for review must be received by the State Water Board no later than 30 days after the date that the individual received written notice of the rescission.

VI. STANDARD PROVISIONS

VI.A. Duty to Comply

- VI.A.1. The discharger shall comply with all General Permit conditions and requirements. Any General Permit non-compliance constitutes a violation of the Clean Water Act and the Porter-Cologne Water Quality Control Act and is grounds for enforcement action and/or removal of General Permit coverage.
- VI.A.2. The discharger shall comply with effluent standards or prohibitions established under Clean Water Act § 307(a) for toxic pollutants within the time provided in the regulations that establish these standards or prohibitions.

VI.B. Need to Halt or Reduce Activity Not a Defense

A discharger's claim that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with this General Permit shall not be a defense in an enforcement action.

VI.C. Duty to Mitigate

The discharger shall take all responsible steps to minimize or prevent any discharge that has a reasonable likelihood of adversely affecting human health or the environment in violation of this General Permit, which includes ceasing discharge as necessary.

VI.D. Proper Operation and Maintenance

- VI.D.1. The discharger shall at all times properly install, operate, and maintain any treatment and control facilities, systems, related appurtenances, and backup or auxiliary systems (treatment control systems) which are installed or used by the discharger to achieve compliance with this General Permit's conditions.
- VI.D.2. The discharger shall include adequate laboratory controls and appropriate quality assurance procedures for all treatment control systems.

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VI.E. Property Rights

This General Permit does not: (1) convey any property rights of any sort or any exclusive privileges, (2) authorize any injury to private property or any invasion of personal rights, (3) or authorize any infringement of federal, state, or local laws or regulations.

VI.F. Duty to Maintain Records and Provide Information

- VI.F.1. The discharger shall maintain a paper or electronic copy of all required records and reports, including but not limited to, a copy of this General Permit and all its attachments and Fact Sheet, for three years from the date generated or date submitted whichever is later.
- VI.F.2. The discharger shall furnish the Water Boards or U.S. EPA, within a reasonable time, any requested information to determine compliance with this General Permit. The discharger shall also furnish, upon request, copies of records that are required to be kept by this General Permit.

VI.G. Inspection and Entry

- VI.G.1. The discharger shall allow staff of the Water Boards, U.S. EPA, and/or an authorized representative of the municipal separate storm sewer system receiving the discharge to:
- a. Enter the site premises during a regulated construction activity and/or at the location where compliance records are maintained in accordance with this General Permit;
 - b. Access and copy any compliance records maintained in accordance with this General Permit;
 - c. Inspect the complete project and site, including any off-site staging areas or material storage areas, and the erosion/sediment controls;
 - d. Sample, monitor, or install automated sampling equipment to ensure General Permit monitoring compliance; and
 - e. Conduct bioassessment monitoring (if required by a Regional Board water quality control plan), receiving water monitoring, and/or evaluate the performance of BMPs.

VI.H. Electronic Signature and Certification Requirements

- VI.H.1. All documents submitted to the Water Boards (including, but not limited to, Permit Registration Documents, Annual Reports, monitoring records, and

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Notices of Termination) are required to be certified by the Legally Responsible Person¹⁵ or a Duly Authorized Representative¹⁶ through SMARTS.

- VI.H.2. All documents (e.g., designs, plans, reports) that require engineering or geologic evaluations and judgments must be prepared by, or under the direction of, appropriately licensed professionals in the State of California. The licensee must sign and provide their registration number or stamp on the documents to be submitted and certified by the Legally Responsible Person or Duly Authorized Representative.
- VI.H.3. Any person signing documents under Section VI.H shall make the following certification:

“I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations. I am also aware that my user ID and password constitute my electronic signature and any information I indicate I am electronically certifying contains my signature. I understand that my electronic signature is the legal equivalent of my handwritten signature. My signature on this form certifies that my electronic signature is for my own use, that I will keep it confidential, and that I will not delegate or share it with any other person. Should I wish to delegate such authority, I will do so formally in writing and electronically notify the State Water Board using SMARTS of such delegation within 10 days of the delegation. I further certify that I will protect my electronic signature from unauthorized use, and that I will contact the State Water Board, within two business days of discovery, if I suspect that my electronic signature has been lost, stolen, or otherwise compromised.”

- VI.H.4. Clean Water Act § 309(c)(4) provides that any person who knowingly makes any false material statement, representation, or certification in any record or other document submitted or required to be maintained under this General Permit, including reports of compliance or non-compliance shall upon conviction, be penalized with a monetary fine of up to \$10,000 or by imprisonment for not more than two years, or both.

¹⁵ Defined in this General Permit, Attachment B (Glossary)

¹⁶ Defined in this General Permit, Attachment B (Glossary)

VI.I. Anticipated Noncompliance

The discharger shall provide advance notice, in writing, to the applicable Regional Water Board and local stormwater management agency of any planned changes in site construction activities that may result in non-compliance with this General Permit.

VI.J. Reporting of Contaminated Soils

The discharger shall have soils sampled and tested to ensure proper handling and public safety measures are implemented when soil contamination is found or suspected, and a responsible party is not identified, or the responsible party fails to promptly take the appropriate action. The discharger shall notify the appropriate local, state (including the Regional Water Board), and federal agency(ies) when contaminated soil is found at a site.

VI.K. Bypass

- VI.K.1. Bypass¹⁷ is prohibited unless the discharger demonstrates one or more of the following conditions:
- a. In accordance with the bypass requirements for active treatment systems in Attachment F; or
 - b. Bypass was unavoidable to prevent loss of life, personal injury, or severe property damage¹⁸; or
 - c. There were no feasible alternatives to bypass, such as the use of auxiliary treatment facilities, retention of untreated waste, or maintenance during normal periods of equipment downtime. This condition is not satisfied if adequate back-up equipment should have been installed in the exercise of reasonable engineering judgment to prevent a bypass that could occur during normal periods of equipment downtime or preventative maintenance; or
 - d. The discharger allowed a bypass to occur that does not cause the exceedance of an effluent limitation(s), due to essential maintenance to assure efficient operation. In such a case, the above bypass conditions are not applicable; and

17 The intentional diversion of waste streams from any portion of a treatment facility or system.

18 Severe property damage means substantial physical damage to property, damage to the treatment facilities that causes them to become inoperable, or substantial and permanent loss of natural resources that can reasonably be expected to occur in the absence of a bypass. Severe property damage does not mean economic loss caused by delays in production.

- e. The discharger submitted a notice to the Regional Water Board, at least 14 calendar days in advance of the need for a bypass except where advance notice was not possible due to an emergency situation where the bypass was unavoidable to prevent loss of life, personal injury or severe property damage. If the discharger was unable to notify the Regional Water Board in advance of a bypass the discharger shall submit written notification to the Regional Water Board within 14 days after the bypass occurs.

VI.L. Upset

- VI.L.1. To establish an affirmative defense of an upset,¹⁹ a discharger must demonstrate the following through properly signed, contemporaneous operating logs or other relevant evidence:
 - a. The non-compliance discharge location;
 - b. The cause(s) of the upset;
 - c. The treatment facility was properly operated and maintained at the time of the upset;
 - d. The discharger submitted notice of the upset as required; and
 - e. Any required remedial measures were implemented as soon as feasibly possible.
- VI.L.2. An administrative determination made before an action of noncompliance occurs is not a final administrative action subject to review.
- VI.L.3. In an enforcement proceeding, the discharger seeking to establish the occurrence of an upset has the burden of proof.

VI.M. Oil and Hazardous Substance Liability

This General Permit, or parts of this General Permit (including, but not limited to, the findings, requirements, conditions, and provisions) shall not be construed to preclude the institution of any legal action or relieve the discharger from any responsibilities, liabilities, or penalties to which the discharger is or may be subject to under Clean Water Act § 311.

¹⁹ An exceptional incident in which there is unintentional and temporary non-compliance with technology-based numeric effluent limitations because of factors beyond the reasonable control of the discharger. An upset event does not include a large precipitation event, wind event, or other natural weather-related force of nature. An upset does not include non-compliance to the extent caused by operational error, improperly designed treatment facilities, inadequate treatment facilities, lack of preventative maintenance, or careless or improper operation.

VI.N. Severability

The provisions of this General Permit are severable; if any provision of this General Permit or the application of any provision of this General Permit to any circumstance is held invalid, the application of such provision to other circumstances, and the remainder of this General Permit, shall not be affected thereby.

VI.O. Reopener Clause

- VI.O.1. This General Permit may be modified, revoked and reissued, or terminated for cause due to promulgation of amended regulations, receipt of U.S. EPA guidance concerning regulated activities, judicial decision, or in accordance with 40 Code of Federal Regulations §§ 122.62, 122.63, 122.64, and 124.5.
- VI.O.2. The submittal of a request by the discharger for a General Permit modification, revocation and reissuance, or termination, notification of planned changes, or anticipated non-compliance does not annul any General Permit condition.
- VI.O.3 This General Permit shall be modified or revoked and reissued to conform if any applicable toxic effluent standard or prohibition (including any schedule of compliance specified in such effluent standard or prohibition) promulgated under Clean Water Act §307(a) for a toxic pollutant which is present in the discharge and the standard or prohibition is more stringent than any pollutant limitation in this General Permit. The Water Boards shall provide the public and dischargers notice of the action.
- VI.O.4 This General Permit may be reopened before March 23, 2032 to revise the requirements implementing the Los Angeles and Long Beach Harbor Waters TMDL for copper, lead, and zinc, for dischargers that discharge to the Dominguez Channel or the Torrance Lateral Channel. State Water Board staff will work with interested stakeholders to develop a plan to collect additional data related to the forthcoming implementation of the 100 mg/L TSS numeric effluent limitation, including the soil screening investigation, and report to the State Water Board via the Executive Director report no later than September 1, 2024. The State Water Board will evaluate whether the additional data and other available information warrants revising the requirements implementing the Los Angeles and Long Beach Harbor Waters TMDL for copper, lead, and zinc at a publicly noticed Board meeting no later than August 31, 2028.
- VI.O.5 This General Permit may be reopened to revise the requirements implementing the Los Angeles Lakes TMDL for chlordane, DDT, dieldrin, and PCBs that discharge to Peck Road Park Lake, Echo Park Lake or Puddingstone Reservoir. State Water Board staff will work with interested stakeholders to develop a plan to collect additional data related to the implementation of the 100 mg/L TSS numeric effluent limitation, including the soil screening investigation, and report to the State Water Board via the Executive Director report no later than September 1, 2023. Upon completion of the work required by the plan, the State Water Board will evaluate whether the additional data and other available

information warrants revising the requirements implementing the Los Angeles Lakes TMDL for chlordane, DDT, dieldrin, and PCBs at a publicly noticed Board meeting.

VI.P. Penalties for Violations of General Permit Conditions

- VI.P.1. Clean Water Act § 309 provides significant penalties for any person who violates a permit condition implementing Clean Water Action §§ 301, 302, 306, 307, 308, 318, or 405 or any permit condition or limitation implementing any such section in a permit issued under § 402. Any person who violates any permit condition of this General Permit is subject to a civil penalty not to exceed \$37,500²⁰ per calendar day of such violation, as well as any other appropriate sanction provided by §309 of the Clean Water Act.
- VI.P.2. Clean Water Act § 309(c)(4) provides that any person who knowingly makes any false material statement, representation, or certification in any record or other document submitted or required to be maintained by this General Permit, including reports of compliance or non-compliance shall upon conviction, be punished by a fine of not more than \$10,000 or by imprisonment for not more than two years or both.
- VI.P.3. The Porter-Cologne Water Quality Control Act provides specific administrative, civil, and criminal penalties, which in some cases are greater than those under the Clean Water Act.

VI.Q. Water Quality Based Corrective Actions²¹

- VI.Q.1. By the end of each reporting year, if the discharger's construction stormwater and/or non-stormwater discharges contain pollutants that are in violation of Receiving Water Limitations (Section IV.D) or in the event that a Responsible Discharger's discharge exceeds an applicable numeric effluent limitation in Attachment H, the discharger shall:
 - a. Conduct a site assessment to identify pollutant source(s) within the site that are associated with construction activity and whether the BMPs described in the SWPPP have been properly implemented;
 - b. Evaluate the site's SWPPP and its implementation to determine whether additional BMPs or SWPPP implementation measures are necessary to reduce or prevent pollutants in all regulated discharges to comply with the Receiving Water Limitations (Section IV.D) or applicable numeric effluent limitations in Attachment H; and

²⁰ May be further adjusted in accordance with the Federal Civil Penalties Inflation Adjustment Act.

²¹ Terms including, but not limited to, Responsible Dischargers, numeric effluent limitations and exceedances are defined in Attachment B of this General Permit.

- c. Certify and submit, through SMARTS, documentation based upon the above site assessment and SWPPP evaluation that:
 - i. Additional BMPs and/or SWPPP implementation measures have been identified and included in the SWPPP to comply with the Receiving Water Limitations (Section IV.D) or applicable numeric effluent limitations in Attachment H; or
 - ii. No additional BMPs or SWPPP implementation measures are required to reduce or prevent pollutants in all regulated discharges to comply with the Receiving Water Limitations (Section IV.D) or applicable numeric effluent limitations in Attachment H.

VI.Q.2. The Regional Water Board or its delegate may require revisions of the discharger's water quality-based corrective actions and/or request additional supporting documentation.

VI.R. Continuation of Expired General Permit

This General Permit continues in force and effect until the effective date of a new General Permit adopted by the State Water Board or the State Water Board rescinds this General Permit.

VII. REGIONAL WATER BOARD AUTHORITIES

- VII.A.** Regional Water Boards (as defined in Attachment B) may terminate General Permit coverage upon determination that a discharger has failed to comply with General Permit requirements. The Regional Water Boards may also terminate General Permit coverage upon determination that the subject discharges must be regulated through a separate Regional Water Board-issued NPDES permit.
- VII.B.** Regional Water Boards may require a discharger to comply with additional monitoring and reporting requirements, including but not limited to, increasing sampling frequency, requiring analysis of additional parameters, increasing the frequency of inspections by the Qualified SWPPP Developer and Qualified SWPPP Practitioner, or implementation of recommendations by the Qualified SWPPP Developer and Qualified SWPPP Practitioner, pursuant to California Water Code § 13383.
- VII.C.** All Regional Water Board actions that modify requirements for compliance, pursuant to California Water Code §13383, with this General Permit shall be provided to the discharger in writing and submitted through SMARTS.
- VII.D.** Regional Water Boards may require dischargers to retain records required by this General Permit for more than the three years.
- VII.E.** Regional Water Boards may obtain site-specific data, records, or documentation demonstrating one or more numeric action level exceedances occurred at a site and may direct the discharger to revise their SWPPP and/or BMPs to address the exceedance.

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- VII.F.** Consistent with California Water Code §§13350(a) and/or 13376, Regional Water Boards finding a discharger in violation of a prohibition or requirement in this General Permit with the potential to discharge pollutants into the waters of the United States, may require a discharger to revise and re-submit the SWPPP, other required documents and/or implement additional BMPs to address site-specific conditions.
- VII.G.** Consistent with 40 Code of Federal Regulations §§ 122.26(a)(9)(i)(D) and 122.26(a)(9)(i)(C), a Regional Water Board may require any discharge of stormwater and non-stormwater from construction activity that is not regulated by this General Permit, and that may cause or contribute to an exceedance of a water quality standard, to obtain General Permit coverage.
- VII.H.** A Regional Water Board has the authority to require a Risk Level determination to be reassessed for a site currently regulated under this General Permit, or with an active waiver, as deemed necessary, including but not limited to the following circumstances:
1. The discharger has a demonstrated history of General Permit non-compliance with this General Permit or its predecessors;
 2. The subject construction site poses a significant risk of causing or contributing to an exceedance of a water quality standard without the implementation of the additional Risk Level 2 or 3 requirements; or
 3. The Regional Water Board staff have documented that the discharger Risk Level for the subject site is calculated incorrectly.

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FACT SHEET

**NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES)
GENERAL PERMIT FOR STORMWATER DISCHARGES ASSOCIATED
WITH CONSTRUCTION AND LAND DISTURBANCE ACTIVITIES
(GENERAL PERMIT)**

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EXHIBIT "C" (Stormwater Pollution Prevention Plan)

I. BACKGROUND

I.A. History

The Federal Water Pollution Control Act (also referred to as the Clean Water Act (CWA)) was amended in 1972 to provide that the discharge of pollutants to waters of the United States from any point source is unlawful unless the discharge complies with a National Pollutant Discharge Elimination System (NPDES) permit. The 1987 amendments to the Clean Water Act added § 402(p), which establishes a framework for regulating municipal and industrial stormwater discharges under the NPDES Program. The United States Environmental Protection Agency (U.S. EPA) published final regulations on November 16, 1990, establishing stormwater permit application requirements for specified categories of industries. The regulations provide that discharges of stormwater to waters of the United States from construction projects that encompass five or more acres of soil disturbance are effectively prohibited unless the discharge complies with a NPDES permit. Regulations (Phase II Rule) that became final on December 8, 1999, lowered the permitting threshold from five acres to one acre.

The State Water Resources Control Board (State Water Board) has elected to adopt only one statewide general permit at this time that will apply to most stormwater discharges associated with construction and land disturbance activity, although federal regulations allow two permitting options for stormwater discharges (individual permits and general permits).

The State Water Board reissued the Construction General Permit for Stormwater Discharges on September 2, 2009 (Water Quality Order 2009-0009-DWQ). The State Water Board adopted Order 2010-0014-DWQ on November 16, 2010, to clarify the signatory requirements. The State Water Board adopted Order 2012-0006-DWQ on July 17, 2012, to remove numeric effluent limitations outside of the use of active treatment systems. Water Quality Order 2009-0009-DWQ and the subsequent amendments are collectively referred to as the previous permit.

The General Permit accompanying this Fact Sheet regulates stormwater runoff from construction sites. Regulating many stormwater discharges under one general permit greatly reduces the administrative burden associated with permitting individual stormwater discharges. To obtain coverage under this General Permit, dischargers shall electronically certify and submit the Permit Registration Documents, which includes a Notice of Intent, Stormwater Pollution Prevention Plan (SWPPP), and other compliance related documents required by this General Permit and submit the appropriate permit fee to the State Water Board. The Regional Water Quality Control Boards (Regional Water Boards) may issue general permits or individual permits containing more specific provisions as the stormwater program develops and if this occurs, this General Permit will no longer regulate those dischargers.

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I.B. Legal Challenges and Court Decisions

I.B.1. Early Court Decisions

The U.S. EPA promulgated regulations exempting most stormwater discharges from the NPDES permit requirements shortly after the passage of the Clean Water Act. (See 40 Code of Federal Regulations § 125.4 (1975); see also *Natural Resources Defense Council v. Costle* (D.C. Cir. 1977) 568 F.2d 1369, 1372 (Costle); *Defenders of Wildlife v. Browner* (9th Cir. 1999) 191 F.3d 1159, 1163 (Defenders of Wildlife).) The District of Columbia Court of Appeals invalidated the regulation, holding that the U.S. EPA “does not have authority to exempt categories of point sources from the permit requirements of [CWA] § 402.” (*Costle*, 568 F.2d at 1377) when environmental groups challenged this exemption in federal court. The *Costle* court rejected the U.S. EPA argument that effluent-based storm sewer regulation was administratively infeasible because of the variable nature of stormwater pollution and the number of affected storm sewers throughout the country. (*Id.* at 1377-82.) Although the court acknowledged the practical problems relating to storm sewer regulation, the court found the U.S. EPA had the flexibility under the Clean Water Act to design regulations that would overcome these problems. (*Id.* at 1379-83.) In particular, the court pointed to general permits and permits based on requiring best management practices (BMPs).

During the next 15 years, the U.S. EPA made numerous attempts to reconcile the statutory requirement of point source regulation with the practical problem of regulating possibly millions of diverse point source discharges of stormwater. (See *Defenders of Wildlife*, 191 F.3d at 1163; see also Gallagher, Clean Water Act in Environmental Law Handbook (Sullivan, edit., 2003) p. 300 (Environmental Law Handbook); Eisen, Toward a Sustainable Urbanism: Lessons from Federal Regulation of Urban Stormwater Runoff (1995) 48 Wash. U.J. Urb. & Contemp. L.1, 40-41 [Regulation of Urban Stormwater Runoff].)

Congress amended the Clean Water Act in 1987 to require NPDES permits for stormwater discharges. (See Clean Water Act § 402(p), 33 USC § 1342(p); *Defenders of Wildlife*, 191 F.3d at 1163; *Natural Resources Defense Council v. U.S. EPA* (9th Cir. 1992) 966 F.2d 1292, 1296.) Congress distinguished between industrial and municipal stormwater discharges in these amendments enacted as part of the Water Quality Act of 1987. Congress provided that NPDES permits regarding industrial stormwater discharges “shall meet all applicable provisions of this section and section 1311 [requiring the U.S. EPA to establish effluent limitations under specific timetables].” (CWA § 402(p)(3)(A), 33 USC § 1342(p)(3)(A); see also *Defenders of Wildlife*, 191 F.3d at 1163-64.)

U.S. EPA adopted regulations in 1990 specifying the activities that were considered to be “industrial” and thus required discharges of stormwater associated with those activities to obtain coverage under NPDES permits. (55 Fed. Reg. 47,990 (1990); 40 Code of Federal Regulations § 122.26(b)(14).)

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Construction activities were originally deemed a subset of the industrial category. (40 Code of Federal Regulations § 122.26(b)(14)(x).) In 1999, U.S. EPA issued regulations for “Phase II” of stormwater regulation, which required most small construction sites (1-5 acres) to be regulated under the NPDES program. (64 Fed. Reg. 68,722; 40 Code of Federal Regulations § 122.26(b)(15)(i).)

I.B.2. Court Decisions on Public Participation

Two federal court opinions have vacated U.S. EPA’s rules that denied meaningful public review of NPDES permit conditions. The Ninth Circuit Court of Appeals on January 14, 2003, held that certain aspects of U.S. EPA’s Phase II regulations governing MS4s were invalid primarily because the general permit did not contain express requirements for public participation. (*Environmental Defense Center v. U.S. EPA* (9th Cir. 2003) 344 F.3d 832.) Specifically, the court determined that applications for general permit coverage (including the Notice of Intent and Stormwater Management Program) must be made available to the public, the applications must be reviewed and determined to meet the applicable standard by the permitting authority before coverage commences, and there must be a process to accommodate public hearings. (*Id.* at 852-54.) Similarly, the Second Circuit Court of Appeals on February 28, 2005, held that the U.S. EPA’s confined animal feeding operation rule violated the Clean Water Act because it allowed dischargers to write their own nutrient management plans without public review. (*Waterkeeper Alliance v. U.S. EPA* (2d Cir. 2005) 399 F.3d 486.) Although neither decision involved the issuance of construction stormwater permits, this General Permit addresses the courts’ rulings where feasible.¹

The Clean Water Act and the U.S. EPA regulations provide states with the discretion to formulate permit terms, including specifying best management practices (BMPs), to achieve strict compliance with federal technology-based and water quality-based standards. (*Natural Resources Defense Council v. U.S. EPA* (9th Cir. 1992) 966 F.2d 1292, 1308.) Accordingly, this General Permit has developed specific BMPs, numeric action levels, and Total Maximum Daily Load (TMDL)-derived numeric action level and numeric effluent limitations in order to

¹ In *Texas Independent Producers and Royalty Owners Assn. v. U.S. EPA* (7th Cir. 2005) 410 F.3d 964, the Seventh Circuit Court of Appeals held that the U.S. EPA’s Construction General Permit was not required to provide the public with the opportunity for a public hearing on the Notice of Intent or Stormwater Pollution Prevention Plan. The Seventh Circuit briefly discussed why it agreed with the Ninth Circuit’s dissent in *Environmental Defense Center*, but generally did not discuss the substantive holdings in *Environmental Defense Center* and *Waterkeeper Alliance*, because neither court addressed the initial question of whether the plaintiffs had standing to challenge the permits at issue. However, notwithstanding the Seventh Circuit’s decision, it is not binding or controlling on the State Water Board because California is located within the Ninth Circuit.

achieve these minimum federal standards. In addition, the General Permit requires a SWPPP to be developed following specified standards and measures in this General Permit for implementation. This General Permit ensures that the dischargers do not “write their own permits” through discharger-requirements to implement specific BMPs, numeric action levels, and numeric effluent limitations, and SWPPP performance standards and information. As a result, this General Permit does not require each discharger’s SWPPP to be reviewed and approved by the Regional Water Boards.

I.B.3. U.S. EPA Construction and Development Effluent Limitations Guidelines and New Source Performance Standards²

The U.S. EPA promulgated Effluent Limitation Guidelines and New Source Performance Standards on December 1, 2009, to control the discharge of pollutants from construction sites (See 74 Fed. Reg. 62996, and 40 Code of Federal Regulations § 450.21.). These requirements, known as the “Construction and Development Rule” became effective on February 1, 2010. Following the promulgation of the Construction and Development Rule in 2009, several parties filed petitions for review of the final rule, identifying potential deficiencies with the dataset that the U.S. EPA used to support its decision to adopt a numeric turbidity limitation as well as other issues. The U.S. EPA finalized amendments to the Construction and Development Rule on March 6, 2014, resulting in the removal of the numeric turbidity limitation and monitoring requirements and clarifying changes in the U.S. EPA’s 2017 and 2022 NPDES General Permit for Discharges from Construction Activity (Construction General Permit) (See 79 Fed. Reg. 12661 and 80 Fed. Reg. 25235) pursuant to a settlement agreement to resolve the litigation. The U.S. EPA 2022 Construction General Permit was adopted and went into effect on February 17, 2022.

a. Summary of Construction and Development Rule Requirements

The Construction and Development Rule requirements include effluent limitations that apply to all permitted discharges from construction sites (40 Code of Federal Regulations § 450.21) for six general categories: i.) Erosion and Sediment Controls, ii.) Soil Stabilization Requirements, iii.) Dewatering, iv.) Pollution Prevention Measures, v.) Prohibited Discharges, and vi.) Surface Outlets. The effluent limitations are structured to require construction operators to first, prevent the discharge of sediment and other pollutants using effective planning and erosion control measures; and second, control discharges that do occur using effective sediment control measures. Dischargers are required to implement a range of pollution control and prevention measures to limit or

² U.S. EPA, [Protection of Downstream Waters in Water Quality Standards: Frequently Asked Questions](https://www.epa.gov/sites/production/files/2018-10/documents/protection-downstream-wqs-faqs.pdf) (June 2014), <<https://www.epa.gov/sites/production/files/2018-10/documents/protection-downstream-wqs-faqs.pdf>> [as of May 20, 2021]

prevent discharges of pollutants, including those from stormwater and non-stormwater discharges. The narrative effluent limitations are designed to prevent or minimize exposure and mobilization of pollutants in stormwater discharge from: (1) sediment and sediment-bound pollutants such as metals and nutrients, (2) construction materials, debris, and other sources of pollutants on construction sites, dissolved construction pollutants, such as nutrients, organics, pesticides, herbicides, and metals, (4) natural pollutants present in construction site soil, such as arsenic or selenium, and (5) previous activities on the site such as agriculture or industrial activity. Source control through minimization of soil erosion is the most effective way of controlling the discharge of these pollutants because, once mobilized by rainfall and stormwater, pollutants can detach from the soil particles and become dissolved pollutants which are not removed by down-slope sediment controls.

b. Incorporation of Construction and Development Rule into this General Permit

This General Permit incorporates the necessary requirements to implement the 2014 Construction and Development Rule amendments. Information on how this General Permit incorporates the Construction and Development Rule is included below.

i. Erosion and Sediment Controls

This General Permit requires dischargers to design, install, and maintain effective erosion controls and sediment controls to minimize the discharge of pollutants through the development and implementation of a site-specific SWPPP and BMPs. The discharger's SWPPP is required to include the site-specific measures implemented to control all construction activity-related pollutants through temporary and permanent erosion and sediment control BMPs (Order, Section IV.O and Attachments D and E). Dischargers are required to implement channel protection and post construction controls to match the pre-construction hydrograph to ensure the minimization of project impacts to downstream channels and streambanks due to erosion and scour, temperature, and loss of ecological services (Attachments D and E). Dischargers are required to set back their construction activities from streams and wetlands unless infeasible to reduce the risk of impacting water quality (e.g., natural stream stability and habitat function). Although this General Permit does not mandate specific setbacks, these distances may be required as part of California Environmental Quality Act (CEQA) or the National Environmental Policy Act (NEPA), the Regional Water Board, municipal requirements, and/or other agencies such as the Department of Fish and Wildlife. The risk calculation and runoff reduction mechanisms in this General Permit are expected to facilitate compliance with any Regional Water Board, local resource agency, and/or California Environmental Quality Act (CEQA) or the National Environmental Policy Act (NEPA). The

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U.S. EPA has provided requirements for determining buffer size.³ These requirements may provide helpful guidance for sizing construction site buffers to limit the disturbance of creeks and natural drainage features. Attachments D and E require the discharger to minimize soil compaction when feasible in site areas where final vegetation will occur, or infiltration features will be installed. Dischargers are required to preserve native topsoil on-site when feasible, unless the intended function of a specific area of the site dictates that the topsoil be disturbed or removed. This General Permit encourages dischargers to keep the clearing and grading of native vegetation at the site at a minimum where areas are needed to build the project and to allow fire protection access. An example of an alternative practice to grading is mowing vegetation and leaving the subgrade root structure and soil intact. A guidance document⁴ was developed in 2016 providing techniques to address the challenges with site stabilization and climate change. Dischargers are encouraged to:

- 1) Plan upfront for site stabilization to occur in months with more moisture to lower the need of imported water to stabilize vegetation;
- 2) Minimize the disturbance of soil to decrease the length of time and cost of final site stabilization;
- 3) Maintain the soil health to control stormwater pollution and erosion through open pore soil structures which support long-term sustainable vegetative cover;⁵ and
- 4) Apply proper stockpiling practices to preserve soil biota and the native seed bank which reduces the need for fertilizer, seed, and water.⁶

3 U.S. EPA, 2022. [Construction General Permit, Appendix F – Buffer Requirements](https://www.epa.gov/system/files/documents/2022-01/2022-cgp-final-appendix-f-buffer-reqs.pdf) (2022). <https://www.epa.gov/system/files/documents/2022-01/2022-cgp-final-appendix-f-buffer-reqs.pdf> [as of July 19, 2022]

4 Construction General Permit (CGP) Training Team, [CGP Review Issue #3 for QSD and QSP Registration and Renewal, Insights for Better Stabilization](https://www.waterboards.ca.gov/water_issues/programs/stormwater/docs/training/cgp_review_issue3.pdf) (2016), <https://www.waterboards.ca.gov/water_issues/programs/stormwater/docs/training/cgp_review_issue3.pdf> [as of May 20, 2021]

5 Caltrans, [Erosion Control Toolbox](https://dot.ca.gov/programs/design/lap-erosion-control-design/tool-1-lap-erosion-control-toolbox) <<https://dot.ca.gov/programs/design/lap-erosion-control-design/tool-1-lap-erosion-control-toolbox>> [as of May 20, 2021]

6 The American Association of State Highway Officials, [Construction Practices for Environmental Stewardship Website](#), 2019. The American Association of State Highways Officials (AASHTO) includes best practices on stockpiling, including Section 4.11.1 on specific guidelines for preserving stockpiles in its online Environmental Stewardship Practices in Construction and Maintenance Compendium. AASHTO

ii. Soil Stabilization Requirements

This General Permit requires dischargers to implement soil stabilization BMPs whenever disturbance activities occur (e.g., clearing, grading, excavating, or other earth disturbing activities). Alternative stabilization measures must be employed as specified by Section III.H of this Order and Attachments D and E of this General Permit in arid, semiarid, and drought-stricken areas where initiating immediate vegetative stabilization measures is infeasible. Stabilization must be completed within a time period determined by the Regional Water Boards. Stabilization may not be required if the intended function of a specific area of the site necessitates that it remains disturbed in limited circumstances.

iii. Dewatering

This General Permit requires dischargers to implement BMPs to control the volume and velocity of dewatering discharges in Section IV.M of the Order. Dischargers are required to minimize the discharge of pollutants from dewatering trenches and excavations through the implementation of BMPs. Dischargers with dewatering activities subject to a separate NPDES, de minimis, or low threat discharger permit for dewatering activities are to obtain coverage through those permits issued by the State or Regional Water Board.

iv. Pollution Prevention Measures

Section IV.O of this Order requires that dischargers design, install, implement, and maintain effective pollution prevention measures to minimize the discharge of pollutants. The SWPPP requirements include the minimization of exposure of pollutants and discharge of pollutants from certain activities included in the Effluent Limitation Guidelines. This General Permit also incorporates specific TMDL requirements for construction stormwater sources to limit loading to impaired waterbodies.

v. Prohibited Discharges

This General Permit authorizes only stormwater and authorized non-stormwater discharges associated with construction activity when in compliance with all General Permit requirements, provisions, limitations, and prohibitions. Section IV.B of this Order prohibits discharges from the following categories:

recommends stockpiling for up to 6 months, but no longer than a year, and a maximum stockpile height of 4 feet.

<https://environment.transportation.org/wp-content/uploads/2021/04/25-254_FR.pdf>
[as of April 28, 2022]

- 1) Dischargers out of compliance with any applicable discharge prohibitions contained in applicable Basin Plans or statewide water quality control plans;
- 2) Discharges to Areas of Special Biological Significance (ASBS), unless granted an exception issued by the State Water Board;
- 3) All discharges to waters of the United States except for the stormwater and non-stormwater discharges specifically authorized by this General Permit or in a separate NPDES permit;
- 4) Debris and trash resulting from construction activities;
- 5) Wastewater from washout or clean out of areas, structures or equipment with concrete, grout, stucco, paint or other construction materials;
- 6) Form-release oils and curing compounds;
- 7) Fuels, oils, fluids, or other materials used in vehicle and equipment operation and maintenance;
- 8) Soaps, solvents, or detergents used in vehicle and equipment washing or external building wash-down; and
- 9) Toxic or hazardous substances from a spill or other release (e.g., asbestos, lead, mercury, or polychlorinated biphenyls (PCBs)).

vi. Surface Outlets

Attachment J of the General Permit authorizes specific construction dewatering discharges and requires the dewatering activity to utilize outlet structures that withdraw water from the surface of the sediment basin or similar impoundment, unless infeasible.

I.C. Healthy Soils and Recycled Water

I.C.1. Healthy Soils Initiative

The State of California launched the Healthy Soils Initiative in 2015, which is a collaboration of state agencies and departments to promote the stewardship of healthy soils. The California Environmental Protection Agency is a Healthy Soils Initiative partner. The initiative recognizes that healthy soils can increase water retention and infiltration, improve plant health, prevent erosion, reduce sediment and dust, sequester carbon to reduce greenhouse gas emissions, improve water quality, and improve biological diversity and wildlife habitat.⁷

⁷ California Department of Food and Agriculture, [California's Healthy Soils Initiative](https://www.cdffa.ca.gov/healthysouils/), <<https://www.cdffa.ca.gov/healthysouils/>> [as of May 20, 2021]

This General Permit encourages healthy soils practices through requirements in Attachments D and E of this General Permit, which require dischargers to preserve native topsoil and reduce compaction of soils. Using healthy soils practices will encourage vegetative growth, increase soil stabilization, and conserve water on construction sites.

I.C.2. Recycled Water Use

The State Water Board adopted the Water Quality Control Policy for Recycled Water (Recycled Water Policy) and the Staff Report with Substitute Environmental Documentation on December 11, 2018 and became effective on April 8, 2019. The Recycled Water Policy states, “When used in compliance with this Policy, California Code of Regulations, title 22 and all applicable state and federal water quality laws, the State Water Board finds that recycled water is safe for approved uses, and strongly supports recycled water as a safe alternative to fresh water or potable water for such approved uses.”⁸

This General Permit encourages the use of recycled water for appropriate application on construction sites, including irrigation of vegetation and dust control when used in compliance with the Recycled Water Policy, California Code of Regulations, title 22 and all applicable state and federal water quality laws.

I.D. Blue Ribbon Panel of Experts (Panel)

I.D.1. Introduction

The State Water Board convened an expert panel (panel) in 2005 and 2006 to address the feasibility of numeric effluent limitations in California’s stormwater permits. Specifically, the panel was asked to address the following:

Is it technically feasible to establish numeric effluent limitations, or some other quantifiable limit, for inclusion in stormwater permits? How would such limitations or criteria be established, and what information and data would be required?⁹

8 State Water Resources Control Board, [Water Quality Control Policy for Recycled Water](https://www.waterboards.ca.gov/board_decisions/adopted_orders/resolutions/2018/121118_7_final_amendment_oal.pdf) (December 11, 2018), <https://www.waterboards.ca.gov/board_decisions/adopted_orders/resolutions/2018/121118_7_final_amendment_oal.pdf> [as of April 28, 2022]

9 Storm Water Panel, [The Feasibility of Numeric Effluent Limits to Discharges of Storm Water Associated with Municipal, Industrial, and Construction Activities](https://www.waterboards.ca.gov/water_issues/programs/stormwater/docs/numeric/swpanel_final_report.pdf) (June 19, 2006), <https://www.waterboards.ca.gov/water_issues/programs/stormwater/docs/numeric/swpanel_final_report.pdf> [as of May 20, 2021]

I.D.2. The Panel observations:

- “Limited field studies indicate that traditional erosion and sediment controls are highly variable in performance, resulting in highly variable turbidity levels in the site discharge.”
- “Site-to-site variability in runoff turbidity from undeveloped sites can also be quite large in many areas of California, particularly in more arid regions with less natural vegetative cover and steep slopes.”
- “Active treatment technologies involving the use of polymers with relatively large storage systems now exist that can provide much more consistent and very low discharge turbidity. However, these technologies have to date only been applied to larger construction sites, generally five acres or greater. Furthermore, toxicity has been observed at some locations, although at the vast majority of sites, toxicity has not occurred. There is also the potential for an accidental large release of such chemicals with their use.”
- “To date most of the construction permits have focused on TSS and turbidity, but have not addressed other, potentially significant pollutants such as phosphorus and an assortment of chemicals used at construction sites.”
- “Currently, there is no required training or certification program for contractors, preparers of soil erosion and sediment control Stormwater Pollution Prevention Plans, or field inspectors.”
- “The quality of stormwater discharges from construction sites that effectively employ BMPs likely varies due to site conditions such as climate, soil, and topography.”
- “The States of Oregon and Washington have recently adopted similar concepts to the Action Levels described earlier.”

I.D.3. Panel Conclusions:

- “It is the consensus of the panel that active treatment technologies make Numeric Limits technically feasible for pollutants commonly associated with stormwater discharges from construction sites (e.g., TSS and turbidity) for larger construction sites. Technical practicalities and cost-effectiveness may make these technologies less feasible for smaller sites, including small drainages within a larger site, as these technologies have seen limited use at small construction sites. If chemical addition is not permitted, then Numeric Limits are not likely feasible.”
- “The Board should consider Numeric Limits or Action Levels for other pollutants of relevance to construction sites, but in particular pH. It is of particular concern where fresh concrete or wash water from cement mixers/equipment is exposed to stormwater.”

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- “The Board should consider the phased implementation of Numeric Limits and Action Levels, commensurate with the capacity of the dischargers and support industry to respond.”

I.D.4. The State Water Board Considerations:

The State Water Board carefully considered the findings of the Panel and related public comments in the development and adoption of the previous permit. The State Water Board also reviewed and considered the comments regarding statewide stormwater policy during the adoption of the Industrial General Permit. From the input received, the State Water Board identified some General Permit and program performance gaps that were addressed in the previous permit and were also adopted in this General Permit. The Summary of Significant Changes (below) in this General Permit align with the Panel’s process and findings, and build onto the previous permit.

I.E. Summary of Significant Changes in This General Permit

I.E.1. Significant Changes:

a. Implementation of Total Maximum Daily Loads (TMDL)

TMDLs are regulatory tools providing the maximum amount of a pollutant from potential sources in the watershed that a water body can receive while attaining water quality standards. A TMDL is defined as the sum of the allowable loads of a single pollutant from all contributing point sources (waste load allocations) and non-point sources (load allocations), plus the contribution from background sources. (40 Code of Federal Regulations § 130.2, subd. (i).)

Discharges covered by this General Permit are considered to be point source discharges, and therefore must comply with effluent limitations that are “consistent with the assumptions and requirements of any available waste load allocation for the discharge prepared by the State and approved by U.S. EPA pursuant to 40 Code of Federal Regulations section 130.7.” (40 Code of Federal Regulations § 122.44, subd. (d)(1)(vii).) In addition, Water Code § 13263, subdivision (a), requires that waste discharge requirements implement relevant water quality control plans. Many TMDLs in existing water quality control plans include both waste load allocation and implementation requirements.

Attachment H of this General Permit lists the watersheds with U.S. EPA-approved and U.S. EPA-established TMDLs that include TMDL requirements for discharges covered by this General Permit.

- Where waste load allocations are expressed at a value that is too low for laboratory methods listed in 40 Code of Federal Regulations Part 136 to detect and for pollutants that are sediment-bound, the Water Board has developed a soil screening investigation and total suspended solids numeric

effluent limitation for sediment-bound pollutants, presented in Attachment H Section I.G.5, to determine compliance.

b. Implementation of Statewide Trash Policy Requirements

The State Water Board adopted an amendment to the Water Quality Control Plan for Ocean Waters of California to Control Trash and Part 1 Trash Provisions of the Water Quality Control Plan for Inland Surface Waters, Enclosed Bays, and Estuaries of California (Resolution 2015-0019) in 2015. This Resolution establishes the statewide water quality objective and implementation plan to control trash.

This General Permit implements this Resolution by prohibiting the discharge of any debris and/or trash from construction sites.

c. Removal of Bioassessment Monitoring

The Bioassessment requirements in the previous permit were initially developed to align with a proposed State Water Board biological integrity policy, which is still under development.

The Bioassessment requirements in the previous permit were reviewed by State Water Board staff and it was determined the requirements were not consistently implemented and data was not generated. These requirements did not generate sufficient data regarding corresponding improvements to water quality or watershed health that would justify the cost of compliance.

The Bioassessment requirements were removed from this General Permit and replaced with acknowledgement to use the Risk Level 3 and linear underground and overhead project Type 3 sites annual fee surcharge to perform monitoring, sampling, and/or bioassessment monitoring through the Surface Water Ambient Monitoring Program (SWAMP) to determine the impacts of large, high-risk construction projects on water quality and watershed health. Future reissuances of this General Permit may include bioassessment or biological integrity requirements to implement specific water quality control plans or state policy for water quality control.

d. Passive Treatment Technologies

State Water Board staff collaborated with stakeholders and other Water Board staff to discuss the use of passive treatment chemicals and technologies throughout the life of the previous permit, and it was determined that many passive treatment chemical types are potentially toxic to fish and other aquatic organisms. Staff also considered and reviewed regulations regarding these

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technologies from U.S. EPA and several other jurisdictions.^{10,11,12} Cationic polyacrylamide-based flocculant products are acutely toxic to aquatic species in small quantities and are neurotoxins. Other flocculant products such as anionic polyacrylamide-based flocculants are chronically toxic to aquatic species in large quantities.

Staff additionally identified low-turbidity discharges from passive treatment chemical application sites do not always correspond to low levels of solids in the discharge and/or an improvement in water quality downstream because:

- i. Turbidity monitoring solely measures small size solids suspended in the water; turbidity monitoring does not measure particle size, weight, or bed load of sediment from flocculated solids leaving a site; and
- ii. Passive treatment chemicals discharged either by aerial deposition or via stormwater runoff contributes similar level of threat to aquatic life from toxicity.

This General Permit contains passive treatment provisions in Attachment G designed to provide the first set of regulations for construction activities use of passive treatment technologies and to align with the U.S. EPA's Construction General Permit requirements for treatment chemicals.

- e. Water Quality Control Plan for Ocean Waters of California (California Ocean Plan)

On March 20, 2012, the State Water Board adopted Resolution 2012-0012 (amended by Resolution 2012-0031) which contained a general exception to the California Ocean Plan for discharges of stormwater and non-point sources. This General Permit requires dischargers who discharge to Areas of Special Biological Significance (ASBS) who have been granted an exception to the California Ocean Plan to comply with requirements in Attachment I.

10 Toronto and Region Conservation, [Anionic Polyacrylamide Application Guide for Urban Construction in Ontario](#) (June 2013), <https://sustainabletechnologies.ca/app/uploads/2013/02/Polymer-Guide-Final_NewFormat.pdf> [as of May 20, 2021]

11 State of Washington Department of Ecology, [Emerging Stormwater Treatment Technologies \(TAPE\)](#) (2018), <<https://ecology.wa.gov/Regulations-Permits/Guidance-technical-assistance/Stormwater-permittee-guidance-resources/Emerging-stormwater-treatment-technologies>> [as of May 20, 2021]

12 U.S. EPA, [Support Document for the Third Six-Year Review of Drinking Water Regulations for Acrylamide and Epichlorohydrin](#) (December 2016), <<https://www.epa.gov/sites/production/files/2016-12/documents/810r16019.pdf>> [as of May 20, 2021]

f. Sufficiently Sensitive Test Methods

U.S. EPA has finalized minor amendments to its Clean Water Act regulations to codify that under the NPDES program, where U.S. EPA has promulgated or otherwise approved analytical methods under 40 Code of Federal Regulations Part 136, or 40 Code of Federal Regulations Chapter I, subchapters N and O, dischargers must use “sufficiently sensitive” analytical test methods. The purpose of the rulemaking was to clarify that NPDES permittees must use U.S. EPA approved analytical methods that are capable of detecting and measuring the pollutants at, or below, the applicable water quality criteria or permit limits.

This General Permit requires the use of sufficiently sensitive methods to meet the requirements of the amended Clean Water Act regulations described above and requires the discharger to ensure all laboratory analyses are sufficiently sensitive and conducted according to test procedures under 40 Code of Federal Regulations Part 136, including the observation of holding times, detection limits, and other measures designed to ensure quality assurance and quality control.

For any calculations required by this General Permit, a value of zero (0) will be assigned for all analytical results less than the minimum level as reported by the laboratory, so long as a sufficiently sensitive method was used (as evidenced by the reported method detection limit and minimum level which is also referred to as the reporting limit).

g. Notice of Non-Applicability

California Water Code § 13399.30 sets forth the authority for the Water Board to provide entities (referring to the person) a process for determining this General Permit does not apply to the entity’s activities through a Notice of Non-Applicability. The addition of the Notice of Non-Applicability provisions in this General Permit addresses the determination process and required information for construction sites situated in areas where stormwater discharges to waters that are not hydrologically connected to waters of the United States.

h. Sampling and Monitoring Requirements

Sampling and Monitoring requirements have changed in this General Permit as follows:

- i. The Qualified SWPPP Developer (QSD) and Qualified SWPPP Practitioner (QSP) have additional requirements to visit the site, conduct visual inspections, and assess site conditions;
- ii. The QSDs and QSPs are required to do on-site visual inspections at intervals that reflect potential changes to the construction site (e.g., start of construction, replacement of a QSD, twice yearly); and

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iii. Samples must be collected during precipitation events with 0.5”¹³ or more predicted within a 24-hour period. This is defined as a Qualifying Precipitation Event for sampling and inspection requirements. The stormwater can be water from rain, snow, or any other precipitation. Qualifying Precipitation Events continue on subsequent 24-hour periods that have precipitation of 0.25” or more forecast, and end with two consecutive 24-hour periods with less than 0.25” forecast.

i. Removal of Rain Event Action Plan

The previous permit designed the Rain Event Action Plan (REAP) to provide an on-site inspection checklist for dischargers to implement requirements prior to a precipitation event. This tool has been discussed over the last ten years internally and externally with stakeholders. This General Permit implements more action-based requirements in lieu of the reporting-based strategy embodied by the REAP. This General Permit replaces REAPS with 1) QSD involvement over the life of the project, 2) additional inspections and visual observations, and 3) an increased requirement to document and implement these site corrective actions.

j. Notice of Termination Process

The Notice of Termination requirements have been updated to include additional project-specific termination information to streamline the Regional Water Board review process. Given that the Notice of Terminations should now be submitted with the complete details to determine approval, this General Permit includes an automatic approval provision after 30 days if not otherwise under review or addressed by the Regional Water Board. This change is to expedite Notice of Termination approval and to reduce the risk of prolonged financial burdens on dischargers for continued on-site monitoring and annual fee payments.

k. Appendices 2 and 2.1 Post Construction Water Balance Calculator

The previous permit included post-construction performance standards requirements and information in Appendices 2 and 2.1. These specific appendices have been removed from this General Permit because these requirements and information are now in Stormwater Applications and Reports Tracking System (SMARTS) and are available for review through the public SMARTS portal. Additionally, Appendix 2 had requirements for post-construction maps contours. This requirement has been removed in this General Permit because this General Permit includes additional SWPPP map requirements and Notice of Termination map requirements. After adoption of

¹³ Xie, W., et. al. (2016). Models for Estimating Daily Rainfall Erosivity in China. Journal of Hydrology v. 535, p. 527-558.

this General Permit, the State Water Board may hold public or focused stakeholder meetings to discuss any necessary updates or changes to the post-construction water balance calculator in SMARTS. Some of this information will also be incorporated into online web-based maps, calculators, and/or visualizations as implementation guidance to the regulated community.

I.F. Cost Considerations

I.F.1. Passive Treatment Technology Provisions

The passive treatment technologies (passive treatment) requirements in this General Permit provide a regulatory pathway for dischargers to treat runoff for excess sediment without the use of an active treatment system while protecting water quality. The new passive treatment provisions were added due to requests from the regulated community, regulatory staff, and other stakeholders. The major components of the new Passive Treatment provisions that have expected cost components are: 1) consultant or discharger hours to develop and implement the Passive Treatment Plan, and 2) hours for Qualified SWPPP Developer (QSD) to implement the Passive Treatment Plan and monitor passive treatment application and use.

- a. Hours for consultants and/or dischargers to develop and implement the Passive Treatment Plan.

The passive treatment technologies in Attachment G requires the development of the Passive Treatment Plan. The costs associated with development and execution of the Passive Treatment Plan are in labor hours, training, collection of manufacturer information and potential hazards to the environment, and research on site-specific implementation of the Attachment G requirements. These costs, based on an hourly QSD billing rate of \$80 to \$120, are estimated at \$3,000 to \$5,000.

- b. QSD hours to implement Passive Treatment Plan and monitor site-specific passive treatment application and use, including post-event sampling.

A QSD is needed to develop and implement the Passive Treatment Plan and will require office and field hours for that individual. This is often a contracting cost to a consultant from the discharger or payment of QSD-staff hours for the discharger's organization. This cost will be highly variable, depending on the amount and duration of exposed soil conditions and the number of precipitation events that produce discharge from a site. The range is therefore estimated at \$2,500 to \$6,500 per year for the QSD and \$500 to \$1,250 in laboratory analysis costs.

I.F.2. Training

The reissuance of this General Permit requires updates to the QSD and QSP training program first introduced in the previous permit. Additional and revised

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training for all parties implementing this General Permit have been identified since 2009 and incorporated into this reissuance. Specific training needs to include: 1) Qualified SWPPP Developers (QSDs) and Qualified SWPPP Practitioners (QSPs) revised roles on the site, 2) training for passive treatment and TMDL implementation, and 3) statewide re-test and/or re-certification of Qualified SWPPP Developers, Qualified SWPPP Practitioners, and Trainers of Record.

a. QSD and QSP revised site roles

The Order and Attachments D and E require more involvement by the QSD and QSP, which is a potential increase in cost to the discharger as these are often contracted positions. Additional duties for the QSD under this permit include required field inspections and post-storm monitoring of passive treatment systems. On average, these duties should require 5 to 7 additional field days per year, at an estimated cost of \$4,000 to \$6,000, and up to two additional office days per year, at an estimated cost of \$1,600. The revised roles for the QSP are expected to result in discharger savings, particularly since the increased QSD inspections may reduce QSP field time.

b. Additional training needed for passive treatment and TMDL implementation.

QSD and QSP personnel will need additional training to come up to speed on the new provisions of this General Permit. New requirements such as passive treatment and TMDL implementation will extend training content and create a learning curve for QSDs and QSPs trained under the previous permit. A four-hour refresher-level course would provide adequate additional training on these subjects, at an estimated cost of \$200 to \$250 for the training and \$150 to \$225 for the employee's time.

c. Potential statewide re-test and re-certification

If the Construction General Permit Training Team determines that all QSD/QSPs need to be re-tested or somehow re-certify their knowledge, this could incur costs to the state as well as to the dischargers for time spent. Assuming that any such re-testing and re-certification would be an online process, the additional cost would amount to two or three hours of employee time, or up to \$125.

I.F.3. Cost Variability

The State Water Board recognizes that there is high variability in cost across all construction projects. Cost variability relates to many factors including: 1) short term vs. long term projects, 2) risk level of the project, and 3) construction season/schedule. Below is a discussion of these variables and their impact on overall cost for implementation of the General Permit.

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a. Short-term vs. long-term projects

Costs associated with the Construction General Permit are already variable due to the ephemeral nature of construction projects and the variation in size and site conditions. Short-term projects that can be completed during dry periods will incur minimal or no additional costs between permits, with expenditures still proportional to size. Projects that span one or more wet periods with more difficult erosion and sediment control issues, or sites that are in a TMDL watershed, will likely have more costs. This can be mostly attributed to increased QSD oversight and additional sampling and analysis requirements.

b. Risk dependent

The project risk calculation creates great variability in BMP cost, ranging from as little as 0.5 percent of the project total for Risk Level 1 site to four percent of the project total for Risk Level 3 sites. Higher risk sites will have more costs associated with BMPs, potential use of passive treatment, active treatment, increased monitoring requirements, and costs associated with discharging to high-risk receiving waters.

c. Construction activity season and schedule

The General Permit implementation costs are minimized for construction projects that use scheduling as a primary BMP and that schedule construction outside of time periods with likely precipitation events. The requirement for advanced BMPs is reduced, including cost associated with treatment (passive or active) if there is no water on-site. Sampling and analysis costs will be non-existent if no discharge occurs.

I.F.4. Savings

This General Permit includes several cost saving areas. After the previous permit, the State Water Board analyzed the provisions that were clear and enforceable, resulted in valuable data collection, and improved water quality. Changes were made to the previous permit to address areas that were not providing valuable data or improving water quality, including: 1) removal of the Rain Event Action Plan (REAP), 2) revised monitoring and sampling frequency, 3) clarifying the allowance of an inactive project status, 4) improved efficiency for reporting and data collection in SMARTS, 5) programmatic permitting for linear underground and overhead projects, and 6) including a 30-day automatic Notice of Termination approval unless notified by the Regional Water Board that the Notice of Termination is denied, returned, or accepted for review.

a. Rain Event Action Plan removal

The development and implementation of the Rain Event Action Plan in the previous permit resulted in minimal data and un-documented improvements in water quality. The removal of this requirement will save the discharger time and

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money, estimated at \$2,500 to \$3,500 per year in report preparation and \$350 to \$500 for labor.

b. Revised monitoring frequency

This General Permit includes a revised monitoring frequency that aligns with real-time site conditions and focuses on the implementation of BMPs and inspections. These requirements still ensure representative sampling and monitoring are conducted and includes BMP evaluations after numeric action level exceedances. For a one-year project duration, the savings are estimated at \$1,750 to \$2,000.

c. Inactive project status

Cost savings for sites to reduce monitoring and inspections during periods of inactivity. The savings come from fewer SWPPP implementation and monitoring hours for consultants and site personnel.

d. Annual Report, SMARTS, and implementation tools

The Annual Report is being redesigned to reduce the number of additional uploads and completion time for the discharger. When feasible, screens will be enhanced to streamline system use and staff is working on implementation tools outside of SMARTS (e.g., web-based maps).

e. Programmatic permitting for linear underground and overhead projects

Allowing linear underground and overhead projects to certify and submit one Notice of Intent for projects that have similar construction activity scopes and are located within one Regional Water Board office boundary will save time and money in application processes, changes of information, and initial inspections.

I.G. Incorporation of Total Maximum Daily Load (TMDL) Requirements and Cost

I.G.1. Introduction

This General Permit's TMDL requirements provide a consistent implementation approach for TMDLs with similar pollutants and waste load allocations, streamlining the process for construction projects to achieve compliance. Responsible Dischargers are required to implement applicable TMDL waste load allocations through the following TMDL-specific requirements developed for this General Permit: compliance with this General Permit, Revised Universal Soil Loss Equation, Version 2, (RUSLE2) modeling, numeric action levels, and/or numeric effluent limitations. This consistency between TMDLs provides cost-efficient implementation for Responsible Dischargers in achieving compliance with applicable TMDL requirements. The discussion below is to provide:

- a. An overview of TMDL implementation where the State Water Board has provided cost-efficiencies;

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- b. General information on TMDL pollutant categories and estimated compliance costs associated with TMDL requirements for Responsible Dischargers;
- c. Examples of appropriate existing BMPs; and
- d. General costs (high, medium, low) for potential TMDL-pollutant BMP categories.

I.G.2. Using this General Permit's Implementation Framework

Costs are site-specific and vary depending on multiple factors described categorically in Section I.F.3 above. This general information is provided to frame the cost considerations for Responsible Dischargers implementing applicable TMDL waste load allocation requirements. The incorporation of TMDL requirements into this General Permit allows for the use of its monitoring and reporting framework to avoid, where possible to meet the TMDL requirements, incurring additional costs associated with TMDL implementation (e.g., additional and separate reports for numeric action level and numeric effluent limitation exceedances, unique monitoring and sampling requirements specific to TMDLs).

- a. The TMDL implementation requirements in this General Permit rely on Responsible Dischargers to complete a thorough pollutant source assessment for the entire duration of their construction project, which shall be included within their SWPPP. Only Responsible Dischargers that identify on-site sources of pollutants associated with an applicable TMDL, as listed in Attachment H, are required to comply with additional TMDL requirements. This provision takes into consideration construction site pollutant source variability and reduces the implementation burden to implement TMDL requirements for pollutants that are not present on their site from construction activities. The additional cost for a TMDL-level pollutant source assessment is estimated at \$1,000 to \$1,250, including additional field time and SWPPP preparation. Dischargers complying with the alternative approach described in Section I.W.6.g.vi of this Fact Sheet may incur additional costs related to the soil screening required as part of the pollutant source assessment. The soil screening cost is estimated at \$200 per sample.
- b. Twenty-nine (29) of the TMDL waste load allocations have been translated to require compliance with this General Permit, without imposing additional RUSLE2 modeling, numeric action levels, or numeric effluent limitations.
- c. Ninety-three (93) TMDL waste load allocations were translated to require using RUSLE2 modeling to demonstrate a construction site's annual soil loss will not deliver more sediment to a water body than pre-construction conditions. This translation was derived in consideration of costs for TMDLs with mass-based waste load allocations, rather than imposing TMDL-specific monitoring requirements for pollutants that are associated with sediment discharges.

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- d. Sixty-two (62) of the TMDL waste load allocations have been translated to require numeric action levels, to consistently implement the General Permit's framework using numeric action levels compliance and reporting. Responsible Dischargers are required to follow the same stormwater management requirements for both TMDL-related and non-TMDL-related numeric action level exceedances in this General Permit. TMDLs with concentration-based waste load allocations to be met in receiving waters, are translated into numeric action levels to be met at the construction site discharge location(s), to avoid costly and often infeasible receiving water monitoring.
- e. Twenty-one (21) TMDL waste load allocations have been translated to impose numeric effluent limitations for pollutants, with required assessments and monitoring consistent with the regulatory framework of this General Permit. However, Responsible Dischargers will follow the water quality based corrective action process in this General Permit and perform the required actions for TMDL-related numeric effluent limitation exceedances instead of a numeric effluent limitation violation report required for non-TMDL numeric effluent limitations. A Responsible Discharger that exceeds a TMDL-related numeric effluent limitation is in violation of this General Permit and may be subject to mandatory minimum penalties, whereas numeric action level exceedances are not violations of this General Permit. Only applicable TMDLs with concentration-based waste load allocations, to be met at the construction site discharge location(s), were translated into numeric effluent limitations.

I.G.3. TMDL-related Numeric Action Level and Numeric Effluent Limitation Exceedances

The incorporation of TMDL implementation requirements may represent an increase in the cost of compliance for certain Responsible Dischargers. The following conditions must occur for a Responsible Discharger to exceed an applicable TMDL-related numeric action level or numeric effluent limitation:

Condition 1: The discharger discharges stormwater and authorized non-stormwater, either directly or through a municipal separate sewer system or other conveyance, to impaired water bodies or watersheds identified in a U.S. EPA-approved TMDL that assigns a concentration-based waste load allocation to construction stormwater discharges. Concentration-based waste load allocations are translated into numeric effluent limitations or numeric action levels and are listed in Attachment H, Table H-2.

Condition 2: The discharger identifies through the site-specific pollutant source assessment that one or more TMDL-specific pollutants are present at the site with the potential to enter discharge.

If the above conditions occur, the discharger is considered a Responsible Discharger for a TMDL, and subject to TMDL-related numeric action levels or numeric effluent limitations.

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Condition 3: The Responsible Discharger triggers the non-visible sampling requirements for the TMDL-specific pollutant when the pollutants may be discharged due to failure to implement BMPs, a container spill or leak, or a BMP breach, failure, or malfunction.

If the spill or leak, or BMP breach, failure or malfunction are immediately cleaned up and BMPs to control the pollutant were implemented, maintained, or replaced prior to the discharge, the Responsible Discharger is not required to sample its discharge.

Condition 4: The discharger conducts non-visible sampling in accordance with Attachment D, Section III.D.3, and Attachment E, Section III.D.3 and the analytical results report a concentration for the TMDL-specific pollutant above the applicable TMDL-related numeric action level or numeric effluent limitation listed in Attachment H, Table H-2.

Condition 5: Conditions 3 and 4 occur at least twice for any and all discharge locations within the same drainage area, during a given reporting year (July 1 through June 30). Each of the discharger's subsequent analytical results reporting a concentration above the TMDL-related numeric action level or numeric effluent limitation, after the second occurrence, is considered a distinct exceedance.

A Responsible Discharger violates a TMDL-related numeric effluent limitation only after all the above conditions occur. Responsible Dischargers that exceeded a TMDL-related numeric effluent limitation or numeric action level will continue to implement iterative corrective actions and BMP implementation to prevent further exceedances. Dischargers that do not take corrective actions following an exceedance are in violation of this General Permit.

I.G.4. Availability of Implementation Tools

The State Water Board recognizes the need to provide Responsible Dischargers tools and information to navigate the applicability of TMDL requirements, determine the spatial location of the requirements, and provide support for compliance analyses. To reduce the Responsible Discharger's cost of complying with the TMDL requirements, state-developed tools to assist in the implementation of and compliance with the TMDL requirements will be made free and publicly available. These include a TMDL applicability flowchart, a GIS-based TMDL applicability map, and additional implementation guidance and training for potential compliance methods.

I.G.5. TMDL Pollutant Categories

This General Permit implements a number of TMDLs separated into the following seven TMDL pollutant categories:

- a. Bacteria
- b. Chloride and salts

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- c. Diazinon
- d. Nutrients
- e. Sediment
- f. Temperature
- g. Metals and Toxics

Attachment H, Table H-2 of this General Permit lists all TMDLs applicable to Responsible Dischargers. For each TMDL, Table 2 cross-references one or more of the pollutant categories above.

a. Bacteria^{14,15}

Sources of bacteria and other pathogens in watersheds include, but are not limited to, animal excrement (from stormwater infrastructure and animals) and sanitary sewer overflows of human excrement. Major contributors from construction sites may include wild or tamed animals on the premises, waste handling, portable toilets, and contaminants in erodible materials. This Fact Sheet contains supportive information referenced from the bacteria TMDLs that construction stormwater dischargers are not a significant source of bacteria and therefore would meet the waste load allocations.

The bacteria TMDLs in Attachment H require the implementation of existing minimum BMPs to control stormwater exposure to bacteria sources, thus compliance with these TMDLs is not expected to result in significant additional costs.

b. Chloride and Salts¹⁶

Salts such as boron, calcium chloride (CaCl), magnesium chloride (MgCl), sodium chloride (NaCl), and sulphate can accumulate in soils within the watershed. Three TMDLs in Attachment H identify construction stormwater

14 Los Angeles Regional Water Board, [Ballona Creek, Estuary, and Tributary Bacteria TMDL](#) (June 7, 2012), <https://www.waterboards.ca.gov/losangeles/water_issues/programs/tmdl/docs/R12-008_RB_BPA.pdf> [as of May 20, 2021]

15 CASQA, [Construction BMP Handbook](#) (January 2015), <https://www.casqa.org/sites/default/files/casqa-handbook-construction/master_hanbook_file_2015_sec.pdf> [as of May 20, 2021] (CASQA Construction BMP Handbook)

16 Los Angeles Regional Water Board, [Calleguas Creek Watershed Salts TMDL](#) (October 4, 2007), <https://www.waterboards.ca.gov/losangeles/water_issues/programs/tmdl/docs/2007-016_RB_BPA.pdf> [as of May 20, 2021]

dischargers as potential sources of chloride and salts. For two of the three TMDLs, compliance with this General Permit was sufficient to meet the assigned waste load allocations, thus not imposing any TMDL-specific costs on the Responsible Dischargers. However, the Upper Santa Clara River TMDL for chloride assigned a concentration-based waste load allocation, which was translated into a numeric action level. As a result, Responsible Dischargers for the Upper Santa Clara River Chloride TMDL can expect a medium to low-cost impact.

Responsible Dischargers in the Upper Santa Clara River watershed (Region 4) may be required to conduct non-visible pollutant monitoring to analyze for boron, chloride, sulfate, and total dissolved solids as part of the TMDL implementation requirements. The estimated additional cost of the non-visible pollutant monitoring for the Upper Santa Clara River TMDL would be approximately \$200-\$400 for sampling and \$150-\$250 for analysis and SMARTS data entry, per sampled discharge location per event.

c. Diazinon¹⁷

Diazinon is an organophosphate pesticide that does not sorb to sediment but is instead mobilized through soils by dissolving in water. Stormwater runoff can come into contact with areas where diazinon was applied and transport the pollutant into the watershed. Although diazinon was once used in both agricultural and urban settings, it has since been banned for non-agricultural uses by the California Department of Pesticide Regulations. Because this General Permit requires all dischargers to perform a pollutant source assessment, and diazinon is banned for non-agricultural uses, compliance with the diazinon TMDL requirements is not expected to incur additional costs.

d. Nutrients^{18,19}

Nutrients (e.g., ammonia, nitrogen compounds, and phosphorous) can be found in stormwater runoff from construction sites, industrial areas, and urban areas. Sources of nutrients from construction sites may include background

17 San Diego Regional Water Quality Control Board, [Chollas Creek Diazinon Total Maximum Daily Load](https://www.waterboards.ca.gov/sandiego/water_issues/programs/tmdls/chollascreek/diazinon.html) (August 14, 2002)
<https://www.waterboards.ca.gov/sandiego/water_issues/programs/tmdls/chollascreek/diazinon.html> [as of May 20, 2021]

18 United States EPA Region IX, [Los Angeles Area Lakes Total Maximum Daily Loads for Nitrogen, Phosphorus, Mercury, Trash, Organochlorine Pesticides and PCBs](https://www.waterboards.ca.gov/losangeles/water_issues/programs/tmdl/Established/Lakes/LALakesTMDLEntireDocument.pdf) (March 26, 2012),
<https://www.waterboards.ca.gov/losangeles/water_issues/programs/tmdl/Established/Lakes/LALakesTMDLEntireDocument.pdf> [as of May 20, 2021]

19 CASQA Construction BMP Handbook, p. 1-7.

concentrations, storage and application of fertilizers, and discharges of nutrient-rich sediments. Most of the nutrient TMDLs in Attachment H require that dischargers comply with waste load allocations by meeting the translated numeric action levels or numeric effluent limitations, while one TMDL relies on RUSLE2 modeling. The compliance cost impact for implementation of the nutrient TMDLs is expected to be medium to high since additional BMPs (filter media BMPs for phosphorus and advanced BMPs for nitrogen) and monitoring may be required for controlling the specific nutrient concentrations from construction sites.

The RUSLE2 modeling used to demonstrate compliance with the San Diego Creek and Newport Bay Nutrients TMDL in Region 8 is estimated to add \$750 to \$1,500 in costs, per project.

If non-visible pollutant monitoring is required, Responsible Dischargers in some watersheds located in Regions 3, 4 and 8 (Central Coast, Los Angeles Basin and Santa Ana), as specified in Attachment H, shall conduct analyses for the TMDL-specific pollutant(s) such as total nitrogen, ammonia, nitrates, nitrites, phosphorous, and orthophosphates. The estimated additional cost of the TMDL monitoring would be approximately \$200-\$400 for sampling and \$200-\$400 for analysis and SMARTS data entry, per sampled discharge location per event.

The May 2021 draft of the Construction Stormwater General Permit, issued for public comments, proposed translations of nitrogen-based nutrient waste load allocations into numeric effluent limitations. The translation of the nitrogen-based nutrient waste load allocations was revised to numeric action levels in this General Permit per the following explanation that numeric action levels are consistent with the assumptions and requirements of the waste load allocations.

All applicable TMDLs with nitrogen-based nutrient waste load allocations discuss low flow as the critical condition for the receiving water impairment. Unlike general urban runoff that occurs year-round, construction stormwater discharges only occur as a result of precipitation events; discharges from construction sites do not typically occur during low flow receiving water conditions. A numeric action level is a more appropriate limitation to implement a TMDL primarily concerned with dry weather discharges. Further, each TMDL discusses municipal wastewater treatment plants as a principal source of nutrient loading. Although stormwater is identified as a potential source, the TMDL did not calculate a source-specific waste load allocation and instead used the water quality objective as the waste load allocation for nutrients. Although the TMDLs sets the compliance location at the point of discharge, because of how the waste load allocation was calculated, the waste load allocations are similar to TMDLs where the compliance point is set at the receiving water. As set forth in Section I.D.3, this General Permit translated

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concentration-based waste load allocations to be met in receiving waters into numeric action levels.

The State Water Board has very few nitrogen-based nutrient sampling results from construction stormwater because the previous permit did not require sampling for nutrients. However, nutrient data is available from required monitoring in the Industrial Stormwater General Permit. An analysis of all stormwater data from implementation of the Industrial Stormwater General Permit from 2015 – 2021 shows that of collected nutrients samples, approximately 95 percent of nitrate-plus-nitrite samples (as nitrogen), and 92 percent of ammonia samples had concentration results were lower than numeric action levels listed in this General Permit. The average sampling results, 0.68 mg/L for nitrate-plus-nitrite and 2.16 mg/L for ammonia, were below the numeric action levels in the Industrial Stormwater General Permit. Both observed average sampling results are a fraction of the action levels in this General Permit. The sampling results available through the implementation of the statewide Industrial Stormwater General Permit include stormwater discharge data from industrial facilities, such as fertilizer manufacturers, with significant potential sources of nutrients. In contrast, sources of nutrients from construction sites are generally limited to existing legacy concentrations in the sediment from past land uses that involved application of fertilizers, pesticides, and herbicides, and storage facilities that store the chemicals. Accordingly, it is generally expected that construction stormwater discharges will not exceed the waste load allocations and numeric action levels are appropriate.

Numeric action levels are consistent with the TMDLs and protective of water quality. All dischargers are required to implement sediment control BMPs and eliminate or minimize site erosion. If the Discharger exceeds the numeric action level, as set forth in Attachment H, Section I.D.3.e, the discharger must report and respond to a numeric action level exceedances. As described in Attachment D and E, Section III.G, when there is an exceedance of a numeric action level, dischargers must determine the source of the pollutant, implement corrective actions to reduce or prevent further exceedances and implement iterative corrective actions until the discharge is in compliance with the action level. Within 14 calendar days of an exceedance, a QSD and QSP must perform on-site visual inspections and the QSP must document any areas of concern (Order, Section V.C.3 & V.D.4). For example, if the construction activities include the application or storage of fertilizers, pesticides, and herbicides, exposure of those products to stormwater must be prevented or minimized. Corrective actions may also include implementing BMPs that eliminate stormwater discharges, BMPs with filter media, or other sediment control BMPs. The Regional Water Boards may require additional monitoring, reporting, and BMP requirements upon obtaining site-specific information about an exceedance to a numeric action level (Attachment H, Section I.D.3.f). The

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State Water Board expects that dischargers can feasibly comply with the nitrogen numeric action levels in this General Permit without the need to implement more advanced BMPs, which as discussed below are not typically possible to install at construction sites.

The most effective BMPs for removal of nitrogen-based nutrients through denitrification, biofiltration, or bioretention are advanced structural treatment BMPs that are used at permanent sites, not temporary construction sites. Denitrification, the process by which nitrates are reduced to gaseous nitrogen by facultative microbes under anaerobic conditions, is often employed at wastewater treatment plants with numeric effluent limitations for ammonia and/or nitrates. Biofiltration BMPs capture and treat stormwater runoff using conditioned soil beds for planting vegetation and establishing microbial communities to filter out pollutants. Denitrifying treatment and bioretention BMPs requires the retention of all the construction site's stormwater. Sites would need adequate space to accommodate the proper sizing and design of such treatment BMPs to effectively remove nutrients. Construction sites often have limited available area, and the larger the site, the more area is needed for treatment BMPs. Construction of permanent BMPs is not typically compatible with construction stormwater management, as site conditions are inherently transient during the term of the construction, and the nutrient removal BMPs would only be needed during land disturbance activities.

Biofiltration basins require established vegetation to efficiently remove nutrients. The vegetation in a biofiltration basin typically needs, at minimum, several growing seasons, (at minimum several months under ideal weather and soil conditions, up through several years under non-supportive growing conditions), for the vegetation to establish itself and provide effective treatment for nutrient removal. Most construction projects are active for a short duration with insufficient time to establish a vegetative biofiltration process that effectively removes nutrients. Although biofiltration is a commonly used post-construction BMP, its utility during construction is limited due to the inability to move biofiltration BMPs; additionally, biofiltration BMPs are designed specifically to treat a defined stormwater discharge quality under specific site conditions. Biofiltration BMPs are expensive, generally costing tens-of-thousands of dollars in addition to the cost of retention of the site's stormwater. Due to the time period needed to design and establish effective treatment, the long-term nature of treatment implementation, and the relative cost, biofiltration BMPs are not well-suited for construction sites that are temporary in nature.

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e. Sediment ²⁰

Excess sediment delivery to stream channels can be a pollutant and is associated with several natural processes as well as anthropogenic sources. Sediment can transport other pollutants that attach to it, including nutrients, trace metals, and organic compounds. Sediment is the primary component of turbidity, the most common sediment water quality analytical parameter used in this General Permit. Anthropogenic construction sources include, but are not limited to, track in and out from earth moving equipment, unpaved access road-related erosion (e.g., construction and maintenance of paved and unpaved roadways), dust, and soil/earth disturbing activities. All Responsible Dischargers are required to comply with the existing requirements of this General Permit, including the turbidity numeric action levels, associated exceedance actions, and the sediment TMDLs incorporated into this General Permit. However, many of the sediment TMDLs will also require additional RUSLE2 modeling to demonstrate compliance with the assigned waste load allocations. Responsible Dischargers for the Los Peñasquitos Lagoon Sediment TMDL are required to submit an estimate of the representative flow rate from their construction site for one precipitation event, each reporting period. Although imposing these additional requirements is expected to result in a low to medium cost impact for Dischargers, they were considered a more cost-effective approach than other means of complying with the TMDL such as TMDL-specific monitoring.

The cost of a runoff flow rate assessment varies by methodology and the method is often determined by the availability of input data. A relatively simple equation such as the Rational Method would require an hour or less for a QSD to calculate. The more complex and accurate National Resources Conservation Service method may require a site visit or extensive internet research and take two to six hours to complete. This translates to a cost range of \$100 to \$600, based on an average billable rate of \$100 per hour for QSDs.

In addition to the regular numeric action level sediment monitoring required by the permit, Responsible Dischargers in some watersheds located in Region 1, as specified in Attachment H, shall conduct RUSLE2 to demonstrate compliance with the waste load allocations. The estimated additional cost of the RUSLE2 calculation requirement will add \$750 to \$1,500 to each project in these Regions.

²⁰ California Stormwater Quality Association (CASQA) Construction BMP Handbook, p. 1-7.

f. Temperature²¹

This General Permit includes seven temperature TMDLs, all of which are located in the North Coast Regional Water Quality Control Board's jurisdiction. The removal of riparian vegetation from road building and urbanization construction are amongst the sources observed to increase Northern California stream temperatures, which can negatively impact juvenile salmonids. Excessive sediment input also raises stream temperature by widening stream channels, filling pools, and eliminating riparian vegetation during flood events. Responsible Dischargers are required to comply with the requirements of this General Permit in order to achieve the applicable waste load allocations in the North Coast Temperature Implementation Policy. Compliance with these TMDLs is not expected to result in additional costs.

g. Metals and Toxics²²

Metals (e.g., aluminum, cadmium, chromium, copper, lead, mercury, nickel, and zinc) and selenium can be found in construction stormwater discharges and are potentially toxic to aquatic life. Many of the equipment and materials used in the built environment (e.g., pipes, rebar, conductors, galvanized metal, paint, vehicles, preserved wood, tires, and vehicle brakes) contain metals, which enter stormwater as the surfaces corrode, decay, dissolve, flake, leach, or rust.

Toxic, synthetic organic compounds (e.g., adhesives, cleaners, herbicides, polycyclic aromatic hydrocarbons (PAHs), polychlorinated biphenyls (PCBs), pesticides, sealants, solvents) may be found in low concentrations but can still be toxic to aquatic life. Sources of synthetic organic compounds at construction sites include, but are not limited to, exposure of the compounds to stormwater during use and/or storage, improper disposal, and accidental release into storm drains or off-site.

The primary transport mechanism for metals and toxics is the mobilization and discharge of fine sediment through stormwater. Metals and organic compounds have an affinity for other organic substances and will partition from water and sorb to sediment. For this reason, it was appropriate to translate mass-based waste load allocations into requiring additional RUSLE2 modeling to estimate sediment delivery from a construction site into a watershed. Using RUSLE2 to

21 United States Environmental Protection Agency Region IX, [Final Upper Main Eel River and Tributaries \(including Tomki Creek, Outlet Creek and Lake Pillsbury\) Total Maximum Daily Loads for Temperature and Sediment](#) (December 29, 2004)

<https://www.waterboards.ca.gov/northcoast/water_issues/programs/tmdls/eel_river_upper_main/pdf/uer-tmdl-final-12-28.pdf> [as of May 20, 2021]

22 CASQA Construction BMP Handbook, p. 1-7.

demonstrate compliance with the waste load allocations avoids cost impacts associated with monitoring for toxic and metal pollutants.

However, a number of the metal and toxics TMDLs are assigned concentration-based waste load allocations, which were translated into numeric action levels or numeric effluent limitations. Many dischargers are not currently implementing BMPs designed to minimize concentrations for metals and toxics, but many Responsible Dischargers will need to implement BMPs designed to comply with the TMDL requirements. The compliance cost impact for the metal and toxics TMDL implementation is expected to be similar to that for normal sediment removal unless site-specific advanced BMPs and additional monitoring are required to comply with the requirements of these TMDLs. In the latter case, more advanced systems such as bioretention ponds, active treatment systems, or membrane filtration structures will likely have costs in the tens of thousands of dollars.

If non-visible pollutant monitoring is required, Responsible Dischargers in some watersheds located in Regions 4, 8 and 9 (Los Angeles Basin, Santa Ana, San Diego), as specified in Attachment H, would have to conduct TMDL analyses for metals and toxics listed for the individual watersheds. These pollutants may include copper, lead, zinc, mercury, nickel, cadmium, chromium and selenium, and toxics in the form of organochlorine pesticides, polychlorinated biphenyls (PCB), and polycyclic aromatic hydrocarbons (PAH). The estimated additional cost of this TMDL monitoring would be approximately \$200-\$400 for sampling and \$525-\$750 for analysis and SMARTS data entry, per sampling location per event. For the Los Angeles Area Lakes TMDL, the waste load allocations for organochlorine pesticides and PCBs are below the analytical reporting limits. Additionally, the Los Angeles and Long Beach Harbor Waters TMDL waste load allocations for total copper, lead, and zinc are analytically detectable, but limited data from construction site stormwater sampling indicates that compliance with these waste load allocations would be extremely difficult. As further detailed below, because organochlorine pesticides, PCBs, copper, lead, and zinc all bind to sediment and sediment is a common pollutant in stormwater from construction sites that can be managed effectively with BMPs, compliance with these two TMDLs is implemented through a soil screening investigation and, if applicable, a total suspended solids (TSS) numeric effluent limitation detailed in Attachment H, Section I.G.5.

The soil screening investigation is used to determine the presence of the applicable metals, organochlorine pesticides, or PCBs by comparing the concentration of pollutants in the soil to the analytical reporting limit for each substance. The analytical reporting limit is the lowest concentration at which an analyte can be measured in a sample and its concentration can be reported with a reasonable degree of accuracy and precision.

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If the analytical reporting limit for any of the TMDL-specific pollutants is exceeded in any soil sample obtained for the soil screening investigation, the Responsible Discharger will be required to sample for TSS as a proxy for the identified TMDL pollutants if the non-visible sampling requirements are triggered. The numeric effluent limitation for TSS is 100 mg/L, and any exceedances require corrective actions detailed in Attachment D, Section III.G and Attachment E, Section III.G.

The value of 100 mg/L TSS is derived from several lines of evidence, including a study where the probability curve between organochlorine pesticides and TSS was modeled to determine that 100 mg/L TSS is protective of water quality when the criteria for 4,4 DDE was 0.00059 mg/L which is equal to the waste load allocation concentrations for chlordane and 4,4 DDT listed in the Los Angeles Area Lakes TMDL. Additionally, a 2018 study found that 100 mg/L TSS correlated with the boundary between particulate and dissolved phase metals in multiple watersheds when the K_d (distribution coefficient) for the metal is 10,000 L/kg.²³

I.G.6. Stormwater BMP Selection

- a. This General Permit provides dischargers flexibility in selecting the site-specific BMPs necessary to achieve compliance. This flexibility is also provided to Responsible Dischargers in selecting, installing, and maintaining the appropriate BMPs for site-specific situations to meet applicable TMDL requirements, including BMP combinations of:
 - i. Non-structural BMPs (such as good housekeeping and staff training);
 - ii. Structural source control BMPs (physical, structural, or mechanical devices or BMPs intended to prevent pollutants from entering stormwater) such as erosion control practices, maintenance of stormwater facilities (e.g., cleaning out sediment traps), construction of roofs over storage and working areas, and direction of equipment wash water and similar discharges to the sanitary sewer or other end-use systems; and/or
 - iii. Structural treatment BMPs which include flow or volume-based treatment BMPs. Structural source control and treatment BMPs usually include a capital investment but are cost-effective compared to removing pollutants

²³ Nasrabadi T, Ruegner H, Schwientek M, Bennett J, Fazel Valipour S, Grathwohl P (2018) "Bulk metal concentrations versus total suspended solids in rivers: Time-invariant & catchment-specific relationships."

Washington Department of Ecology (2004) "A Total Maximum Daily Load Evaluation for Chlorinated Pesticides and PCBs in the Walla Walla River."

Angela Gorgoglione, Fabián A. Bomberdelli, Bruno J. L. Pitton, Lorence R. Oki, Darren L. Haver and Thomas M. Young (2018), "Role of Sediments in Insecticide Runoff from Urban Surfaces: Analysis and Modeling."

after they have entered stormwater and been discharged into a receiving water body.

- b. Stormwater BMP categories for the TMDL pollutant types above are, in general, physical, chemical, hydraulic, and biological. Selection of appropriate site BMPs must be determined based on site-specific factors. No single BMP can achieve the required pollutant reductions for every given situation or pollutant, and each BMP approach has pros and cons. The Responsible Discharger should consider the cost-benefit²⁴ when selecting stormwater BMPs. Some factors include, but are not limited to, upfront-cost, maintenance-cost, pollutant removal efficiency per area/treatment unit, local permitting, site hydrology and geology, safety, space, staffing, and monitoring needs for implementing the BMP(s). There are many ways to calculate the upfront and maintenance cost of BMPs that consider, for example, BMP sizing, the annual cost for maintenance and/or the annual maintenance hours required.²⁵

Table 1 – University of New Hampshire Stormwater Center²⁶ Select BMP Maintenance Costs and Hours

BMP	Maintenance Cost (per year)	Annual Maintenance Hours
Bioretention	\$1,890.00	20.7
Chamber System	Not Assessed	Not Assessed
Detention Pond	\$2,380.00	24.0
Gravel Wetland	\$2,138.00	21.7
Porous Asphalt	\$1,080.00	6.0
Pervious Concrete	\$1,080.00	6.0
Retention Pond	\$3,060.00	28.0
Sand Filter	\$2,807.00	28.5

I.G.7. Stormwater BMP Categories

24 State of Hawaii Department of Transportation Highways Division. [Stormwater Permanent Best Management Practices Manual](http://hidot.hawaii.gov/wp-content/uploads/2015/05/Appx-E.1-Permanent-BMP-Manual-Feb-2007.pdf), page 7-2 Table 1. (February 2007). <<http://hidot.hawaii.gov/wp-content/uploads/2015/05/Appx-E.1-Permanent-BMP-Manual-Feb-2007.pdf>>. [as of May 20, 2021]. (State of Hawaii BMP Manual)

25 U.S. EPA. [Methodology for developing cost estimates for Opti-Tool Memorandum](https://www3.epa.gov/region1/npdes/stormwater/tools/green-infrastructure-stormwater-bmp-cost-estimation.pdf) (February 20, 2016), page 8. <<https://www3.epa.gov/region1/npdes/stormwater/tools/green-infrastructure-stormwater-bmp-cost-estimation.pdf>>. [as of April 28, 2022]. (U.S. EPA BMP Cost Estimation Memorandum)

26 U.S. EPA BMP Cost Estimation Memorandum, University of New Hampshire Stormwater Center (UNHSC) Select BMP Maintenance Costs and Hours, page 8.

EXHIBIT "C" (Stormwater Pollution Prevention Plan)

The following categories generally describe currently available types of stormwater BMPs, their expected effectiveness for the TMDL pollutant categories, and some general cost comparisons. The cost comparisons for 6.a-b are based on:

- Staff experience in administering this General Permit for the non-structural and structural source control BMPs;
- The CASQA Industrial and Commercial BMP Handbook for appropriateness of minimum BMPs to control pollutants;
- The CASQA Construction Handbook for appropriateness of minimum BMPs to control pollutants;²⁷ and
- The California Department of Transportation (Caltrans) Construction Site BMP Manual.²⁸

The cost for non-structural controls, which includes good housekeeping, preventative maintenance, spill and leak prevention and response, erosion and sediment controls, employee training programs, and quality assurance and record keeping, is lower than the costs for other BMPs. For example, these costs consist of staff time for training or conducting routine minimum BMP activities and minimal costs for certain materials such as spill kits or for materials for retaining records. Costs for source control BMPs were estimated generally as being low, medium, or high, dependent on a variety of factors.

The cost comparisons and information in Table 2 for 6.a-i are based on general conclusions from research conducted by the California Stormwater Quality Association, U.S. EPA, U.S. Department of Transportation, State of Hawaii Department of Transportation Highways Division, State of Minnesota Pollution Control Agency, and the Water Environment and Reuse Foundation. State Water Board staff reviewed these sources on:

- The selection of BMPs for general categories of pollutants and performance of pollutant removal;
- The provided upfront costs for a BMP category from a range of low, medium, and high; and
- The provided maintenance costs for a BMP category from a range of low, medium, and high.

27 CASQA Construction BMP Handbook, 2015.

28 California Department of Transportation (Caltrans), [Construction Site BMP Manual](https://dot.ca.gov/-/media/dot-media/programs/construction/documents/environmental-compliance/csbmp-may-2017-final.pdf) (May 2017). <<https://dot.ca.gov/-/media/dot-media/programs/construction/documents/environmental-compliance/csbmp-may-2017-final.pdf>> [as of May 20, 2021]

More specific information on methodology and estimates is available from these sources, which are cited below.

- a. **Non-Structural BMPs**, which include, but are not limited to, site sweeping, staff training and education, dumpster and waste management, routine portable toilet maintenance and cleaning, and proper handling and spill response for construction materials.²⁹ These BMPs can significantly reduce pollutant concentrations in all categories (4.a-g) and can range from low to medium upfront costs depending on the staffing and size of size. In general, operation and maintenance costs are low.
- b. **Source control BMPs**, which include minimizing or eliminating exposure of a pollutant source, can significantly reduce pollutant concentrations in all categories (4.a-g). Upfront costs can range from low (e.g., moving materials or activities indoors or under cover) to high (if, for example, the site must move or build extra covered areas/structures). In general, the operation and maintenance costs are low for exposure minimization and elimination BMPs.
- c. **Bioretention BMPs**³⁰ are soil and plant-based filtration structures that reduce runoff velocity and remove pollutants over time through a variety of processes. Bioretention can significantly reduce pollutant concentrations for categories (4.a), (4.d), (4.e), (4.f), and (4.g) (varies for dissolved metals).³¹ Usually, costs are medium to high³² per area treated and are tied to proper sizing and design, with low to medium maintenance requirements and cost.³³

29 U.S. Department of Transportation (DOT), Federal Highway Administration. [Stormwater Best Management Practices in an Ultra-Urban Setting: Selection and Monitoring. Section 6.5 Table 57. Relative Rankings of Cost Elements and Effective Life of BMP Options.](#)

<https://www.environment.fhwa.dot.gov/Env_topics/water/ultraurban_bmp_rpt/uubmp6p4.aspx> [as of April 28, 2022]. (U.S. DOT BMP Selection and Monitoring)

30 California Stormwater Association (CASQA), [Industrial and Commercial Best Management Practice Online Handbook](#) September 2014, TC-32.

<https://www.casqa.org/sites/default/files/casqa-handbook-industrial/full_handbook_2014.pdf> [as of May 20, 2021] (CASQA Industrial and Commercial BMP Handbook)

31 Water Environment and Reuse Foundation (WERF). [International Stormwater BMP Database 2020 Summary Statistics Final Report](#),

<https://www.waterrf.org/system/files/resource/2020-11/DRPT-4968_0.pdf> [as of April 28, 2022]. (International Stormwater BMP Database).

32 State of Hawaii BMP Manual, page 7-2 Table 1.

33 U.S. DOT BMP Selection and Monitoring, section 6.5 Table 57; State of Hawaii BMP Manual, page 7-2 Table 1; U.S. EPA BMP Cost Estimation Memorandum, page 8.

- d. **Media or Treatment Filtration BMPs**³⁴ include either active or passive processes. In passive processes, water flows through treatment media or surface by gravity. In active processes, stormwater flows through media via a pump or similar mechanized system. The media are usually a custom or proprietary blend from the manufacturer and/or vendor (e.g., flocculants, coagulants, carbon, sand, organics). Active systems are chambered and may include pretreatment features to enhance the treatment process. Media filtration can significantly reduce pollutant concentrations categories (4.a), (4.e), and (4.g)³⁵ depending on the specific treatment media. The costs vary significantly depending on the pollutant(s) intended for treatment, the size of the system, and the system design. Upfront costs are generally medium to high per area treated with medium to high maintenance requirements and cost.³⁶
- e. **Retention BMPs** (sediment basin, retention wet pond or extended detention wet pond)³⁷ are constructed basins that have a permanent pool of water most of the year which settle out pollutants and can use plant life to biologically remove pollutants. Retention can significantly reduce pollutant concentrations for all categories but (4.c) and effectiveness for category (4.g) varies depending on the metal and whether the metal is dissolved.³⁸ The upfront and maintenance requirements and costs are tied to proper sizing and design of the system and vary from medium to low.³⁹
- f. **Detention BMPs** (Dry extended detention ponds, dry ponds, extended detention basins, detention ponds, extended detention ponds)⁴⁰ are basins with designed outlets to achieve a required stormwater draw down time (e.g., 24, 48, or 72 hours). The basins are designed to detain stormwater runoff for some minimum time (e.g., 48 hours) allowing particles and associated pollutants to settle. These basins have a temporary wet pool dependent on the infiltration rate of the subsoil. Detention can significantly reduce pollutant concentrations

34 CASQA Industrial and Commercial BMP Handbook, TC-40 Media Filter.

35 CASQA Industrial and Commercial BMP Handbook, TC-40 Media Filter.

36 State of Hawaii BMP Manual, page 7-2 Table 1; U.S. DOT BMP Selection and Monitoring, section 6.5 Table 57; U.S. EPA BMP Cost Estimation Memorandum, page 8.

37 CASQA Industrial and Commercial BMP Handbook, TC-20 Wet Pond.

38 WERF International Stormwater BMP Database 2016 Summary Report.

39 State of Hawaii BMP Manual, page 7-2 Table 1; U.S. DOT BMP Selection and Monitoring, section 6.5 Table 57; U.S. EPA BMP Cost Estimation Memorandum, page 8.

40 CASQA Industrial and Commercial BMP Handbook, TC-22 Extended Detention Basins.

for all categories except for (4.c) and (4.g), though detention's effectiveness for metals is variable depending on the metal and whether the metal is dissolved.⁴¹ The upfront and maintenance requirements and costs are tied to proper sizing and design of the system and vary from medium to low.⁴²

- g. **Wetland BMPs** (constructed wetlands)⁴³ are constructed basins with a permanent pool of water for most of the year and are shallower with more vegetation than wet ponds. Stormwater is stored in the shallow pools of vegetation. Pollutant removal is achieved through microbial transformation, plant uptake, settling, and adsorption. Pretreatment is suggested to reduce the needed annual maintenance by reducing the amount of sediment and other solids entering the BMP. Wetlands can significantly reduce pollutant concentrations for all categories except for (4.b) and (4.c).⁴⁴ The upfront costs are medium to high, and the operation and maintenance costs and requirements are medium.⁴⁵
- h. **Infiltration BMPs** (volume reduction)⁴⁶ are trenches or basins which store stormwater in the void space between the media (e.g., rock, stones, soil media) and infiltrates/exfiltrates through the bottom and sides into the ground. Infiltration reduces stormwater discharge volume and pollutant loadings to surface waters and can recharge groundwater aquifers or be used for other appropriate purposes and provide cost-savings by offsetting the use of potable water (e.g., cooling towers and equipment cleaning water). Pretreatment is necessary to limit the amount of gross pollutants, oil & grease, and sediment to the system to ensure the system functions properly. Infiltration can significantly reduce pollutant concentrations for all categories, however, in all cases fate and transport of pollutants to groundwater should be evaluated for impacts to drinking water beneficial uses (e.g., salts, solvents). The upfront and

41 WERF International Stormwater BMP Database 2016 Summary Report.

42 State of Hawaii BMP Manual, page 7-2 Table 1; U.S. DOT BMP Selection and Monitoring, section 6.5 Table 57; U.S. EPA BMP Cost Estimation Memorandum, page 8.

43 CASQA Industrial and Commercial BMP Handbook, TC-21 Constructed Wetlands.

44 WERF International Stormwater BMP Database 2016 Summary Report.

45 State of Hawaii BMP Manual, page 7-2 Table 1; U.S. DOT BMP Selection and Monitoring, section 6.5 Table 57; U.S. EPA BMP Cost Estimation Memorandum, page 8.

46 CASQA Industrial and Commercial BMP Handbook, TC-10 Infiltration Trench and TC-11 Infiltration Basin.

maintenance costs and requirements are tied to proper sizing and design of the system and are medium.⁴⁷

Table 2 – Effective BMP Examples for TMDL Pollutant Categories⁴⁸

Best Management Practice	Bacteria (4.a)	Chloride and Salts (4.b) ⁴⁹	Diazinon (4.c)	Nutrients (4.d)	Sediment (4.e)	Temperature (4.f)	Toxics and Metals (4.g) ⁵⁰
Non-Structural and Exposure Minimization	X	X	X	X	X	X	X
Bioretention Devices	X			X	X	X	X
Media or Treatment Filtration	X				X		X
Retention Basins/Ponds	X	X		X	X	X	X
Detention Basins/Ponds	X	X		X	X	X	
Constructed Wetlands	X			X	X	X	X
Infiltration or Volume Reduction	X	X		X	X	X	X

47 State of Hawaii BMP Manual, page 7-2 Table 1; U.S. DOT BMP Selection and Monitoring, section 6.5 Table 57; U.S. EPA BMP Cost Estimation Memorandum, page 8.

48 WERF International Stormwater BMP Database 2016 Summary Report. Also see Table 2 footnotes 47 and 48.

49 Not evaluated in the WERF International Stormwater BMP Database 2017 Summary and is based upon guidance from the Minnesota 2015 Industrial Stormwater BMP Handbook.

50 From CASQA TC-10 and TC-11 not evaluated in the WERF International Stormwater BMP Database 2017 Summary.

I.H. Rationale

I.H.1. General Permit Approach

A General Permit for construction activities over one acre is an appropriate permitting approach for the following reasons:

- a. A General Permit is an efficient method to establish the essential regulatory requirements for a broad range of construction activities under differing site conditions;
- b. A General Permit is the most efficient method to handle the large number of construction stormwater permit applications;
- c. A General Permit application process for coverage is far less onerous than that for individual permit and hence more cost effective;
- d. A General Permit is consistent with U.S. EPA's four-tier permitting strategy, the purpose of which is to use the flexibility provided by the Clean Water Act in designing a workable and efficient permitting system; and
- e. A General Permit is designed to provide coverage for a group of related facilities or operations of a specific industry type or group of industries. It is appropriate when the discharge characteristics are sufficiently similar, and a standard set of permit requirements can effectively provide environmental protection and comply with water quality standards for discharges. In most cases, the general permit will provide sufficient and appropriate management requirements to protect the quality of receiving waters from discharges of stormwater from construction sites.

There may be instances where a General Permit is not appropriate for a specific construction project. A Regional Water Board may require any discharger otherwise covered under this General Permit to apply for and obtain an individual permit or apply for coverage under a more specific General Permit. The Regional Water Board must determine that this General Permit does not provide adequate assurance that water quality will be protected, or that there is a site-specific reason why an individual permit should be required.

There may be other permits or requirements in addition to this General Permit. For example, the discharger may also need a streambed alteration agreement from the California Department of Fish and Wildlife, a Water Quality Certification (CWA § 401) as administered by the State and Regional Water Boards, CWA § 404 permit administered by the U.S. Army Corp. of Engineers, and/or a permit for low threat or de minimis discharges. Contact the appropriate Regional Water Board(s) to determine if other permits are required for the construction activity.

EXHIBIT "C" (Stormwater Pollution Prevention Plan)

I.H.2. Antidegradation Findings

Federal regulations at 40 Code of Federal Regulations § 131.12 require that state water quality standards include an antidegradation policy consistent with federal requirements. The State Water Board established California's antidegradation policy in State Water Board Resolution No. 68-16 ("Statement of Policy with Respect to Maintaining High Quality of Waters in California"). Where the federal antidegradation policy is applicable, the State Water Board has interpreted Resolution No. 68-16 to incorporate the federal antidegradation policy.⁵¹ The permitted discharge must be consistent with the antidegradation provision of 40 Code of Federal Regulations § 131.12 and State Water Board Resolution No. 68-16. The State Water Board finds that the permitted discharges authorized by this general NPDES permit are consistent with the antidegradation provisions of 40 Code of Federal Regulations § 131.12 and State Water Board Resolution No. 68-16, as set forth herein.

In the context of this general NPDES permit, compliance with the federal antidegradation policy requires consideration of the following. First, the State Water Board must ensure that "existing instream uses and the level of water quality necessary to protect the existing uses" are maintained and protected.⁵² Second, if the baseline quality of a waterbody for a given constituent "exceeds levels necessary to support propagation of fish, shellfish, and wildlife and recreation in and on the water,"⁵³ that quality shall be maintained and protected" through the requirements of this general NPDES permit unless the State Water Board makes findings that: (1) any lowering of the water quality is "necessary to accommodate important economic or social development in the area in which the waters are located"; (2) "water quality adequate to protect existing uses fully" is assured; and (3) "the highest statutory and regulatory requirements for all new and existing point sources and all cost-effective and reasonable best management practices for nonpoint source control" are achieved.⁵⁴ Before allowing any lowering of high quality water, the Board must conduct an analysis of alternatives that evaluates practicable alternatives that would prevent or lessen the degradation associated with the discharges permitted. In the context of 40 Code of Federal

51 State Water Board Order WQ 86-17 (Fay), pages 16-19.

52 State Water Board, Administrative Procedures Update, Antidegradation Policy Implementation for NPDES Permitting, 90-004 (APU 90-004), page 4. 40 Code of Federal Regulations § 131.12(a)(1). This provision has been interpreted to mean that, "[i]f baseline water quality is equal to or less than the quality as defined by the water quality objective, water quality shall be maintained or improved to a level that achieves the objectives."

53 This discussion refers to such waters as "high quality waters."

54 40 Code of Federal Regulations § 131.12(a)(2).

Regulations § 131.12(a)(2)(ii), practicable means “technologically possible, able to be put into practice, and economically viable.”⁵⁵

The permit must also comply with any requirements of State Water Board Resolution No. 68-16 beyond those imposed through incorporation of the federal antidegradation policy.⁵⁶ Resolution No. 68-16 requires that high quality waters be maintained unless degradation is justified based on findings that any lowering of water quality is “consistent with the maximum benefit to the people of the State” and “will not unreasonably affect present and anticipated beneficial use of such water and will not result in water quality less than that prescribed in the policies” and further that the discharge is subject to “waste discharge requirements which will result in the best practicable treatment or control of the discharge.”⁵⁷ The baseline quality considered in making the appropriate findings is the best quality of the water since 1968, the year of adoption of Resolution No. 68-16, or a lower level if that lower level was allowed through a permitting or other regulatory action, such as establishing a water quality objective, that was consistent with the federal and state antidegradation policies.⁵⁸ The following analysis assumes, without deciding, that the baseline for antidegradation analysis is 1968.⁵⁹

55 40 Code of Federal Regulations § 131.3(n).

56 State Water Board Order No WQ 86-17 (Fay), page 23, Finding No. 11

57 State Water Board Orders WQ 81-5 (*City of Lompoc*), WQ 82-5 (*Chino Basin Municipal Water District*), WQ 90-6 (*Environmental Resources Protection Council*). State Water Board Resolution 68-16, Resolve 2. Best practicable treatment or control is not defined in Resolution 68-16; however, the State Water Board has evaluated what level of treatment or control is technically achievable using “best efforts.” *Questions and Answers*, State Water Board Resolution 68-16, (Feb. 16, 1995), pp. 5-6. The State Water Board states: “To evaluate the best practicable treatment or control method, the discharger should compare the proposed method to existing proven technology; evaluate performance data, e.g., through treatability studies; compare alternative methods of treatment or control; and/or consider the method currently used by the discharger or similarly situated dischargers...The costs of the treatment or control should also be considered....”

58 State Water Board APU 90-004, page.4. The baseline for application of the federal antidegradation policy is 1975, which is the date used in 40 Code of Federal Regulations § 131.3(e) to define existing uses of a waterbody. For state antidegradation requirements, see also *Asociacion de Gente Unida por el Agua (AGUA) v. Central Valley Water Board* (2012) 210 Cal.App.4th 1255,1270. The baseline for the application of the state antidegradation policy is generally the highest water quality achieved since 1968, the year the policy was adopted.

59 State Water Board Resolution 68-16, Resolve 1. The baseline may be later than 1968 for two reasons. First, the appropriate baseline is determined by the date on which a

a. The Board Is Not Required to Make Waterbody by Waterbody and Pollutant by Pollutant Antidegradation Findings

The State Water Board finds that it is not required to conduct a waterbody by waterbody and pollutant by pollutant antidegradation analysis for this permit. The State Water Board makes this finding for two reasons. First, the Administrative Procedures Update, Antidegradation Policy Implementation for NPDES Permitting, 90-004 (APU 90-004), which specifies a waterbody by waterbody and pollutant by pollutant analysis for some permitting actions, does not address permitting for diffuse stormwater discharges. Second, APU 90-004 itself indicates that a waterbody by waterbody and pollutant by pollutant analysis is only required when conducting a “complete” antidegradation analysis; a complete analysis, in turn, is not required where any “reduction in water quality is temporally limited and would not result in any long-term deleterious effects on water quality.”⁶⁰ As detailed below in the section regarding waters that do not meet water quality objectives and in Alternative 1, a complete analysis is not required. The discussion below elaborates on these two reasons.

APU 90-004 is a State Water Board internal guidance document establishing methods for implementing the federal and state antidegradation policies in NPDES permits. APU 90-004 suggests that an antidegradation analysis requires a pollutant by pollutant and waterbody by waterbody analysis in certain contexts, specifically where the discharge at issue is a discrete discharge from a singular facility, such as discharges from publicly owned treatment works. However, APU 90-004 has limited value when considering antidegradation in the context of diffuse stormwater discharges from tens of thousands of future construction projects of a wide variety distributed throughout the entire state over the life of the permit, each with the potential for discharging multiple

policy establishing the level of water quality to protect was effective.

State Water Board APU 90-004, page 2. The various water quality control plans and State Policies for Water Quality Control have been adopted and amended many times since the 1970’s to include new or revised water quality objectives. Second, a permitting action with appropriate antidegradation findings allowing degradation may establish a new baseline consistent with the level of water quality achieved under that permit. The State Water Board has regulated construction stormwater discharges in the past through general permits issued in 1999 and 2009. APU 90-004 acknowledges that no antidegradation analysis is required where the water board has no expectation that water quality will be reduced by the permitting action; here, if the water quality achieved under the prior general permits had been used as the baseline, arguably, no antidegradation analysis would have been required. Nevertheless, for ease of analysis, 1968 is used herein as the baseline.

⁶⁰ State Water Board APU 90-004, page 2.

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pollutants, to a wide variety of waterbodies statewide.⁶¹ This interpretation is sensible, if not necessary, for this general NPDES permit, given the short-term nature of construction projects and the fact that, as of the date of adoption of this permit, the type and location of the construction projects that will be regulated by this General Permit is unknown. Therefore, only a generalized antidegradation analysis can, and must, be conducted for the discharges authorized by this general NPDES permit.

In addition, reliable data on the baseline water quality since 1968 is not available for all pollutants for all surface waters of the state that might receive discharges authorized by this General Permit. The State Water Board did not begin conducting statewide assessments of water quality until 1973. That first assessment was based only on very limited sampling for only five water quality parameters on portions of 23 water bodies. Over the course of the next five decades, those assessments have gradually become more comprehensive and thorough, culminating with the State Water Board's most recent 2020-2022 Integrated Report, which assessed the waterbodies for three of the nine Regional Water Quality Control Boards. However, even though a large amount of ambient water quality data is now collected and evaluated for these biennial assessments, the integrated reports are focused on assessing whether the waterbodies are supporting beneficial uses. The assessments are not intended to provide information about whether the waterbodies are of a higher quality than necessary to support their beneficial uses.⁶² As a result, this analysis assumes that some of the waterbodies that will receive stormwater discharges from some of the construction sites are high quality waters with respect to at least some pollutants that might be in the authorized discharges. Due to the wide variety and unknown identity of the large number of potential waterbodies that might receive authorized discharges from construction projects under this permit and the lack of specific, reliable data regarding each potential receiving waterbody, the analysis of waterbodies that might be affected by this general NPDES permit must also be done at a generalized level.

The State Water Board additionally finds that, even if APU 90-004 applies to the issuance of this permit, it requires at most a "simple" antidegradation analysis. APU 90-004 contemplates that a "simple" antidegradation analysis is

61 State Water Board Order WQ 2018-0002, page 77. Reaches a similar conclusion for agricultural discharges. This is even more so for the discharges authorized by this Order, because, unlike discharges from agricultural lands, there is much more uncertainty as to the location of the future construction projects and the temporal nature of discharges of stormwater from construction sites.

62 [Regional Water Quality Control Boards Biennial Assessments](https://www.waterboards.ca.gov/water_issues/programs/water_quality_assessment).

<https://www.waterboards.ca.gov/water_issues/programs/water_quality_assessment>
[as of July 19, 2022]

appropriate under specified circumstances. In particular, as stated above, APU 90-004 states that a simple antidegradation analysis is allowed when the “[Water] Board determines the reduction in water quality is temporally limited and will not result in any long-term deleterious effects on water quality; e.g., will cease after a storm event is over.”⁶³

APU 90-004 does not provide guidance on the scope and content of a simple antidegradation analysis. Nor does it define the terms “temporally limited” or “long term.” Those terms must therefore be interpreted in the context of the types of discharges being permitted and with deference to the best professional judgment of the State Water Board. Construction stormwater discharges fit within the example provided by the APU and are temporal and inherently short-term. Therefore, any degradation would be temporally limited and would not result in long-term deleterious effects on water quality. In addition, the permit continues the requirements of the previous permits or imposes equivalent or more protective requirements such that, in at least at a generalized level, the water quality established under the prior permits is expected to be maintained and improved.

The State Water Board determines that the findings made below meet the requirements of a simple antidegradation analysis and are also consistent with an antidegradation analysis done at a generalized level, as appropriate for this permit. With these findings, based on the information available to it and using its best professional judgment, the State Water Board concludes that the discharge will not be adverse to the intent and purpose of the State and federal antidegradation policies. Regardless of APU 90-004’s application, however, the below analysis is consistent with the generalized antidegradation analysis appropriate for this general NPDES permit and complies with both the federal antidegradation regulations, and with the State antidegradation policy.

b. The State Water Board Makes the Following Antidegradation Findings

The discharges permitted in the permit are consistent with the antidegradation provisions of 40 Code of Federal Regulations § 131.12 and Resolution No. 68-16. The State Water Board’s conclusion that the terms and conditions of the permit are consistent with the antidegradation policies is based on the following analysis.

First, for waterbodies that meet, but do not exceed, the water quality objective for a particular pollutant, no antidegradation findings are required. For these waterbody and pollutant combinations, compliance with the General Permit’s requirements ensures that all construction stormwater discharges authorized by

this permit do not interfere with the maintenance and protection of existing beneficial uses and water quality objectives.

- i. Waterbodies that do not meet water quality objectives (waterbodies that are not high quality)

Because coverage under this General Permit is available statewide, this General Permit authorizes discharges to at least some surface waters that are not meeting water quality objectives. Some of these waterbodies are listed on the State Water Board's section 303(d) list of impaired waters, some of which have applicable TMDLs developed by the Regional Water Boards or U.S. EPA.⁶⁴ Some receiving waters are not meeting water quality objectives for multiple pollutants. Under both federal and state antidegradation policies, these receiving waters are not considered "high quality" waters for these pollutants. For receiving waters that are not high quality waters, the federal antidegradation policy requires that regulatory actions ensure that existing instream uses and the level of water quality necessary to protect the existing uses are maintained and protected. (40 Code of Federal Regulations § 131.12(a)(1).)⁶⁵ The General Permit ensures that existing instream (beneficial) uses and the level of water quality necessary to protect the existing uses are maintained and protected through requirements that discharges authorized by this General Permit do not cause or contribute to exceedances of water quality objectives in the receiving water and to restore impaired waterbodies by requiring compliance with TMDL-specific requirements as set forth in Attachment H and compliance with receiving water limitations set forth in the General Permit, Section IV.D. These provisions are collectively designed to ensure that discharges authorized by this General Permit do not cause any further degradation of impaired waterbodies and do not interfere with the improvement of the quality of such waters to a level protective of existing uses over a time schedule that is as short as possible.

The antidegradation policies do not explicitly or implicitly override the authority and discretion the Clean Water Act and the Water Code grant to the State Water Board as to how it structures a permit to ensure water

⁶⁴ Impaired waters, or waters that are not high quality, are not confined to those listed only on the 303(d) List. There are several reasons for this, including but not limited to that some of the 303(d) Lists do not reflect current data. In addition, sometimes the State lacks sufficient data to add a waterbody to the 303(d) List. Accordingly, the 303(d) List itself does not reflect all waterbodies that are impaired.

⁶⁵ By its terms, State Water Board Resolution No. 68-16 does not separately apply to waters that are not high quality, except by incorporating the federal antidegradation policy as discussed above.

quality necessary to protect beneficial uses. The law does not require immediate restoration of impaired waterbodies nor does it require an immediate prohibition of discharges that contribute to an exceedance in the waterbody. Rather, federal regulations at 40 Code of Federal Regulations § 122.47 allow NPDES permits to have compliance schedules. Similarly, Water Code § 13263, subdivision (c), authorizes the Regional Water Boards to include a time schedule for achieving water quality objectives in waste discharge requirements. Consistent with Water Code § 13242, TMDL implementation plans, as incorporated into the water quality control plans, include a time schedule for actions to be taken. When issuing waste discharge requirements, Water Code § 13263 requires Regional Boards to implement any relevant water quality control plans that have been adopted. Certainly, water quality objectives must be achieved; but the law, as cited above, recognizes and allows for the fact that it can take time to restore or achieve the objectives. In this regard, some impaired waterbodies may fail to improve or, rarely, continue to degrade, for a period of time before showing improvement. This period of time may be as long as multiple years. This is not contrary to the authorities for compliance schedules stated above and is not contrary to the antidegradation policies.

ii. High quality waterbodies

Some of the waterbodies within the area covered by this General Permit may be high quality waters for certain pollutants. Some of these waterbodies may be currently high quality as compared to currently applicable objectives. Others of these waterbodies may be currently impaired but may be classified as high quality waters because they were historically high quality for certain pollutants.

Although compliance with the General Permit will generally not result in degradation in high quality waters, compliance with the General Permit does not guarantee that there could never be any degradation in any high quality waters from a specific construction project. Therefore, the State Water Board makes the following findings to comply with antidegradation requirements for any discharges authorized by this General Permit to high quality waters.

For high quality waterbodies, the State Water Board finds as follows:

First, to determine whether the discharge is necessary, the State Water Board must determine whether there are any cost-effective alternatives available that eliminate or reduce the reduction in water quality. For a general, statewide permit, the appropriate inquiry is whether there are cost-effective alternatives to the regulatory framework in the General Permit, not whether there is a cost-effective alternative to an individual project eligible for enrollment under the General Permit. The State Water Board has

determined that construction stormwater discharges are appropriately regulated under a general permit rather than individual NPDES permits. There are typically approximately 10,000 ongoing construction projects with stormwater discharges authorized under this General Permit (or its predecessor general permits) at any given time, according to the State Water Board's SMARTS database. These projects typically last from one to three years, at which point coverage under this General Permit is terminated and discharges are no longer authorized. Employing the large number of additional staff necessary to review and issue such a high volume of individual stormwater permits would not be efficient use of resources, would necessitate very large increases in permit fees under Water Code § 13260, subdivision (d)(1)(B) to pay for the additional staff, and would likely result in economic disruption due to delays in permitting construction projects. As further explained in Fact Sheet, Section I.H.1, a General Permit is the appropriate mechanism to regulate a large number of similar discharges while still protecting water quality.

Practicable Alternatives: The State Water Board has evaluated a range of practicable alternatives that would prevent or lessen any degradation associated with permitted construction stormwater discharges to high quality waters. These alternatives are discussed below.

Alternative 1 – The first alternative is the approach that the General Permit takes. The General Permit requires dischargers, with the assistance of qualified stormwater professionals, to:

- 1) Determine the risk the construction project poses on the receiving water, based on how much sediment is anticipated to be discharged offsite and whether the receiving water is impaired for sediment or supports COLD, SPAWN, and MIGRATORY beneficial uses. Higher risk projects must comply with additional permit requirements, including sampling and monitoring, and additional BMPs.
- 2) Assess conditions at the construction site that could impact stormwater quality such as sources of pollutants that could be transported offsite by stormwater runoff.
- 3) Develop a site-specific Stormwater Pollution Prevention Plan to include information needed to demonstrate compliance with all requirements of the permit and to ensure water quality is protected (Fact Sheet, Section I.V.). This includes identification and implementation of a suite of best management practices tailored to the construction project and the conditions at the site to minimize or eliminate the stormwater discharges, or the pollutants in the stormwater discharges, or both, in compliance with BCT/BAT/BPT standards.

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- 4) Visually inspect the construction site to verify implementation of best management practices is in accordance with the Stormwater Pollution Prevention Plan.
- 5) Monitor stormwater discharges for pH and turbidity during each day of a qualifying precipitation event and compare sample results to numeric action levels to verify that implementation of the best management practices is protective of water quality.
- 6) Monitor stormwater discharges for TMDL-specific pollutants, if applicable, and compare to a TMDL-related numeric action level or numeric effluent limitation to verify that the discharge complies with the TMDL-based waste load allocations. TMDL monitoring requirements apply if the site is in a TMDL watershed with waste load allocations translated into numeric action levels or numeric effluent limitations; has sources of the TMDL-specific pollutant(s) onsite; and there is a failure to implement best management practices, a container spill or leak, or a best management practices breach, failure, or malfunction.
- 7) Take corrective actions such as repairing or implementing additional best management practices, if visual inspections and discharge monitoring indicate a deficiency.
- 8) Submit sampling and annual reports regarding implementation of this General Permit.

All discharges authorized by this General Permit must comply with receiving water limitations that require that discharges 1) do not adversely affect human health or the environment, 2) do not contain pollutants in quantities that threaten to cause pollution or public nuisance, 3) do not contain pollutants that cause or contribute to an exceedance of any applicable water quality objectives or standards contained within an applicable water quality control plan, and 4) comply with the applicable TMDL implementation requirements of this General Permit (Order, Section IV.D). Furthermore, the Regional Water Boards retain the authority to impose any additional site-specific requirements where necessary to prevent degradation and to protect water quality standards.

Under this General Permit, there are disincentives to discharging such that dischargers already seek to minimize or eliminate their stormwater discharges where possible. The General Permit promotes efforts to maximize the capture of stormwater from construction sites through retention basins, infiltration galleries, and other controls that reduce the amount of stormwater that is discharged from the site. If there are no discharges, the General Permit's sampling requirements and any otherwise applicable numeric action levels or numeric effluent limitations are not

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applicable to that discharger and the discharger would not risk an enforcement action for any potential discharge-related General Permit violations. Accordingly, dischargers have an incentive to schedule their work during dry weather or to retain stormwater whenever possible. Collectively, these requirements generally prevent degradation, and where that is not possible, minimize degradation and the duration of any degradation. This alternative does not, however, guarantee that no construction site will ever have authorized stormwater discharges that may result in temporary, limited degradation.

Alternative 2 – The second alternative would be more stringent permit requirements in watersheds with high quality waters. Different approaches for more stringent requirements could include a construction prohibition, a prohibition of discharges, a requirement that active treatment be used for all pollutants in all stormwater discharges, or numeric effluent limitations for all pollutants in all stormwater discharges.

The State Water Board finds that more stringent requirements are not currently possible for any of these approaches for the following reasons:

- **Construction prohibition:** Such a prohibition would exceed the State Water Board's authority to regulate discharges of waste to waters of the state from discharges. The State Water Board does not have the authority to directly regulate land use. (Wat. Code, §§ 13260, 13263.) Such a prohibition is also not possible because many construction projects are essential and cannot be relocated (e.g., repair of existing roads and utilities).
- **Prohibition on discharges:** By eliminating all stormwater discharges, pollutants from stormwater would not reach high quality receiving waters during wet weather and therefore could not cause any degradation. As wet weather will always occur, this approach would require all construction sites to retain all stormwater through retention basins, infiltration galleries, and other controls that would prevent stormwater from reaching surface waters through infiltration, evaporation, or storage and reuse. The complete retention to eliminate any possibility of discharge is not typically technologically or economically feasible in many locations. Although retention, detention, and run-on BMPs are frequently implemented as part of the SWPPP, these BMPs are typically designed only to reduce stormwater discharges or the likelihood thereof, not to completely eliminate discharges. Retention that eliminates the possibility of discharges to any surface waters would require much larger sizing than a retention or detention BMP used to reduce discharges because it would need to be sized to capture even extreme weather

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events.⁶⁶ U.S. EPA estimated that the base cost, which does not include costs of acquiring the land,⁶⁷ annual maintenance costs, design, geotechnical testing, legal fees, land costs, and other unexpected or additional costs such as fees for disposing of contaminated excavated soils, for a retention and detention basins is \$0.50-\$1.00 per cubic foot.⁶⁸ The estimate of typical costs reflects 15,000 – 150,000 cubic feet of storage. Thus, a retention basin for a 50-acre residential site would have the base cost of \$100,000. But this base cost only represents the typical implementation of stormwater BMPs, which only provide for detention or partial retention. A retention basin for a 50-acre residential site that eliminated the possibility of discharge would need to be much larger and therefore is more costly. Most California counties require stormwater basins to be designed to a 2-year, 24-hour storm intensity at minimum. Assuming a typical bare soil runoff coefficient of 0.35 (Type C soil), a 2-year, 24-hour storm (2.27 inches of rainfall) at a 50-acre site in Orange County, for example, would produce a total of approximately 3.31 acre-feet of runoff per day. Adding a normal Factor of Safety for detention structures of 2.0, 5,770 cubic feet of water would need to be retained per acre, or 288,400 cubic feet for the entire parcel. An ‘atmospheric river’ type storm that lasted three days at this intensity would require at least six times this amount of storage, as the runoff coefficient would increase each day. The costs would vary significantly depending on land costs (e.g., urban versus rural area) and slope. Complete retention of all stormwater would not be technologically feasible at all construction sites.

66 For example, in October 2021, there were historic Category 5 atmospheric rivers throughout California.

67 The cost of acquiring land can be substantial.

E.g. [Working Paper 19-01: The Price of Residential Land for Counties, ZIP codes, and Census Tracts in the United States.](#),

<<https://www.fhfa.gov/PolicyProgramsResearch/Research/Pages/wp1901.aspx>> [as of July 19, 2022]. For example, in Los Angeles County, residential land costs were estimated at \$1-3 million per acre. *Id.*

See also, Southern California Coastal Water Research Project. [Concept Development: Design Storm for Water Quality in the Los Angeles Region, Technical Report 520](#). October 1, 2007, page 7.

<https://ftp.sccwrp.org/pub/download/DOCUMENTS/TechnicalReports/520_designStorm.pdf> [as of July 19, 2022].

68 [U.S. EPA Urban Storm Water BMP Preliminary Data Summary - 1999](#), page 6-3.

<https://www.epa.gov/sites/default/files/2015-11/documents/urban-stormwater-bmps_preliminary-study_1999.pdf> [as of July 19, 2022]. Other costs could include, for example, filling, regrading, and vegetating the retention pond after the construction project has concluded.

Certain sediment types are poorly suited for infiltration (e.g., clay soils infiltrate poorly). Construction sites are inherently dynamic, but retention basins cannot move. Stormwater may have different discharge points during different phases of construction, and a retention basin could not be moved to accommodate the changing points. In urban areas with infill development, there is not sufficient space for such large retention basins. In some cases, such large basins could also implicate vector control or public safety issues.⁶⁹ In other areas where the groundwater table is high, it may not be possible to design an effective retention basin without hitting the groundwater table and potentially causing groundwater quality problems.

Even if complete retention were technologically possible, the costs associated with constructing effective complete retention structures are not generally economically feasible for most construction projects.⁷⁰ Expensive, structural BMPs are generally not economically feasible to implement on construction sites, which are temporary in nature, in part because the useful life of the investment is short-term and difficult to recoup. Requiring implementation of substantially more expensive controls may render projects that are beneficial to the people of the state economically infeasible. For example, government-funded road projects often operate on fixed budgets where increased costs on one construction project leaves less money to complete other projects.⁷¹ Similarly, restoration projects are frequently funded by grants. Increased construction costs would render less money available for additional restoration projects. Increased construction

69 Southern California Coastal Water Research Project. [*Concept Development: Design Storm for Water Quality in the Los Angeles Region, Technical Report 520*](#). October 1, 2007, page 7.

<https://ftp.sccwrp.org/pub/download/DOCUMENTS/TechnicalReports/520_designStorm.pdf> [as of July 19, 2022]. Notes the potential trade-offs between water quality and ensuring public safety, including protecting property from flood damage and maintaining passable roadways.

70 Southern California Coastal Water Research Project. [*Concept Development: Design Storm for Water Quality in the Los Angeles Region, Technical Report 520*](#). October 1, 2007, p. 14.

<https://ftp.sccwrp.org/pub/download/DOCUMENTS/TechnicalReports/520_designStorm.pdf> [as of July 19, 2022]. Provides an example. Discusses the feasibility of BMP implementation costs in the Ballona Creek watershed and highlighting the difference between new or redevelopment versus retrofit.

71 [Overview of Transportation Funding](#) (2015).

<<https://lao.ca.gov/handouts/transportation/2015/Transportation-Funding-022315.pdf>> [as of July 19, 2022]. For example, general obligation bonds can help pay for transportation projects and are for a set amount.

costs might also deter affordable housing projects, which operate on thin margins and frequently depend on government subsidies.⁷²

Determining a range of costs for complete retention of stormwater is complex due to the wide variety of conditions. Costs vary widely across construction projects throughout California due to precipitation, size, soil types, topography, and other location-specific factors such as labor costs. Two examples of costs to complete full retention of stormwater on a site with 16 acres of disturbed soil area (mean CGP size), based solely on the difference in precipitation, are as follows:

On a 16-acre project in the rainy North Coast region, a 2 year, 24-hour storm (2.93 inches of rainfall) would require a 148,900 cubic foot capacity detention basin, equivalent to a 29,780 square foot excavation at five feet in depth, including the required one foot of freeboard. A typical cost of \$10/cubic yard for excavation⁷³ is approximately \$55,150, not including off-haul of spoils, if required. In addition, the basin would require engineered backfill if any roadways or buildings were subsequently constructed at the site, increasing the costs by \$415,000 for import backfill and compaction (at \$75/cubic yard).⁷⁴ This scenario would therefore have a total cost of at least \$470,150, since there would be additional costs for engineering design and final grading.

On a 16-acre project in an arid southern California region, the 2-year, 24-hour storm (1.72 inches of rainfall) for a similar level of retention would require an 87,400 cubic foot capacity detention basin at an excavation-only cost of \$32,375. Using the same assumptions as above, engineered backfill would increase the total costs to at least \$275,150.

The above examples show excavation and backfill costs only for a one-day design storm, and would add \$3,000–\$5,000 to the cost of each house in a typical residential development, depending on location (based on six houses/acre). However, an ‘atmospheric river’ storm lasting three days at the same intensity would require far more retention capacity, as the runoff coefficient would increase each day. In the northern part of the state, such a storm would necessitate an 893,400 cubic foot (33,100 cubic yard) basin, covering four acres at a four-foot depth and one foot of freeboard. The costs

72 [Affordable Housing and Sustainable Communities Program](https://www.hcd.ca.gov/affordable-housing-and-sustainable-communities).

<<https://www.hcd.ca.gov/affordable-housing-and-sustainable-communities>> [as of July 19, 2022]. Provides an example.

73 [Caltrans project 01-476604, Mendocino County, Item 044](http://website.dot.ca.gov/hq/construc/estdet/01-476604-025.txt).

<<http://website.dot.ca.gov/hq/construc/estdet/01-476604-025.txt>> [as of July 19, 2022]

74 [Caltrans project 01-262004, Mendocino County, Item 072](http://website.dot.ca.gov/hq/construc/estdet/01-262004-064.txt).

<<http://website.dot.ca.gov/hq/construc/estdet/01-262004-064.txt>> [as of July 19, 2022]

for excavation and engineered backfill would amount to \$2.8 million. Complete retention of stormwater for all construction sites regulated by this General Permit would be cost prohibitive.

- **Active treatment:** This approach would be to require the use of active treatment of all construction stormwater prior to discharge in areas with high quality waters. This approach may not be feasible because generally speaking, this permit may not specify the design location, type of construction, or particular manner in which compliance may be achieved with a requirement. (Wat. Code, § 13360.) In addition, active treatment is highly effective at treating water for TSS and turbidity, but generally does not remove pollutants that do not sorb to sediment, such as dissolved phase metals and hydrocarbon compounds. In order for this approach to be successful in guaranteeing no degradation of high quality waters, it would be necessary for active treatment to reliably treat all pollutants to levels that are equal to, or better than, the actual levels of each pollutant in each waterbody. Such limitations could only be established if the high quality waterbody and existing levels of each pollutant for which that water was high quality were known. As explained above, this data does not exist on a statewide basis. In addition, active treatment of all stormwater would likely be cost-prohibitive for some construction sites, because the cost of active treatment is directly related to the volume of stormwater that must be treated. For example, costs for a one-time use of active treatment systems ranges from \$10,029 for 1.9 acres to \$96,674 for 145 acres.⁷⁵ However, current information obtained from staff conversations with an active treatment system vendor in the Sacramento area indicates that installed systems typically range from \$70,000-\$80,000 for a 200 gallon per minute seasonal system to \$700,000 for a 2,000 gallon per minute seasonal system such as may be required to accommodate 3-inch storm events on a 16-acre site. Finally, based on staff conversations with the same active treatment system vendor and staff's limited market search for additional active treatment vendors, active treatment systems are not evenly distributed throughout the state and there are currently an insufficient number of systems available to deploy to all construction sites during regional precipitation events.

75 U.S. EPA, [Development Document for Final Effluent Guidelines and Standards for the Construction & Development Category](#) (Nov. 2009) page. 9-35.

<[https://www.epa.gov/sites/default/files/2015-](https://www.epa.gov/sites/default/files/2015-06/documents/construction_development_dd_2009_chapters_1-11.pdf)

[06/documents/construction_development_dd_2009_chapters_1-11.pdf](https://www.epa.gov/sites/default/files/2015-06/documents/construction_development_dd_2009_chapters_1-11.pdf)> [as of July 19, 2022]

- **Establishment of numeric effluent limitations for discharges to high quality waters:** In order to prevent any degradation of any high quality water under this approach, the General Permit would have to implement water quality-based numeric effluent limitations that are equal to, or lower than, the actual ambient levels of each pollutant in each waterbody. Such limitations could only be established if the high quality waterbody and existing levels of each pollutant for which that water was high quality were known. As explained above, this data does not exist on a statewide basis. Even if the data did exist, it would not be possible to determine whether the methods to achieve compliance with the numeric effluent limitations would be technically or economically feasible at most or all construction sites. Further, because such numeric effluent limitations would necessarily be waterbody and pollutant specific, administration of such limitations would not be feasible under the General Permit structure.

Alternative 3 – Given the uncertainties about the locations of, and data limitations about, high quality waters, a third alternative would be to mandate specific requirements that would apply to all construction projects statewide. These statewide requirements could include more numeric effluent limitations, more stringent numeric action levels, or requiring the installation of specific BMPs, like active treatment.

- **Require on-site stormwater retention for a compliance storm:** Because a prohibition on all discharges is not feasible as discussed above, one approach would be to require controls that eliminated discharges in most storms. For example, dischargers could be required to retain all runoff from the 95th percentile, 24-hour storm volume or the 85th percentile, 24-hour storm volume.⁷⁶ Requiring all construction sites to install retention basins designed to retain all stormwater from large “compliance storms,” rather than complete retention from storms of all sizes, would encounter similar technological and economic difficulties as those identified above, just at a somewhat lesser scale. Considerations would have to include engineering design cost, available space for both the basin and excavation spoils stockpiles, avoidance of underground utility installations, schedule delays caused by constructing, using, backfilling and regrading the basin, off-haul of spoils and import of

76 Southern California Coastal Water Research Project. [*Concept Development: Design Storm for Water Quality in the Los Angeles Region, Technical Report 520*](#), October 1, 2007, page 12.

<https://ftp.sccwrp.org/pub/download/DOCUMENTS/TechnicalReports/520_designStorm.pdf> [as of July 19, 2022]. For example, a BMP sized to capture 90% instead of 80% of decadal runoff volume would require a BMP nearly triple the size.

engineered fill, if required, disposition of accumulated stormwater or allowance for evaporation, vector control, and safety barriers. Further, there is no guarantee that the discharges from storms larger than the selected compliance storm would not cause degradation of high quality waters.

- **Establishment of numeric technology based effluent limitations statewide:** Even assuming that there might be a treatment technology that, if utilized, could guarantee no degradation of high quality waters, the State Water Board does not have the data that would be necessary to impose effluent limitation that would be derived from the use of that technology. In previous litigation, the superior court determined that the State Water Board did not have sufficient BMP performance data to impose technology based numeric effluent limitations for pH and turbidity for Risk Level 3 sites. Absent the development of this needed additional data, the Board would not be able to support the implementation of numeric technology based effluent limitations to prevent any possibility of degradation.⁷⁷
- **Active treatment:** This option would suffer from the same problems identified for active treatment described under alternative 2, above. Consistent with the Blue Ribbon Panel's findings, active treatment is not feasible for all sites: "The active treatment systems have generally been employed on sites five acres or larger. While the systems are technically

⁷⁷ *California Building Industry Association v. State Water Resources Control Board*, Sacramento Superior Court Case No. 34-20009-80000338-CU-WM-GDS. Effluent Limitations Guidelines and Standards for the Construction and Development Point Source Category, 79 Federal Register 12661-01 (March 06, 2014). The U.S. EPA provides an explanation for not including a previous numeric effluent limitation for turbidity in its Effluent Limitation Guidelines for construction stormwater: "At this time, EPA is concerned that a numeric limitation may create a disincentive to green infrastructure techniques for managing stormwater. For example, meeting a numeric standard may require installation of a sediment basin or other impoundment on certain sites, which may be a disincentive to installing distributed stormwater controls. Also, EPA recognizes that additional data collection would likely be necessary in order to inform any establishment of numeric discharge standards and monitoring requirements in the future. At such time that EPA decides on a path forward with respect to numeric discharge standards and monitoring requirements, EPA will take appropriate actions to notify interested stakeholders. EPA encourages interested parties to continue submitting data and information to EPA with respect to numeric discharge standards at construction sites."

feasible for sites of any size, including sites or drainages as small as an acre or less, the cost may be prohibitive.”⁷⁸

- **Use of other, specific BMPs:** Alternative 1 already requires the use of minimum BMPs such as non-structural BMPs (e.g., maintenance, good housekeeping, staff training/education, proper handling, spill response, project planning/scheduling) and source control BMPs (e.g., site design and planning, irrigation). This alternative approach would be to specify that certain additional BMPs would need to be used at all sites. This approach may not be feasible because generally speaking, as discussed above, this General Permit may not specify the design location, type of construction, or particular manner in which compliance may be had with a requirement. (Wat. Code, § 13360.) In addition, the efficacy of any structural BMPs are both site specific and pollutant specific, such that there are not universally beneficial BMPs that should be mandatory on all sites.

One of the first basic steps in creating a stormwater management plan is to assess site and watershed conditions. Site and watershed conditions include information such as geographic features or landmarks, drainage patterns, and general topography. Next, a plan should evaluate pollutants of concern and other additional benefits that BMPs can provide. Accordingly, the selection of appropriate BMPs is a highly site-specific inquiry. Because of the complexity of appropriate BMP selection, the permit requires a qualified stormwater professional to identify the appropriate site-specific BMPs and prepare the SWPPP. The General Permit imposes substantial education and training requirements for qualified stormwater professionals to ensure that the selection of site-specific BMPs is appropriate. (See General Permit, Sections V.C. – V.I.)

For example, bioretention basins are very effective for multiple pollutants, but are not feasible at many construction sites, as discussed in further detail in Fact Sheet, Section I.G.5.d. Media filters are another BMP that may be effective at removing multiple pollutants, but are already typically recommended by qualified stormwater professionals under Alternative 1. Accordingly, requiring the universal use of specific structural BMPs for antidegradation purposes is not a feasible alternative because requiring specific BMPs may not be effective at reducing pollution and may not be technically feasible or cost effective depending on site characteristics.

⁷⁸ The Feasibility of Numeric Effluent Limits Applicable to Discharges of Storm Water Associated with Municipal, Industrial, and Construction Activities, page 16.

iii. Economic and Social Development Considerations and Consistency with Maximum Benefit to the People of the State

The State Water Board adopts the approach set forth in Alternative 1 for the General Permit. This alternative may allow limited and temporal degradation of high quality waters by construction stormwater discharges, but this alternative does require all construction stormwater discharges to not cause or contribute to exceedances of water quality objectives or interfere with the maintenance and protection of beneficial uses for high quality waters in all cases. Two of the approaches described under Alternative 2 would guarantee no degradation of high quality waters (i.e., construction prohibition and prohibition on discharges), but all of the approaches described under Alternative 2 are infeasible for the reasons described above and would hamper important social and economic development. The approaches described under Alternative 3 would not guarantee no degradation of high quality waters from authorized discharges, and are either technically or economically infeasible, or contrary to the framework of a general permit in which the methods for reducing or eliminating pollutants in stormwater discharges are developed by a stormwater professional and tailored to each individual construction site, or both.

The limited and temporal degradation of high quality waters that could occur under this General Permit is necessary to accommodate important economic or social development in the area and is consistent with the maximum benefit to the people of the state. Construction activities support important economic and social development. Construction is a large, vital industry in California, adding an estimated \$240 billion in value in 2017 and a major source of employment.⁷⁹ The U.S. Bureau of Labor Statistics estimates that there are 968,760 construction laborers in California.⁸⁰ Construction projects include critical infrastructure (e.g., broadband

79 U. S. Census Bureau. [Construction \(NAICS Sector 23\)](#), (2017).

<<https://www.census.gov/data/tables/2017/econ/economic-census/naics-sector-23.html>> [as of July 19, 2022].

Legislative Analyst's Office. [CalFacts 2018](#). Construction is one of the major sectors for California's 17 million jobs. <<https://lao.ca.gov/reports/2018/3905/calfacts-2018.pdf>> [as of July 19, 2022].

80 U. S. Bureau of Labor Statistics. [Occupation Employment and Wage Statistics, 47-2061 Construction Laborers](#) (May 2021).

<<https://www.bls.gov/oes/current/oes472061.htm>> [as of July 19, 2022].

internet,⁸¹ roads,⁸² utility lines), public safety (e.g., flood control,⁸³ system hardening⁸⁴), restoration,⁸⁵ housing,⁸⁶ and commercial development. As noted by many commenters on the draft versions of this General Permit, California is facing a housing shortage.

Where there is a public utility, increased construction costs could be passed on by increased fees to utility users or road users. Higher construction costs could affect whether a housing project remains affordable.

Importantly, under Alternative 1, notwithstanding the possibility of limited and temporal degradation from some authorized stormwater discharges, the State Water Board finds that authorized stormwater discharges will not cause or contribute to exceedances of water quality objectives in high quality waters, and therefore will not cause pollution or conditions of nuisance or otherwise adversely affect beneficial uses of the receiving waterbodies. Because all beneficial uses will be maintained and protected, there will be only very minor impacts to water quality resulting from any degradation that does occur, so any resulting harm to the public interest associated with any degradation will also be very minor and speculative

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- 81 State of California Executive Department. [Executive Order N-73-20](https://www.gov.ca.gov/wp-content/uploads/2020/08/8.14.20-EO-N-73-20.pdf) (August 14, 2020). <<https://www.gov.ca.gov/wp-content/uploads/2020/08/8.14.20-EO-N-73-20.pdf>> [as of July 19, 2022].
- 82 State Highway Operation and Protection Program. [Ten-Year Project Book, Fiscal Years 2021/22-2030/31](https://dot.ca.gov/-/media/dot-media/programs/asset-management/documents/2022-q2-book-combined-a11y.pdf). <<https://dot.ca.gov/-/media/dot-media/programs/asset-management/documents/2022-q2-book-combined-a11y.pdf>> [as of July 19, 2022].
- 83 California Department of Water Resources. [Small Communities Flood Risk Reduction](https://water.ca.gov/Work-With-Us/Grants-And-Loans/Small-Communities-Flood-Risk-Reduction). <<https://water.ca.gov/Work-With-Us/Grants-And-Loans/Small-Communities-Flood-Risk-Reduction>> [July 19, 2022].
- 84 E.g., [Governor Newsom Signs Historic Legislation to Boost California's Housing Supply and Fight the Housing Crisis](https://www.nytimes.com/2021/07/21/business/energy-environment/pge-underground-powerlines-wildfires.html) (September 16, 2021). <<https://www.nytimes.com/2021/07/21/business/energy-environment/pge-underground-powerlines-wildfires.html>> [as of July 19, 2022]. In response to wildfires, utility companies aim to put power lines underground.
- 85 Southern California Wetlands Recovery Project. [Work Plan 2020](https://scwrp.org/wp-content/uploads/2020/04/Work-Plan-Report-2020.pdf). <<https://scwrp.org/wp-content/uploads/2020/04/Work-Plan-Report-2020.pdf>> [as of July 19, 2022].
- 86 Office of the Governor. [Governor Newsom Signs Historic Legislation to Boost California's Housing Supply and Fight the Housing Crisis](https://www.gov.ca.gov/2021/09/16/governor-newsom-signs-historic-legislation-to-boost-californias-housing-supply-and-fight-the-housing-crisis/) (September 16, 2021). <<https://www.gov.ca.gov/2021/09/16/governor-newsom-signs-historic-legislation-to-boost-californias-housing-supply-and-fight-the-housing-crisis/>> [as of July 19, 2022]. In 2021, Governor Newsom signed bipartisan legislation to expand housing production in California.

because all high quality waters will still fully support all beneficial uses. Therefore, it is not necessary to analyze the harm to the public interest associated with the authorized stormwater discharges, especially in a generalized and simple antidegradation analysis.

iv. Requirement for Highest Statutory and Regulatory Requirements and Best Practicable Treatment and Control

The permit requires the highest statutory and regulatory requirements and requires that the dischargers meet best practicable treatment or control and, as described more fully above, requires the following:

- Implementation of BAT/BCT/BPT, including compliance with U.S. EPA's effluent limitation guidelines for the construction and development category as the level of pollutant abatement that is the best available technology economically achievable;
- Compliance with receiving water limitations;
- Enhanced requirements on non-stormwater discharges;
- TMDL-specific requirements that are consistent with the waste load allocations established by TMDLs that identify construction stormwater as a source; and
- Reservation of authority for the Regional Water Boards to retain the ability to impose additional sampling and monitoring requirements or coverage under an individual NPDES permit if necessary.

v. Public Participation:

Numerous public participation opportunities have been provided during the development of this permit. In addition to the minimum public participation requirements required by the federal regulations governing NPDES permits and Water Code § 13167, State Water Board staff has met informally with stakeholders, held staff workshops, and accepted comments on an administrative draft of the permit.

I.I. Regional Water Board Authorities

Because this General Permit will be issued to thousands of construction sites across the State, the Regional Water Boards retain discretionary authority over certain issues that may arise from the discharges in their respective regions. This General Permit does not grant the Regional Water Boards any authority they do not otherwise have; rather, it merely emphasizes that the Regional Water Boards can take specific actions related to this General Permit. For example, the Regional Water Boards will be enforcing this General Permit and may need to adjust some requirements for a discharger based on the discharger's compliance history.

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I.J. Construction Activities Covered

I.J.1. General Activities Covered

Construction activity phases (demolition and pre-development site preparation, grading and land development, streets and utilities, vertical construction, and final landscaping and site stabilization) can impact a construction site's runoff sediment supply, pollutant loading, and transport characteristics. These modifications can occur both during and after the construction phase and, without proper controls, such as the requirements set forth in this General Permit, could result in significant degradation of the established water body beneficial uses in California. The primary stormwater pollutant at construction sites is excess sediment. Excess sediment can cloud the water and reduce the amount of sunlight reaching aquatic plants, clog fish gills, smother aquatic habitat and spawning areas, and impede navigation in our waterways. Sediment also transports other pollutants such as nutrients, metals, oils, and greases, and pesticides. In addition to sediment, other pollutants that are commonly associated with construction activities include, but are not limited to, pollutants from cement, stucco, paints, cleaning materials, general debris, chemicals associated with historical structures mobilized through demolition, historical contamination chemicals in soil mobilized by construction disturbance, and other construction related products easily transported by stormwater runoff. Dischargers can reduce and avoid the effects of these pollutants on water quality through better construction site design and use of best management practices (BMPs).

- a. In accordance with the Ninth Circuit Court of Appeals' decision in *Natural Resource Defense Council v. U.S. EPA* (9th Cir. 2008) 526 F.3d 591, and subsequent denial of the U.S. EPA's petition for reconsideration in November 2008, oil and gas construction activities discharging stormwater contaminated only with sediment are no longer exempt from the NPDES program;
- b. Site geotechnical investigation work requires special precaution when backfilling bore holes so that aquifers are adequately protected from surface contamination;
- c. Disturbances related to geotechnical or other site investigation work is a construction activity requiring permit coverage;
- d. Construction activities that disturb 1 or more acres of soil associated with the construction of new fire prevention methods (e.g., fire barriers, fire breaks, and fire prevention areas) require permit coverage;
- e. Stormwater discharges from dredge spoil placement that occur outside of U.S. Army Corps of Engineers jurisdiction (upland sites) and that disturb one or more acres of land surface from construction activity are covered by this General Permit. Construction projects that include in-water work that require a

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Clean Water Act 404 permit should contact the Regional Board to determine whether a Clean Water Act 401 Certification is necessary; and

- f. Concrete mixing for the purpose of construction, in which all mixing activities occur solely within a specific project site, may do so under this General Permit. The project site boundary are those as defined in the project's site-specific SWPPP.

I.J.2. Linear Underground and Overhead Projects subject to this General Permit

- a. Underground and overhead facilities typically constructed as linear underground and overhead projects include, but are not limited to, any conveyance, pipe, or pipeline for the transportation of any gaseous, liquid (including water, wastewater for domestic municipal services), liquescent, or slurry substance; any cable line or wire for the transmission of electrical energy; any cable line or wire for communications (e.g., telephone, telegraph, radio, or television messages); and associated ancillary facilities. Construction activities associated with linear underground and overhead projects include, but are not limited to, those activities necessary for the installation of underground and overhead linear facilities (e.g., conduits, substructures, pipelines, towers, poles, cables, wires, connectors, switching, regulating and transforming equipment and associated ancillary facilities) and include, but are not limited to, underground utility mark-out, potholing, concrete and asphalt cutting and removal, trenching, excavation, boring and drilling, access road and pole/tower pad and cable/wire pull station, substation construction, substructure installation, construction of tower footings and/or foundations, pole and tower installations, pipeline installations, welding, concrete and/or pavement repair or replacement, and stockpile/borrow locations.
- b. Water Quality Order 2003-0007-DWQ regulated construction activities associated with small linear underground and overhead projects that resulted in land disturbances greater than one acre, but less than five acres. These projects were considered non-traditional construction projects. Attachment E of this Order now regulates all construction activities from linear underground and overhead projects resulting in land disturbances greater than one acre.
- c. All disturbances to the ground must be accounted for and considered additive. The following formula attempts to account for all disturbances from the construction activity, not just the trenching activity itself:

$$\text{Total Disturbed Area} = W_t * L_t + A_p + D_b * N_b + W_r * L_r$$

Where:

- W_t is the width of the disturbance, including trench width, plus the immediate access width;
- L_t is the length of the trench or project pipe;

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- A_p is the area where project-related activity occurs (i.e., equipment and material storage, staging, and preparation areas not on paved surfaces, ancillary facility areas);
- D_b is the bore hole diameter multiplied by the immediate access width;
- N_b is the number of bore holes;
- W_r is the new road construction width; and
- L_r is the length of the new road.

This formula illustrates how to account for all disturbances to the ground resulting from the construction activity. Although dischargers are not required to use this exact formula, they must include all disturbances to the ground in their total calculation.

- d. The visual inspection requirements set forth in Monitoring and Reporting Requirements in Attachment E are applicable to all linear underground and overhead projects regardless of type.
- e. This General Permit's visual inspection requirements apply to linear underground and overhead project Type 1 projects in both populated (developed or paved) and rural (undeveloped or unpaved) settings. In a populated environment, daily closure requirements for an open excavation may be an important element of a SWPPP for stormwater protection and safety plans because open excavations present a safety hazard to both pedestrians and traffic. However, uncovered excavations in rural settings do not pose as significant a threat to safety. Likewise, it makes sense for linear underground and overhead project Type 1 projects in developed settings to return disturbed land back to pre-construction conditions daily, because of incidental non-stormwater discharges in an urban environment and the associated potential for runoff from paved, impermeable surfaces. However, projects in rural settings, are less likely to have impervious surfaces and non-stormwater discharges and may not present the same threat to water quality.

I.J.3. Demolition

- a. When a construction project involves demolition or renovation, construction and demolition debris is created. Construction and demolition debris can consist of three types of wastes:
 - i. Inert or non-hazardous waste;
 - ii. Hazardous waste as regulated by the United States Environmental Protection Agency under the Resource Conservation and Recovery Act (RCRA); and
 - iii. Items that contain hazardous components that might be regulated by the state.

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b. This General Permit requires best management practices (BMPs) to reduce the exposure of hazardous materials found in older structures from mobilizing in stormwater. Common hazardous materials related to demolition can be found on the U.S. EPA's website⁸⁷ and include but are not limited to:

i. Asbestos-Containing Materials

State of California Department of Industrial Relations Cal/OSHA has adopted regulations regarding asbestos exposure California Code of Regulations, Title 8, § 1529.

ii. Mercury Containing Devices

Many structures utilize devices that contain mercury. Mercury is persistent and toxic to human health and the environment. Mercury containing devices such as thermostats fluorescent lamps shall be isolated, removed and taken to an appropriate disposal facility.

iii. Lead-Based Paint

Older structures have a high likelihood of containing lead-based interior and exterior lead-based paint. During the demolition process the lead-based paint can be mobilized and behave like dust. The lead-based paint can be inhaled by workers on the demolition site and tracked off-site causing hazardous exposure to lead to the community. Therefore, it is important to minimize exposure by implementing lead-safe practices during demolition activities.

iv. Polychlorinated Biphenyls (PCBs) in Caulk

PCBs have been identified in caulk in many older structures. Protective BMPs and OSHA approved Personal Protective Equipment shall be utilized to prevent the exposure of PCBs to workers and the surrounding environment during and after demolition.

In order to be in compliant with all PCB TMDLs, Mercury TMDLs and statewide policies, dischargers are required to schedule demolition at times of the year with a low probability of a precipitation event, cover demolished material when activity stops for the day or prior to precipitation, or have a certified individual examine the structure for hazardous materials and mitigate the hazard with a method that prevents the material from discharging off-site.

⁸⁷ U.S. EPA, [Harmful Materials and Residential Demolition](https://www.epa.gov/large-scale-residential-demolition/harmful-materials-and-residential-demolition), <<https://www.epa.gov/large-scale-residential-demolition/harmful-materials-and-residential-demolition>> [as of May 20, 2021]

Because of the production ban of PCBs in 1979, this General Permit has requirements for demolition of buildings built prior to January 1, 1980.⁸⁸

I.J.4. Common Plan of Development or Sale

U.S. EPA regulations include the term “common plan of development or sale” to ensure that acreage within a common project does not artificially escape this General Permit’s requirements because construction activities are phased, split among smaller parcels, or completed by different owners or developers. The State Water Board is required to exercise its regulatory discretion in providing a common-sense interpretation of the term as it applies to construction projects and permit coverage. An overbroad interpretation of the term would render meaningless the clear “one acre” federal permitting threshold and would potentially trigger permitting of almost any construction activity that occurs within an area that had previously received area-wide utility or road improvements.

The 2008 U.S. EPA NPDES General Permit for Discharges from Construction Activity (2008 Construction General Permit) provided further clarification on the common plan of development or sale regarding non-contiguous construction activities. Where discrete construction projects within a larger common plan of development or sale are located at least 1/4 mile apart and the area between the projects is not being disturbed, each individual project can be treated as a separate plan of development or sale provided any interconnecting road, pipeline, or utility project that is part of the same “common plan” is not concurrently being disturbed. For example, oil and gas well pads separated by 1/4 mile could be treated as separate projects. However, if the same two well pads and an interconnecting access road were all under construction at the same time, they would generally be considered as part of a single “common plan” for permitting purposes. If a utility company was constructing new trunk lines off an existing transmission line to serve separate residential subdivisions located more than 1/4 mile apart, the two trunk line projects could be considered separate projects.

Construction projects generally receive grading and/or building permits (Local Permits) from local authorities prior to initiating construction activity. These Local Permits spell out the scope of the project, the parcels involved, the type of construction approved, etc. Referring to the Local Permit helps define “common plan of development or sale.” In cases such as tract home development, a Local Permit will include all phases of the construction project including rough grading, utility and road installation, and vertical construction. All construction activities approved in the Local Permit are part of the common plan and must remain under the General Permit until construction is completed. For custom home construction,

⁸⁸ Geosyntec Consultants for the Bay Area Stormwater Management Association. Integrated Monitoring Report Part B: PCB and Mercury Loads Avoided and Reduced via Stormwater (IMR). 2013.

Local Permits typically only approve vertical construction as the rough grading, utilities, and road improvements were already independently completed under the previous Local Permit. In the case of a custom home site, the homeowner must submit plans and obtain a distinct and separate Local Permit from the local authority in order to proceed. General Permit coverage for an individual homeowner building a custom home on a private lot of less than one acre is not required. Similarly, the installation of a swimming pool, deck, or landscaping that disturbs less than one acre that was not part of any previous Local Permit are not required to obtain General Permit coverage.

The following are several examples of construction activity of less than one acre that would require permit coverage:

- a. A landowner receives a building permit(s) to build tract homes on a 100-acre site split into 200 one-third acre parcels, (the remaining acreage consists of streets and parkways) which are sold to individual homeowners as they are completed. The landowner completes and sells all the parcels except for two. Although the remaining two parcels combined are less than one acre, the landowner must continue permit coverage for the two parcels.
- b. One of the parcels discussed above is sold to another owner who intends to complete the construction as already approved in the local permit. The new landowner must electronically certify and submit Permit Registration Documents to complete the construction even if the new landowner is required to obtain a separate Local Permit.
- c. The landowner in (1) above purchases 50 additional one half-acre parcels adjacent to the original 200-acre project. The landowner seeks a Local Permit (or amendment to existing local permit) to build on 20 parcels while leaving the remaining 30 parcels for future development. The landowner must amend Permit Registration Documents to include the 20 parcels 14 days prior to commencement of construction activity on those parcels.

I.K. Construction Activities Not Covered

I.K.1. Traditional and Linear Construction Activities Not Covered

Construction activities not covered by this General Permit are listed in the Order Section II.B and Section II.D.

I.K.2. Notice of Non-Applicability

Reliance on approved jurisdictional determinations is not allowed in the General Permit for a number of reasons. First, approved jurisdictional determinations delineate the scope of waters of the United States. They do not determine whether an activity results in a discharge to a water of the United States. Second, the scope of waters of the United States is subject to changes based on change of regulations or judicial decisions. Approved jurisdictional determinations are valid

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for a discrete number of years, and they may not be up-to-date with respect to implementing the current regulations if there is an intervening change during the duration of the validity of the approved jurisdictional determination. Finally, it is likely that the approved jurisdictional determination was requested by another party and in another context, such as the discharge of dredged or fill material. As such, the findings may not be easily extrapolated.

In 1998, the California Water Code was amended to require entities who are requested by the State Water Board to obtain General Permit coverage, but that have a valid reason to not obtain General Permit coverage, to submit a Notice of Non-Applicability (NONA). (Cal Wat. Code, § 13399.30, subd. (a)(2)).

The State Water Board considered allowing Entities to review United States Army Corp of Engineer approved jurisdictional determinations to evaluate, without a California licensed professional geologist, whether their facility location is within a basin and/or other physical location that is not hydrologically connected to waters of the United States. The State Water Board believes that this process can be difficult in some cases. In addition, there may be areas of the state that are not hydrologically connected to waters of the United States for which there is not a corresponding United States Army Corps of Engineer approved Jurisdictional Determination. Therefore, all “No Discharge” Technical Reports must be signed (wet signature and license number) by a California licensed professional engineer or geologist. In addition, the discharger must obtain a concurrence letter from the Regional Water Board that has jurisdiction over the site location.

I.K.3. Small Construction Erosivity Waiver

The U.S. EPA’s Stormwater Phase II Final Rule provides the option for a Small Construction Rainfall Erosivity waiver. This waiver applies to construction sites between 1 and 5 acres and allows permitting authorities to waive those sites that do not have adverse water quality impacts.

Projects that do not qualify for the Small Construction Rainfall Erosivity waiver include:

- a. Projects that are part of a larger common plan of development disturbing more than 5 acres; and/or
- b. Projects with construction lasting one year or greater.

Dischargers eligible for the Small Construction Erosivity waiver are exempt from coverage for this General Permit. The discharger must certify and submit to the State Water Board that small construction activity will occur only when the rainfall erosivity factor (“R” factor in the Revised Universal Soil Loss Equation) is less than 5 to obtain the waiver. The period of construction activity begins when the WDID number is issued and ends when the disturbed areas of the project meet the final stabilization conditions in Order Section III.H. The R value is calculated from the construction start date through all phases of construction (initial land disturbance

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through final stabilization). Small projects that are part of a larger plan of development (less than 5 combined acres of disturbance) use the earliest start date associated with the plan of development and their estimated time of meeting the final stabilization requirements.

Projects that qualify for the small construction erosivity waiver are not subject to the post-construction standards of this General Permit, but may be subject to existing permitted Phase I or Phase II municipal separate storm sewer system (MS4) post-construction requirements.

A waiver eligibility condition requires the operator to periodically inspect and properly maintain the area until the criteria for final stabilization defined in this General Permit is met. If use of this interim stabilization eligibility condition is relied upon to qualify for the waiver, a signature on the waiver with a certification statement constitutes acceptance of and commitment to complete the final stabilization process. The discharger must apply for a waiver in SMARTS prior to commencing construction activities.

U.S. EPA funded a cooperative agreement with Texas A&M University to develop an online rainfall erosivity calculator. Dischargers can access the calculator from the U.S. EPA's website.⁸⁹ Use of the calculator allows the discharger to determine potential eligibility for the rainfall erosivity waiver. It may also be useful in determining the time periods during which construction activity could be waived from General Permit coverage.

I.L. Obtaining and Modifying General Permit Coverage

This General Permit states the Legally Responsible Person (LRP) or a person legally authorized to sign and certify on behalf of the LRP is responsible for obtaining General Permit coverage. The LRP must electronically submit⁹⁰ Permit Registration Documents prior to commencement of construction activities in the Stormwater Multiple Application Report Tracking System (SMARTS). Permit Registration Documents consist of:

- A Notice of Intent;
- A Risk Assessment;
- Post-Construction Calculations (when applicable);
- A Site Map;
- A SWPPP; and

⁸⁹ U.S. EPA, [Rainfall Erosivity Factor Calculator for Small Construction Sites](https://lew.epa.gov/), <https://lew.epa.gov/> [as of May 20, 2021]

⁹⁰ Each signatory (LRP or DAR) must have an electronic authorization form on file with the State Water Board for each organization they represent in SMARTS.

- The application fee.

A Waste Discharge Identification number (WDID) will automatically be emailed to the LRP once these components have been submitted and are deemed complete. Failure to obtain coverage under this General Permit for stormwater discharges to waters of the United States is a violation of the Clean Water Act and the California Water Code.

The LRP is typically the person who possesses the title of the land, easement, or leasehold interest of the estate upon which the construction activities will occur for the regulated site. The LRP for linear underground and overhead projects is typically the person authorized to make management decisions of the utility company, municipality, or other public or private company or agency that owns or operates the linear underground and overhead project.

The Duly Authorized Representative is a person who has legal authority to sign, certify, and electronically submit Permit Registration Documents and Notices of Termination on behalf of the Legally Responsible Person.

It is expected that as the stormwater program develops, the Regional Water Boards may issue general or individual permits containing more specific provisions. If this occurs, this General Permit no longer regulates those dischargers obtaining coverage under those general or individual permits.

Any information provided to the Regional Water Board shall comply with the Homeland Security Act and any other federal law that concerns security in the United States; any information that does not comply should not be submitted.

Annual Reports must be submitted by projects that are enrolled under this General Permit for more than 90 days in a reporting period. The Annual Reports shall be submitted electronically in SMARTS. Annual Reports are due to the State Water Board by September 1st of each year with a July 1st through June 30th reporting period.

The application requirements clearly identify the responsible parties, locations, and scope of operations of dischargers covered by this General Permit and documents the discharger's knowledge of the General Permit's requirements. Regional Water Boards will enter their inspection and enforcement data into SMARTS.

Coverage under this General Permit remains in effect until a Notice of Termination is submitted in SMARTS and approved by the applicable Regional Water Board where the project is located. The discharger is responsible for any missed or outstanding invoices if the Regional Water Board denies the Notice of Termination. For outstanding invoices, a complete Notice of Termination must be received by the Regional Water Board 90 days from the original invoice date in order to cancel the invoice. The invoice is deemed valid and payable if a complete Notice of Termination is received after 90 days.

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This General Permit allows a discharger to terminate portions of a construction project if those portions have been sold to another owner. This General Permit is not transferable, so the new owner has the responsibility to obtain coverage, update the Stormwater Pollution Prevention Plan (SWPPP), and comply with General Permit requirements. The seller must notify the new owner about their responsibilities concerning this General Permit and must notify the State Water Board by submitting the new owner's name, address, and phone number on the Change of Information form for the termination to be processed. The seller must also disclose the state of construction, if construction activity is ongoing, or if the post-construction requirements are completed. The new owner for ongoing construction activity after the change of ownership is not exempt from this General Permit's SWPPP requirements and must submit new Permit Registration Documents within 30 days of the date of change of ownership. The new owner is expected to review and update the existing SWPPP to ensure it is appropriate for the construction activity being undertaken.⁹¹

The Legally Responsible Person is always ultimately responsible for project compliance. This individual must certify the Permit Registration Documents and will be the recipient of any Notices of Violations or Administrative Civil Liabilities (fines) for the project.

The current annual fees are included in the Water Code fee schedule⁹² and are based on total disturbed area (acres) of the construction project. Projects continuing from the previous permit into this General Permit will pay the annual fees based on their current billing cycle.

Consistent with the 2022 U.S. EPA NPDES General Permit for Discharges from Construction Activity, this General Permit requires the discharger to post a sign or other General Permit coverage notice at a location viewable and legible by the public from a safe, publicly accessible location. This General Permit requires the posting of the project's unique WDID number, waiver identification number, and site and project contact information. If posting in a publicly accessible location is not possible, the discharger must make the site-specific WDID readily available upon request.

91 The SWPPP must be amended, or a new SWPPP developed by the discharger's QSD if not already in compliance with this General Permit's SWPPP requirements in the Order for Linear Underground and Overhead Projects.

92 State Water Resources Control Board, [NPDES Storm Water Fees](https://waterboards.ca.gov/resources/fees/water_quality/#stormwater), <https://waterboards.ca.gov/resources/fees/water_quality/#stormwater> [as of May 20, 2021]

I.M. Notice of Termination Final Stabilization

This General Permit is consistent with the 2022 U.S. EPA NPDES General Permit for Discharges from Construction Activity which requires the following for Notice of Termination final stabilization:

- I.M.1. Establish uniform, perennial cover of vegetation⁹³ (i.e., evenly distributed, without large bare areas) to provide 70 percent or more of the cover that is provided by permanent vegetation in local undisturbed areas; and/or
- I.M.2. Implement permanent non-vegetative stabilization measures to provide effective cover of any areas of exposed soil.
- I.M.3. Exceptions:
 - a. Arid, semi-arid, and drought-stricken areas. Final stabilization is met if the area has been seeded or planted to establish vegetation that provides 70 percent or more of the cover that is provided by permanent vegetation in local undisturbed areas within three years and, to the extent necessary to prevent erosion on the seeded or planted area, non-vegetative erosion controls have been applied that provide cover for at least three years without active maintenance.
 - b. Disturbed areas on agricultural land that are restored to their preconstruction agricultural use.
 - c. Areas that need to remain disturbed (e.g., racetracks, animal corrals, baseball diamonds, etc.). In limited circumstances, stabilization may not be required if the intended function of a specific area of the site necessitates that it remains disturbed, and only the minimum area needed remains disturbed (e.g., dirt access roads, utility pole pads, areas being used for storage of vehicles, equipment, materials).

I.N. Discharge Prohibitions

This General Permit authorizes the discharge of stormwater to surface waters from construction activities that result in the disturbance of one or more acres of land, provided that the discharger satisfies all General Permit conditions. This General Permit prohibits the discharge of pollutants other than stormwater and non-stormwater discharges authorized by this General Permit or another NPDES permit. This General Permit also prohibits all discharges which contain a hazardous substance in excess of reportable quantities established in 40 Code of Federal Regulations §§ 117.3 and 302.4, unless a separate NPDES permit has been issued to regulate those discharges. In addition, this General Permit incorporates discharge prohibitions contained in water quality control plans, as implemented by the nine

⁹³ Applications of products where stabilization is dependent on vegetative growth (e.g., hydroseed) does not meet final stabilization criteria if vegetative growth is not achieved.

Regional Water Boards. Discharges to Areas of Special Biological Significance (ASBS) are prohibited unless covered by an exception that the State Water Board has approved.

Non-stormwater discharges include a wide variety of sources, including improper dumping, spills, or leakage from storage tanks or transfer areas. Non-stormwater discharges may contribute significant pollutant loads to receiving waters. Measures to control spills, leakage, and dumping, and to prevent illicit connections during construction must be addressed through structural as well as non-structural BMPs. The State Water Board recognizes, however, that certain non-stormwater discharges may be necessary for the completion of construction projects. Authorized non-stormwater discharges may include those from de-chlorinated potable water sources such as: fire hydrant flushing, irrigation of vegetative erosion control measures, pipe flushing and testing, water to control dust, uncontaminated ground water dewatering, and other discharges not subject to a separate general NPDES permit adopted by a region. Therefore, this General Permit authorizes such discharges provided they meet the following conditions:

These authorized non-stormwater discharges must:

1. Comply with BMPs as described in the SWPPP;
2. Filter or treat, using appropriate technology, all dewatering discharges from sedimentation basins;
3. Meet the numeric action levels for pH and turbidity; and
4. Not cause or contribute to a violation of water quality standards.

Additionally, authorized non-stormwater discharges must not be used to clean up failed or inadequate construction or post-construction BMPs designed to keep materials on-site. This General Permit prohibits the discharge of stormwater that causes or threatens to cause pollution or nuisance. Dewatering is also discussed in Section I.B.3.b.iii above.

I.O. Technology and Water Quality Based Effluent Limitations for All Types of Discharges

I.O.1. Technology-Based Effluent Limitations

NPDES permits for stormwater discharges associated with construction activity must meet all applicable provisions of §§ 301 and 402 of the Clean Water Act. These provisions require controls of pollutant discharges that utilize best available technology economically achievable (BAT) for toxic pollutants and non-conventional pollutants and best conventional pollutant control technology (BCT) for conventional pollutants. Additionally, these provisions require controls of pollutant discharges to reduce pollutants and any more stringent controls necessary to meet water quality standards. The U.S. EPA has already established such limitations, known as effluent limitation guidelines, for some industrial

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categories. The State Water Board implemented the effluent limitation guidelines and standards for the construction and development point source category into this General Permit as discussed in Section I.B.3 above. In instances where there are no effluent limitation guidelines, the permit writer is to use best professional judgment to establish discharger requirements using BAT and BCT technology. This General Permit contains narrative effluent limitations, technology-based numeric effluent limitations for active treatment systems and BMP-based, narrative, and numeric water quality-based effluent limitations for Total Maximum Daily Loads (TMDL) waste load allocation implementation.

The previous permit, as originally adopted by the State Water Board on September 2, 2009, contained numeric effluent limitations for pH (within the range of 6.0 and 9.0 pH units) and turbidity (500 Nephelometric Turbidity Units (NTU)) that applied only to Risk Level 3 and linear underground and overhead project Type 3 construction sites. The California Building Industry Association, the Building Industry Legal Defense Foundation, and the California Business Properties Association (petitioners) challenged the previous permit in *California Building Industry Association et al. v. State Water Resources Control Board*. The Superior Court ruled in favor of the State Water Board on almost all of the issues the petitioners raised, but the Superior Court invalidated the numeric effluent limitations for pH and turbidity for Risk Level 3 and linear underground and overhead project Type 3 sites because it determined that the State Water Board did not have sufficient BMP performance data to support those numeric effluent limitations. As a result of the Superior Court's writ of mandamus, the numeric effluent limitations for pH and turbidity were removed from the previous permit, except for active treatment systems. In addition, the previous permit required Risk Level 3 and linear underground and overhead project Type 3 dischargers with discharges directly to surface waters to conduct receiving water monitoring if directed by Water Boards whenever their effluent exceeds specified receiving water monitoring triggers. The receiving water monitoring triggers were established at the same levels as the previous numeric effluent limitations (effluent pH outside the range of 6.0 and 9.0 pH units or turbidity exceeding 500 NTU). In restoring the receiving water monitoring requirements, the State Water Board determined that it was appropriate to require receiving water monitoring at the request of the Water Boards for these types of sites with discharges directly to surface waters that exceeded the receiving water monitoring triggers under any precipitation event scenarios because these sites represent the highest threat to receiving water quality.

This General Permit includes receiving water monitoring requirements for Risk Level 3 and linear underground and overhead project Type 3 with discharges directly to surface water. An exceedance of a receiving water monitoring trigger is not a violation of this General Permit.

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BAT and BCT technologies include passive systems such as conventional runoff and sediment control and treatment systems such as coagulation or flocculation using sand filtration, when appropriate. Such technologies allow for effective treatment of soil particles less 0.02 mm (medium silt) in diameter. This General Permit requires the discharger to install structural controls, as necessary, such as erosion and sediment controls that meet BAT and BCT to achieve compliance with water quality standards. These effluent limitations constitute compliance with the requirements of the Clean Water Act.

Because this General Permit is an NPDES permit, there is no legal requirement to address the factors set forth in Water Code §§ 13241 and 13263, unless the permit is more stringent than what federal law requires. (See *City of Burbank v. State Water Resources Control Bd.* (2005) 35 Cal.4th 613, 618, 627.) None of the requirements in this General Permit are more stringent than the minimum federal requirements, which include technology-based requirements achieving BAT and BCT and strict compliance with water quality standards. The inclusion of numeric effluent limitations in the permit for active treatment systems does not cause this General Permit to be more stringent than current federal law. Numeric effluent limitations and best management practices are simply two different methods of achieving the same federal requirement: strict compliance with state water quality standards. Federal law authorizes both narrative and numeric effluent limitations to meet state water quality standards. The use of numeric effluent limitations to achieve compliance with water quality standards is not a more stringent requirement than the use of BMPs. (State Water Board Order No. WQ 2006-0012 (Boeing).) Accordingly, the State Water Board does not need to take into account the factors in Water Code §§ 13241 and 13263.

The State Water Board has concluded that the establishment of BAT and BCT will not create or aggravate other environmental problems through increases in air pollution, solid waste generation, or energy consumption. While there may be a slight increase in non-water quality impacts due to the implementation of additional monitoring or the construction of additional BMPs, these impacts will be negligible in comparison with the construction activities taking place on-site and would be justified by the water quality benefits associated with compliance.

a. pH Receiving Water Monitoring Trigger

The minimum standard control methods for pH in runoff requires the use of preventive measures such as avoiding concrete pours during rainy weather, covering concrete and directing flow away from fresh concrete if a pour occurs during rain, covering scrap drywall and stucco materials when stored outside and potentially exposed to rain, and other housekeeping measures to control potential contaminants. If necessary, pH-impaired stormwater from construction sites can be treated in a filter, settling pond, or basin, with additional natural or chemical treatment required to meet pH limits set forth in this General Permit.

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The basin or pond acts as a collection point and holds stormwater for a sufficient period for the contaminants to be settled out, either naturally or artificially, and allows any additional treatment to take place. The State Water Board considers these techniques to be equivalent to BCT. The State Water Board used best professional judgement in determining the pH concentration discharge limitations.

The chosen trigger was established by calculating three standard deviations above and below the mean pH of runoff from highway construction sites⁹⁴ in California. Proper implementation of BMPs should result in discharges that are within the range of 6.0 to 9.0 pH units.

b. Turbidity Receiving Water Monitoring Trigger

The turbidity receiving water monitoring trigger of 500 NTU is a performance-based trigger and was developed using three different analyses aimed at finding the appropriate threshold to set the performance-based limit to ensure environmental protection, effluent quality, and cost-effectiveness. The analyses fell into three, main types: (1) an ecoregion-specific dataset developed by Simon et. al. (2004); (2) Statewide Regional Water Quality Control Board enforcement data; and (3) published, peer-reviewed studies and reports on in-situ performance of best management practices in terms of erosion and sediment control on active construction sites.

A 1:3 relationship between turbidity (expressed as NTU) and suspended sediment concentration (expressed as mg/L) is assumed based on a review of suspended sediment and turbidity data from three gauges used in the USGS National Water Quality Assessment Program:

USGS 11074000 SANTA ANA R BL PRADO DAM CA

USGS 11447650 SACRAMENTO R A FREEPORT CA

USGS 11303500 SAN JOAQUIN R NR VERNALIS CA

The receiving water monitoring trigger represents staff determination that the trigger value is the most practicable based on available data. The turbidity receiving water monitoring trigger represents a bridge between the narrative effluent limitations and receiving water limitations. State Water Board staff analyzed construction site discharge information (monitoring data, estimates) and receiving water monitoring information to support this receiving water monitoring trigger.

94 California Department of Transportation, Caltrans Construction Sites Runoff Characterization Study (September 2002) <<https://dot.ca.gov/-/media/dot-media/programs/environmental-analysis/documents/env/ctsw-rt-03-065-a11y.pdf>> [as of May 20, 2021]

Compliance with this value does not necessarily represent compliance with either the narrative effluent limitations (as enforced through the BAT and BCT standard) or the receiving water limitations since the turbidity receiving water monitoring trigger represents an appropriate threshold level expected at a site. In the San Diego region, some inland surface waters have a receiving water objective for turbidity equal to 20 NTU. A discharge up to, but not exceeding, the turbidity receiving water monitoring trigger of 500 NTU may still cause or contribute to the exceedance of the 20 NTU standard. Most of the waters of the State are protected by turbidity objectives based on background conditions.

Table 3 – Regional Water Board Basin Plans, Water Quality Objectives for Turbidity

Regional Water Board	WQ Objective	Background/Natural Turbidity	Maximum Increase
1	Based on background	All levels	20 percent
2	Based on background	> 50 NTU	10 percent
3	Based on background	0-50 JTU 50-100 JTU > 100 JTU	20 percent 10 JTU 10 percent
4	Based on background	0-50 NTU > 50 NTU	20 percent 10 percent
5	Based on background	0-5 NTU 5-50 NTU 50-100 NTU > 100 NTU	1 NTU 20 percent 10 NTU 10 percent
6	Based on background	All levels	10 percent
7	Based on background	N/A	N/A
8	Based on background	0-50 NTU 50-100 NTU > 100 NTU	20 percent 10 NTU 10 percent
9	Inland Surface Waters, 20 NTU All others, based on background	0-50 NTU 50-100 NTU > 100 NTU	20 percent 10 NTU 10 percent

Table 4 shows the suspended sediment concentrations at the 1.5-year flow recurrence interval for the 12 ecoregions in California from Simon et. al (2004).

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Table 4 – Results of Ecoregion Analysis

Ecoregion	Percent of California Land Area	Median Suspended Sediment Concentration (mg/L)
1	9.1	874
4	0.2	120
5	8.8	35.6
6	20.7	1530
7	7.7	122
8	3.0	47.4
9	9.4	284
13	5.2	143
14	21.7	5150
78	8.1	581
80	2.4	199
81	3.7	503

The area-weighted average for the suspended sediment concentration is 1633 mg/L.

If a 1:3 relationship between turbidity and suspended sediment is assumed, the median turbidity is 544 NTU.

The following Table 5 is composed of turbidity readings measured in NTUs from administrative civil liability actions for construction sites from 2003 - 2009. This data was derived from the complete listing of construction-related administrative civil liabilities (ACLs) for the six-year period. All administrative civil liabilities were reviewed and those that included turbidimeter readings at the point of stormwater discharge were selected for this dataset.

Table 5 – Administrative Civil Liabilities (ACL) Sampling Data taken by Regional Water Board Staff

WDID#	Region	Discharger	Turbidity (NTU)
5S34C331884	5S	Bradshaw Interceptor Section 6B	1800
5S05C325110	5S	Bridalwood Subdivision	1670
5S48C336297	5S	Cheyenne at Browns Valley	1629
5R32C314271	5R	Grizzly Ranch Construction	1400
6A090406008	6T	El Dorado County Department of Transportation, Angora Creek	97.4
5S03C346861	5S	TML Development, LLC	1600
6A31C325917	6T	Northstar Village	See Subdata Set

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Table 6 – Subdata Set Turbidity for Point of Stormwater Runoff Discharge at Northstar Village

Date	Turbidity (NTU)	Location
10/5/2006	900	Middle Martis Creek
11/2/2006	190	Middle Martis Creek
01/04/2007	36	West Fork, West Martis Creek
02/08/2007	180	Middle Martis Creek
02/09/2007	130	Middle Martis Creek
02/09/2007	290	Middle Martis Creek
02/09/2007	100	West Fork, West Martis Creek
02/10/2007	28	Middle Martis Creek
02/10/2007	23	Middle Martis Creek
02/10/2007	32	Middle Martis Creek
02/10/2007	12	Middle Martis Creek
02/10/2007	60	West Fork, West Martis Creek
02/10/2007	34	West Fork, West Martis Creek

A 95 percent confidence interval for mean turbidity in an administrative civil liability order was constructed. The data set used was a small sample size, so the 500 NTU (the value derived as the receiving water monitoring trigger for this General Permit) needed to be verified as a possible population mean. In this case, the population refers to a hypothetical population of turbidity measurements of which our sample of 20 represents. A t-distribution was assumed due to the small sample size:

Mean: 512.23 NTU

Standard Deviation: 686.85

Margin of Error: 31.45

Confide Interval: 190.78 NTU (Low), 833.68 NTU (High)

Based on a constructed 95 percent confidence interval, an administrative civil liability order turbidity measurement will be between 190.78 – 833.68 NTU. 500 NTU falls within this range. Using the same data set, a small-sample hypothesis test was also performed to test if the administrative civil liability turbidity data set contains enough information to cast doubt on choosing a 500 NTU as a mean. 500 NTU was again chosen due to its proposed use as an acceptable value. The test was carried out using a 95 percent confidence interval. Results indicated that the administrative civil liability turbidity data set does not contain significant sample evidence to reject the claim of 500 NTU as an acceptable mean for the administrative civil liability turbidity population.

There are few published, peer-reviewed studies and reports on in-situ performance of best management practices in terms of erosion and sediment control on active construction sites. The most often cited study is a report titled,

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“Improving the Cost Effectiveness of Highway Construction Site Erosion and Pollution Control”⁹⁵. The primary author, Dr. Horner states the following in a comment letter to the State Water Board summarizing this report:

“The most effective erosion control product was wood fiber mulch applied at two different rates along with a bonding agent and grass seed in sufficient time before the tests to achieve germination. Plots treated in this way reduced influent turbidity by more than 97 percent and discharged effluent exhibiting mean and maximum turbidity values of 21 and 73 NTU, respectively. Some other mulch and blanket materials performed nearly as well. These tests demonstrated the control ability of widely available BMPs over a very broad range of erosion potential.”

Other technologies studied in this report produced effluent quality at or near 100 NTU. It is the best professional judgement of the State Water Board staff that erosion control is preferred and that technology performance in a controlled study showing effluent quality directly leaving a BMP is always easier and cheaper to control than effluent being discharged from the project (edge of property, etc.).

To summarize, the analysis showed that: (1) results of the Simon et. al dataset reveals turbidity values in background receiving water in California’s ecoregions range from 16 NTU to 1716 NTU (with a mean of 544 NTU); (2) based on a constructed 95 percent confidence interval, construction sites will be subject to administrative civil liability (ACL) when their turbidity measurement falls between 190.78 – 833.68 NTU; and (3) sites with highly controlled discharges employing and maintaining good erosion control practices can discharge effluent from the BMP with turbidity values less than 100 NTU. State Water Board staff has determined, using its best professional judgement, that it is most cost effective to set the receiving water monitoring trigger for turbidity at 500 NTU.

I.O.2. Determining Compliance with Effluent Standards

a. Numeric Action Levels

This General Permit contains technology based numeric action levels for pH and turbidity, and requirements for effluent monitoring at all Risk Level 2 and 3, and linear underground and overhead project Type 2 and 3 sites. The numeric action levels are: a pH numeric action level of 6.5 to 8.5, and a turbidity numeric action level of 250 Nephelometric Turbidity Units (NTUs). Additionally, this General Permit sets a turbidity numeric action level for receiving water

⁹⁵ Horner, Guedry, and Korten Hof, [Improving the Cost Effectiveness of Highway Construction Site Erosion and Pollution Control](https://wsdot.wa.gov/research/reports/fullreports/200.1.pdf) (1990)
<<https://wsdot.wa.gov/research/reports/fullreports/200.1.pdf>> [as of April 28, 2022]

monitoring of 500 NTU. Numeric action levels are essentially numeric benchmark values for certain parameters that, if exceeded in effluent sampling, trigger the discharger to take actions.

The primary purpose of numeric action levels is to assist dischargers in evaluating the effectiveness of their on-site measures. Construction sites need to employ many different systems that must work together to achieve compliance with the permit's requirements. The numeric action levels chosen should indicate whether the systems are working as intended. This General Permit requires dischargers with numeric action level exceedances to implement additional, alternative, or improved BMPs and revise their SWPPPs accordingly to either prevent pollutants in stormwater and authorized non-stormwater discharges from being discharged, or to substantially reduce the pollutants to levels consistently below the numeric action levels. An exceedance of a numeric action level does not constitute a violation of this General Permit, however, failure to implement any applicable requirement of this General Permit, or additional BMPs or improved BMPs to adequately prevent future numeric action level exceedances, and/or not reporting any numeric action level exceedance through SMARTS is a violation of this General Permit. Dischargers are required to electronically self-report any discharges that exceed numeric action levels or numeric effluent limitations. Multiple exceedances of a numeric action level or failure to report numeric action level exceedances through SMARTS can be cause for the discharger to implement an active treatment system.

Another purpose of numeric action levels is to provide information regarding construction activities and water quality impacts. This data will provide the Water Boards and the rest of the stormwater community with more information about levels and types of pollutants present in runoff and how effective the dischargers' BMPs are at reducing pollutants in effluent. The State Water Board also hopes to learn more about the linkage between effluent and receiving water quality. In addition, these requirements will provide information on the mechanisms needed to establish compliance monitoring programs at construction sites in future permit deliberations.

i. pH

The chosen limits were established by calculating one standard deviation above and below the mean pH of runoff from highway construction sites in California. Proper implementation of BMPs should result in discharges that are within the range of 6.5 to 8.5 pH units.

The Caltrans study included 33 highway construction sites throughout California over a period of four years, which included 120 storm events. All of these sites had BMPs in place that would be generally implemented at all types of construction sites in California.

The Surface Water Ambient Monitoring Program (SWAMP) has a Guidance Compendium for Watershed Monitoring and Assessment. Sections 3.1.4 and 3.1.5 of this Compendium contain guidance for pH and turbidity sampling.⁹⁶

ii. Turbidity

The State Water Board's staff used their best professional judgement to develop a numeric action level that can be used as a learning tool to help dischargers improve their site controls, and to provide meaningful information on the effectiveness of stormwater controls. A statewide turbidity numeric action level has been set at 250 NTU.

The Surface Water Ambient Monitoring Program (SWAMP) has a Guidance Compendium for Watershed Monitoring and Assessment. Sections 3.1.4 and 3.1.5 of this Compendium contain guidance for pH and turbidity sampling.

I.O.3. Receiving Water Limitations

Construction activities that cause or contribute to an exceedance of water quality objectives or standards must be addressed. The dynamic nature of construction activity gives the discharger the ability to quickly identify and monitor the source of the exceedances. This is because when stormwater mobilizes sediment, it provides visual cues of erosion, where corrective actions should take place, and how effective they are once implemented.

This General Permit requires that stormwater, dewatering, and authorized non-stormwater discharges eliminate the discharge of pollutants that cause or contribute to an exceedance of any applicable water quality objectives or standards. The sampling and analysis monitoring requirements in this General Permit will help determine whether BMPs installed and maintained are preventing pollutants in discharges from the construction site that may cause or contribute to an exceedance of water quality objectives or standards.

Water quality objectives or standards consist of designated beneficial uses of surface waters and the adoption of ambient criteria necessary to protect those uses. The ambient criteria are termed "water quality objectives" when adopted by the Water Boards. There is a risk that stormwater runoff from construction sites containing pollutants could enter surface waters and cause or contribute to an exceedance of water quality standards. For that reason, dischargers should be aware of the applicable water quality standards in their receiving waters. The best method to ensure compliance with receiving water limitations is to implement

96 A [SWAMP Field Methods Course training CD](#) is also available for the public at www.waterboards.ca.gov/water_issues/programs/swamp/cdrom.html or please contact stormwater@waterboards.ca.gov to request a copy. [as of May 20, 2021]

BMPs that prevent pollutants from contacting stormwater or leaving the construction site in runoff.

California water quality standards are published in the Basin Plans adopted by each Regional Water Board, the California Toxics Rule (CTR), the National Toxics Rule (NTR), and Statewide Water Board Plans, for example, the California Ocean Plan.

Dischargers can determine the applicable water quality standards by contacting Regional Water Board staff or by consulting one of the following sources. The actual Basin Plans that contain the water quality standards can be viewed at the website of the appropriate Regional Water Board⁹⁷, the State Water Board site for statewide plans,⁹⁸ or the U.S. EPA regulations for the NTR and CTR (40 Code of Federal Regulations §§ 131.36-38). Basin Plans and statewide plans are also available by mail from the appropriate Regional Water Board or the State Water Board. The U.S. EPA regulations are available on their website.⁹⁹

I.O.4. Water Quality Based Effluent Limitations for Construction Stormwater: TMDLs and Waste Load Allocations

This General Permit implements Clean Water Act § 303(d) impaired water body(ies) with Regional Water Board or U.S. EPA adopted TMDLs identifying sources regulated by this General Permit. The TMDLs in Attachment H include the specific waste load allocation for this activity and source. Dischargers are required to comply with any applicable TMDL requirements in this General Permit (see Attachment H and Section I.W of this Fact Sheet for additional TMDL applicability information).

Responsible Dischargers that are assigned TMDL-related numeric action levels or numeric effluent limitations are required to collect samples in accordance with the non-visible sampling requirements in Attachments D and E and compare all analytical results to the applicable numeric action levels or numeric effluent limitations specified in Attachment H of this General Permit.

I.P. Training Qualifications and Requirements

To ensure that the preparation, implementation, and oversight of the SWPPP is sufficient for effective pollution prevention, the Qualified SWPPP Developer and

97 State Water Resources Control Board, [RWQCB Directory](https://www.waterboards.ca.gov/about_us/contact_us/rwqcb_directory.html), <https://www.waterboards.ca.gov/about_us/contact_us/rwqcb_directory.html> [as of May 20, 2021]

98 State Water Resources Control Board, [Plans and Policies](https://www.waterboards.ca.gov/plans_policies/), <https://www.waterboards.ca.gov/plans_policies/> [as of May 20, 2021]

99 [U.S. EPA Website](https://www.epa.gov/) <<https://www.epa.gov/>> [as of May 20, 2021]

Qualified SWPPP Practitioner are responsible for creating, revising, overseeing, and implementing the SWPPP.

I.Q. Sampling, Monitoring, Reporting, and Record Keeping for Linear Underground and Overhead Projects and Traditional Construction Monitoring Requirements

I.Q.1. Introduction

This General Permit requires visual monitoring at all sites and effluent water quality monitoring at all Risk Level 2 and 3 and linear underground and overhead project Type 2 and 3 sites (also some Type 1 and Risk Level 1 sites). Receiving water monitoring may be required by the Regional Water Board at some Risk Level 3 and Type 3 sites as described below. All sites are required to submit the sampling results, inspection records, and Annual Reports specified in this General Permit, which contain specific documentation collected over the reporting period.

I.Q.2. Visual

Visual inspections of stormwater discharges, dewatering discharges, authorized non-stormwater discharges, and unauthorized non-stormwater discharges are required for all sites subject to this General Permit. This General Permit requires dischargers to implement corrective actions at the site to address deficiencies identified during the visual monitoring.

All dischargers are required to conduct visual inspections as described in General Permit Attachment's D or E. This General Permit requires the discharger to visually-inspect a site for indications of pollutants in stormwater runoff, erosion, failed BMPs, and improper BMP installation. Each discharge location and drainage area require an inspection for the presence of (or indications such as erosion, pollutant mobilization, or other potential threat to human health and the environment) unauthorized and authorized non-stormwater discharges and their sources. Dischargers must conduct pre, during, and post-precipitation event inspections to: (1) identify adequacy of BMP design, implementation, and effectiveness, (2) identify any necessary additional BMPs, and (3) revise the SWPPP on-site and in SMARTS accordingly. Dischargers must maintain on-site records of all visual observations, personnel performing the observations, observation dates, weather conditions, locations observed, and corrective actions taken in response to the observations.

This General Permit requires visual monitoring for precipitation events which result in the discharge of water from the site. Sites are encouraged to use size catch basins to retain the first flush of a precipitation event, which is consistent with BAT and BCT. The size of a precipitation event cannot be predicted so an adequate trigger for a pre-precipitation event visual inspection is 50 percent or greater probability of producing precipitation based on the National Weather Service Forecast Office of the National Oceanic and Atmospheric Administration (NOAA).

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General Permit Attachments D and E list the minimum criteria for an inspection checklist. Dischargers may develop their own inspection forms or may use a Water Board-developed form if one is available.

Some visual inspections may be delegated by the QSP to an individual that has received training as described in the discharger's site personnel roles and responsibilities in this General Permit.

I.Q.3. Non-Visible Pollutant Monitoring

This General Permit requires that all dischargers develop a sampling and analysis strategy for monitoring pollutants that are not visually detectable in stormwater. Some monitoring may be delegated by the QSP to an individual that has received training as described in the discharger's site personnel roles and responsibilities in this General Permit. Monitoring for non-visible pollutants is required at any site when the exposure of construction materials occurs and where a potential discharge can cause or contribute to an exceedance of a water quality objective or standard. Pollutants found in materials used in large quantities at construction sites throughout California and exposed throughout the rainy season, such as cement, fly ash, and other recycled materials or by-products of combustion are a significant concern for construction discharges. The water quality standards that apply to these materials will depend on their composition. Some of the more common stormwater pollutants from construction activity are not CTR pollutants. Examples of construction non-visible pollutants¹⁰⁰ include, but are not limited to, bacteria and viruses, fertilizers or nutrients, herbicides, greases; lubricants; oils, metals, synthetic chemicals, and pesticides.

a. Bacteria and Viruses

Bacteria and viruses are common stormwater contaminants. Construction site sources include, but are not limited to, animal excrement, waste management, and sanitary facilities. High levels of indicator bacteria in stormwater have led to the closure of beaches, lakes, and rivers to contact recreation such as swimming.

b. Fertilizers and Nutrients

Fertilizers and nutrients are common stormwater contaminants. Construction site sources include, but are not limited to, landscape fertilization, these nutrients can result in excessive vegetation or algae growth in natural water systems or be toxic to aquatic life, resulting in impaired beneficial uses.

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100 Section P.1.b adapted from the CASQA Construction BMP Handbook, p. 1-6, 1-7, 1-10.

c. Herbicides and Pesticides

Herbicides and pesticides (including fungicides, rodenticides, and insecticides) have been detected repeatedly in stormwater at levels toxic to certain organisms, even when pesticides have been applied in accordance with label instructions. The washing of construction equipment used for noxious weed removal can also spread invasive species¹⁰¹. Construction site sources include, but are not limited to, noxious weed and vegetation management, pest control, and vector control.

d. Greases, Lubricants, Oils

Greases, lubricants, and oils include a wide array of hydrocarbon compounds and other synthetic materials, some of which are toxic to aquatic organisms at low concentrations. Construction site sources include, but are not limited to, equipment spills and leaks from delivery; storage; use, equipment and vehicle drive train; suspension; hydraulic system cleaning and maintenance, material storage, on-site staff parking areas, paving operations, and waste disposal.

e. Metals

Metals including, but not limited to, cadmium, copper, chromium, iron, lead, nickel, and zinc are commonly found in stormwater and are of concern because some are toxic to aquatic organisms, can bioaccumulate (accumulate to toxic levels in aquatic animals such as fish), and have the potential to contaminate drinking water supplies. Construction site sources, include but are not limited to, naturally occurring metals associated with earth disturbance, gravel materials, construction materials, equipment maintenance, equipment fluids, paving operations, and welding and fabrication activities.

f. Synthetic Chemicals

Synthetic chemicals may be found in stormwater and can be toxic in low concentrations. Construction site sources include, but are not limited to, batteries, construction materials, chemical fire suppression, chemical storage, equipment and vehicle fueling (also related to Section I.Q.3.d above), paving operations, and waste management.

Many of the above sources can result in construction stormwater discharges containing pollutants. For example, high pH can result from improperly maintained treatment systems, cement and gypsum, and wash waters. Salts can also be found

101 Center for Environmental Excellence by AASHTO, [Chapter 4 Construction Practices for Environmental Stewardship 4.11 Vegetation Management in Construction](#) (2019) <https://www.epa.gov/sites/default/files/2015-11/documents/25-25-4_fr.pdf> [as of April 28, 2022]

in construction site materials, including but not limited to, fertilizers and nutrients, herbicides and pesticides, soil treatments, and surfactants.

Some of these constituents are subject to Statewide Policy, water quality control plans, or Attachment H's TMDL Water Quality Based Effluent Limitations. Dischargers are encouraged to discuss these standards with Water Board staff and other stormwater quality professionals.

The most effective way to reduce or minimize the non-visible sampling and analysis requirements is to reduce and manage exposure of construction materials, activities, and equipment to precipitation and/or stormwater runoff. Materials or activities that are not exposed do not have the potential to enter stormwater runoff, and therefore receiving water sampling is not required. Preventing contact between stormwater and construction materials, equipment, or materials or preventing the runoff are the most important BMPs at any construction site.

Preventing or eliminating the exposure of pollutants at construction sites is not always possible. Some materials and activities, such as soil amendments or earth moving equipment, are designed to be used in a manner that will result in exposure to stormwater. In these cases, it is important to make sure that these materials and activities are applied and operated according to the manufacturer's instructions and at a time when pollutants are less likely to be washed away. Other construction materials can be exposed when storage, waste disposal, or the application of the material is done in a manner not protective of water quality. Representative sampling is required for these situations, unless there is capture and containment of all stormwater that has been exposed. In cases where construction materials may be exposed to stormwater, but the stormwater is contained and is not allowed to run off the site, sampling will only be required when inspections show that the containment failed or is breached, resulting in potential exposure or discharge to receiving waters.

This General Permit requires the discharger to conduct a pollutant source assessment to develop a list of potential pollutants based on a review of site or project potential sources, which will include construction activities, equipment materials, soil amendments, soil treatments, and historic contamination at the site. The discharger must review existing environmental and real estate documentation to determine the potential pollutants that could be present on the construction site as a result of past land use activities.

Possible reference materials for previously existing pollution and past land uses:

- i. Environmental Assessments;
- ii. Initial Studies;
- iii. Phase 1 Assessments prepared for property transfers;

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- iv. Environmental Impact Reports or Environmental Impact Statements prepared under the requirements of the National Environmental Policy Act or the California Environmental Quality Act; and
- v. Available soil chemical analysis results.

I.Q.4. Effluent Monitoring

Consistent with 40 Code of Federal Regulations, § 122.44, all linear underground and overhead project Type 2 and 3 and Risk Level 2 and 3 dischargers (also some Type 1 and Risk Level 1 sites) must perform sampling and analysis of effluent discharges to characterize discharges associated with construction activity from the entire area disturbed by the project. Dischargers must collect samples of stored or contained stormwater that is discharged during or subsequent to a precipitation event. Some monitoring may be delegated by the QSP to an individual that has received training as described in the discharger's site personnel roles and responsibilities in this General Permit.

This General Permit requires stormwater runoff sampling for pH and turbidity for all Risk Level 2, linear underground and overhead project Type 2, Risk Level 3, and linear underground and overhead project Type 3 sites. Sampling is required at all locations where stormwater, dewatering, and/or authorized non-stormwater associated with construction activity is discharged off-site or enters any on-site waters of the United States (e.g., a creek running through a site). Dischargers are required to identify all sampling locations in the SWPPP and site map and sampling is only required when a discharge occurs. Attachments D and E of this General Permit require specific sampling requirements and non-sampling justifications.

This General Permit contains sampling, analysis, and monitoring requirements for pH and turbidity. Sampling of non-visible pollutants identified in the pollutant source assessment is required when the materials or chemicals have the potential to cause or contribute to an exceedance of a water quality standard (e.g., BMP breach, failure, malfunction, or leak or spill observed during a visual inspection).

This General Permit requires that all dischargers maintain a paper or electronic copy of all required records for three years from the date generated or date submitted, whichever is later. These records shall be available at the site until a Notice of Termination is approved by the Regional Water Board. Linear underground and overhead project documents may be retained in a crew member's vehicle and made available upon request.

a. Traditional Construction Monitoring Requirements

A summary of the monitoring and reporting requirements is found in Table 7 and 8 below. Dischargers are also required to report and retain records in accordance with this General Permit's Order and Attachment D requirements.

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Table 7 – Required Monitoring Elements for Risk Levels

Risk Level	Visual	Non-Visible Pollutants	Effluent	Receiving Water
Risk Level 1	Required	As needed	Where applicable	Not required
Risk Level 2	Required	As needed	pH, turbidity	Not required
Risk Level 3	Required	As needed	pH, turbidity	For discharges directly to surface waters if: 1) pH or turbidity Receiving Water Monitoring Trigger exceeded; and 2) upon Regional Water Board direction

Table 8 – Stormwater Effluent Monitoring Requirements by Risk Level

Level	Frequency	Effluent Monitoring
Risk Level 1	When non-visible pollutants, identified in the SWPPP or otherwise known to be on site, may be discharged due to failure to implement BMPs, a container spill or leak, or a BMP breach, failure, or malfunction.	Applicable non-visible pollutant parameters
Risk Level 2 and 3	When non-visible pollutants, identified in the SWPPP or otherwise known to be on site, may be discharged due to failure to implement BMPs, a container spill or leak, or a BMP breach, failure, or malfunction.	Applicable non-visible pollutant parameters
Risk Level 2 and 3	One sample per discharge location per day of a precipitation event characterizing discharges associated with construction activity from the entire project disturbed area.	pH, turbidity, and applicable non-visible pollutant parameters

b. Linear Construction Monitoring and Sampling Requirements

Attachment E establishes minimum monitoring and reporting requirements for all linear underground and overhead projects and the specific monitoring requirements depending on project complexity and risk to water quality. The monitoring requirements for Type 1 linear underground and overhead project are less than Type 2 and 3 projects because Type 1 projects have a lower potential to impact water quality.

This General Permit requires the discharger to prepare a monitoring program prior to the start of construction and immediately implement the program at the start of construction for linear underground and overhead projects. The monitoring program must be implemented at the appropriate level to protect water quality at all times throughout the life of the project. Dischargers are also

required to report and retain records in accordance with this General Permit's Order and Attachment E requirements.

Table 9 – Require Monitoring Elements for Linear Underground and Overhead Project Types

Risk Level	Visual	Non-Visible Pollutants	Effluent	Receiving Water
Type 1	Required	As needed	Where applicable	Not required
Type 2	Required	As needed	pH, turbidity	Not required
Type 3	Required	As needed	pH, turbidity	For discharges directly to receiving waters if: 1) pH or turbidity Receiving Water Monitoring Trigger exceed; and 2) upon Regional Water Board direction.

i. Type 1 Linear Underground and Overhead Project Monitoring Requirements

This General Permit requires a discharger to conduct daily visual inspections of Type 1 linear underground and overhead projects during site operating hours while construction activities are occurring. Inspections are to be conducted by qualified personnel and can be conducted in conjunction with other daily activities. Inspections are conducted to ensure the BMPs are adequate, maintained, and in place at the end of the construction day. The required SWPPP revisions (when appropriate) should be based on the results of the daily inspections and reported so the site General Permit implementation is currently reflected. Inspections can be discontinued in non-active construction areas where soil disturbing activities have been completed and final stabilization has been achieved (e.g., trench has been paved, substructures have been installed, and successful final vegetative cover or other stabilization criteria have been met).

A discharger implementing a monitoring program for Type 1 linear underground and overhead projects is required to implement temporary and permanent stabilization BMPs after active construction is completed. Inspection activities are required until adequate permanent stabilization has been established and will continue in areas where re-vegetation is chosen until minimum vegetative coverage has been established. The required photograph requirements taken during site inspections are for verification of requirements and are submitted through SMARTS.

This General Permit also includes the minimum criteria required for an inspection checklist. Dischargers may develop their own inspection forms or may contact the Water Board for an inspection form, if one is available.

ii. Type 2 and 3 Linear Underground and Overhead Project Monitoring Requirements

This General Permit requires the discharger to conduct daily visual inspections of Type 2 and 3 linear underground and overhead projects during site operating hours when construction activities are occurring. Inspections are to be conducted by qualified personnel and can be in conjunction with other daily activities.

All Type 2 and 3 linear underground and overhead project dischargers are required to conduct inspections by qualified personnel of the construction site during site operating hours prior to all anticipated precipitation events, during, and after actual precipitation events. The discharger is required to conduct inspections during site operating hours for each 24-hour period during extended precipitation events. Inspections can be discontinued in non-active construction areas where soil disturbing activities have been completed and final stabilization has been achieved (e.g., trench has been paved, substructures installed, and successful vegetative cover or other stabilization criteria have been met).

The goals of these inspections are: (1) to identify areas contributing to a stormwater discharge; (2) to evaluate whether measures to reduce pollutant loadings identified in the SWPPP are adequate, properly installed, and functioning in accordance with the terms of this General Permit; and (3) to determine if additional control practices or corrective maintenance activities are needed. Equipment, materials, and workers must be available for rapid response to failures and emergencies. All corrective BMP maintenance is to be performed as soon as possible, depending upon worker safety.

All dischargers are required to develop and implement a monitoring program for inspecting Type 2 and 3 linear underground and overhead projects that require temporary and permanent stabilization BMPs after active construction is completed. The inspections will be conducted to ensure the BMPs are adequate and maintained and will continue until adequate permanent stabilization has been established in areas where revegetation is chosen until minimum vegetative coverage has been established.

This General Permit also requires a log of inspections conducted before, during, and after the precipitation event(s) be maintained in the SWPPP. The log will provide the date and time of the inspection and who conducted the inspection. Photographs must be taken during site inspections and submitted through SMARTS.

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This General Permit's Attachment E lists minimum criteria required for an inspection checklist. Dischargers may develop their own inspection forms or may contact the Water Board for an inspection form, if one is available.

iii. Sampling Requirements for all Linear Underground and Overhead Project Types

Linear underground and overhead projects are subject to sampling and analysis requirements for visible pollutants (i.e., sedimentation/siltation, turbidity, pH) and for non-visible pollutants.

1) Sampling for non-visible pollutants is required for Type 1, 2, and 3 linear underground and overhead projects.

Non-visible pollutant monitoring is required for pollutants associated with construction sites and activities that (1) are not visually detectable in stormwater discharges, (2) are known or should be known to occur on the construction site, and (3) could cause or contribute to an exceedance of water quality standard or objectives in the site's receiving waters. Sample collection for non-visible pollutants are required only: (1) during a precipitation event when pollutants associated with construction activities may be discharged with stormwater runoff in the event of a BMP breach, failure, malfunction, leak or spill, (2) identified in the discharge and is from construction activities and/or materials, and (3) when the discharger has failed to adequately clean the area of material and pollutants. Failure to implement appropriate BMPs will trigger the same sampling requirements as those required in (1) above, or when the discharger has failed to implement appropriate BMPs prior to the next precipitation event.

It is not anticipated that all linear underground and overhead projects will be required to collect samples for pollutants not visually detected in runoff due to the nature and character of the construction site and activities as previously described in this Fact Sheet. Most linear underground and overhead projects are constructed in urban areas with public access (e.g., existing roadways, road shoulders, parking areas, etc.). This raises a concern regarding the potential contribution of pollutants from vehicle use and/or from normal activities of the public (e.g., vehicle washing, landscape fertilization, pest spraying, etc.) in runoff from the project site. Since the dischargers are not necessarily the landowners of the project area and are not able to control the presence of these pollutants in the stormwater that runs through their projects, it is not the intent of this General Permit to require dischargers to sample for these pollutants unless they are generated specifically from the linear underground and overhead project materials and/or activities. This General Permit does not require the discharger to sample for these

types of pollutants except where the discharger has on-site materials or activities containing or specifically generating these pollutants and when the conditions described above occur.

2) Regional Water Board-Required Additional Monitoring Requirements

The Regional Water Board can require, in writing, additional monitoring requirements in this General Permit under Clean Water Act authority and specific authorities listed in this General Permit’s Order and Attachment E. Additional monitoring requirements include, but are not limited to, requirements specified in an enforcement order, additional sampling parameters, frequency, methods, practices, and/or reporting (for stormwater, dewatering, and/or non-stormwater) based upon site-specific analysis.

3) Receiving Water Monitoring

This General Permit protects the receiving water’s beneficial uses from construction site pollutants. Risk Level 3 and linear underground and overhead project Type 3 site discharges subject to the receiving water monitoring triggers with: (1) receiving water monitoring trigger exceedances defined in this General Permit, (2) discharges are directly into receiving waters, and (3) the discharger is directed to monitor by the Water Boards are required to monitor the upstream and downstream receiving water(s) for turbidity and pH (if applicable). These requirements were modified to make it clear that they do not apply to discharges to an MS4 that later discharges into a surface water.

Table 10 – Receiving Water Monitoring Requirements

Level or Type	Receiving Water Monitoring Triggers
Risk Level 1 and Linear Underground and Overhead Project Type 1	Not applicable/required
Risk Level 2 and Linear Underground and Overhead Project Type 2	Not applicable/required
Risk Level 3 and Linear Underground and Overhead Project Type 3	For discharges directly to surface waters if: 1) pH or turbidity Receiving Water Monitoring Trigger exceeded; and 2) upon Regional Water Board direction.

I.Q.5. Reporting Requirements

- a. Reporting Numeric Effluent Limitation Violations (Water Quality Based Corrective Actions or Numeric Effluent Limitation Violation Report)

All discharges subject to TMDL-specific numeric effluent limitations requirements must electronically submit all precipitation event sampling results

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to the Water Boards through SMARTS no later than 10 days after receiving the field analysis results or analytical laboratory results. The purpose of the electronic certification and submittal of the Water Quality Based Corrective Actions or Numeric Effluent Limitation Violation Report is to: (1) allow public access to General Permit-required reporting, (2) document the discharger's compliance actions, and (3) notify the Water Boards of the exceedance so that they can determine whether any follow-up (e.g., inspection, enforcement) is necessary to bring the site into compliance.

Responsible Dischargers with a water quality exceedance are in violation of this General Permit and must additionally submit the Water Quality Based Corrective Actions or Numeric Effluent Limitation Violation Report containing:

- The analytical method(s), reporting unit(s), and method detection limit(s) of each analytical parameter (analytical results that are less than the method detection limit are to be reported as "less than the method detection limit or <MDL");
- The date, place, and time of sampling;
- Any visual observation (inspections);
- Any measurements, including precipitation; and
- A description of the current BMPs associated with the effluent sample that exceeded the numeric effluent limitation and any proposed corrective actions taken.

b. Reporting Numeric Action Level Exceedances (Numeric Action Level Exceedance Report)

All Risk Level 2 and 3 and linear underground and overhead project Type 2 and 3 dischargers must electronically submit all precipitation event sampling results for the pH and turbidity numeric action levels, through SMARTS, no later than 10 days after the conclusion of the precipitation event. All Risk Level 2 and 3 and linear underground and overhead project Type 2 and 3 dischargers must electronically submit all precipitation event sampling results for TMDL-related numeric action levels, through SMARTS, no later than 10 days after receiving the analytical laboratory results. In the event that any effluent sample exceeds an applicable numeric action level, a Regional Water Board or its delegate may request (in writing) that the Risk Level 2 or 3 and linear underground and overhead project Type 2 or 3 dischargers submit and certify a Numeric Action Level Exceedance Report, through SMARTS, within 30 days of receiving the written request.

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In the event that an applicable pH, turbidity or TMDL-specific numeric action level has been exceeded, the required reporting contains:

- The analytical method(s), reporting unit(s), and method detection limit(s) of each analytical parameter (analytical results that are less than the method detection limit are to be reported as "less than the method detection limit or <MDL");
- The date, place, and time of sampling;
- Any visual observation (inspections);
- Any measurements, including precipitation; and
- A description of the current BMPs associated with the effluent sample that exceeded the numeric action level and any proposed corrective actions taken.

c. Analytical Sample Reporting

All dischargers are required to certify and submit analytical monitoring results in SMARTS using the monitoring ad hoc report (a separate ad hoc monitoring report is needed for each precipitation event). Electronically certified and submitted sampling and analysis results are required to include an upload of the original laboratory reports and chain of custody forms.

d. Annual Report

All dischargers must prepare and electronically certify and submit an Annual Report no later than September 1st of each year using SMARTS including the specified information described in this General Permit's Order and any additional necessary site compliance information such as a summary of all corrective actions taken during the reporting period, or the identification of any compliance activities or corrective actions that were not implemented.

I.Q.6. Record Keeping

According to 40 Code of Federal Regulations §§ 122.21(p) and 122.41(j), the discharger is required to retain paper or electronic copies of all records required by this General Permit for a period of at least three years from the date generated or the date submitted to the Water Boards. A discharger must retain records for a period beyond three years if directed by Regional Water Board.

I.R. Risk Determination

A site Risk Level calculation is the estimated potential for sediment transport and risk to the receiving water. This General Permit contains calculation requirements to determine a project's Risk Level 1, 2 and 3, or a linear underground and overhead projects Type 1, 2, and 3 as described below. Construction industry-accepted sediment erosion models and Water Boards-provided or site-specific receiving water

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risk models are used to determine pre-construction project and post-construction project risks for all the project's construction phases.

I.R.1. Traditional Construction Projects

a. Overall Risk Determination

There are two major requirements related to site planning and risk determination in this General Permit. The project's overall risk is broken up into two elements: (1) project sediment risk (the relative amount of sediment that can be discharged, given the project and location details) and (2) receiving water risk (the risk sediment discharges pose to the receiving waters).

i. Project Sediment Risk:

The Revised Universal Soil Loss Equation (RUSLE) is used to calculate watershed sediment risk. The RUSLE was originally developed to calculate sheet and rill erosion rate in tons/acre/project duration. It is consistent with the original intent of the RUSLE to not introduce a project size threshold to develop risk categories expressed on tons/project duration.

The Regional Board has the authority to question any aspect of the sediment risk calculation, including the R factor used in determining Watershed Sediment Risk. The RUSLE2 computer program can also be used to calculate the R factor and in many cases yields more accurate values than those generated from the EPA Erosivity Calculator.

Project Sediment Risk is determined by multiplying the R, K, and LS factors from the Revised Universal Soil Loss Equation (RUSLE) to obtain an estimate of project-related bare ground soil loss expressed in tons/acre. The RUSLE equation is as follows:

$$A = (R)(K)(LS)(C)(P)$$

Where:

A is the rate of sheet and rill erosion

R is the rainfall-runoff erosivity factor

K is the soil erodibility factor

LS is the length-slope factor

C is the cover factor (erosion controls)

P is the management operations and support practices (sediment controls)

The C and P factors are given values of 1.0 to simulate bare ground conditions.

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There is a map option¹⁰² and a manual calculation option for determining soil loss. For the map option, the R factor for the project is calculated using the online calculator.¹⁰³ To determine soil loss in tons per acre, the discharger multiplies the R factor times the value for K times LS.

For the manual calculation option, the R factor for the project is calculated using the online calculator. The K and LS factors are determined using Attachment D.1.

Soil loss of less than 15 tons/acre is considered **low** sediment risk.

Soil loss between 15 and 75 tons/acre is **medium** sediment risk.

Soil loss over 75 tons/acre is considered **high** sediment risk.

The soil loss values and risk categories were obtained from mean and standard deviation RKLS values from the U.S. EPA EMAP program. High risk is the mean RKLS value plus two standard deviations. Low risk is the mean RKLS value minus two standard deviations

ii. Receiving Water Risk:

Receiving water risk is based on whether a project drains to a water body or watershed that is sediment-sensitive. A sediment-sensitive water body or watershed is either:

- On the most recent 303(d) list for water bodies impaired for sediment; or
- Has the beneficial uses of COLD, SPAWN, and MIGRATORY.

A project that meets at least one of the two criteria has a high receiving water risk. A list of sediment-sensitive water bodies is posted on the State Water Board's website¹⁰⁴ and included in Attachment D.1. An interactive map of 303(d) listed water bodies in California is available on the State Board's website.¹⁰⁵

102 The guidance Geographic Information System Risk maps will be provided electronically on the State Water Board's website prior to the effective date of this General Permit.

103 U.S. EPA, [Rainfall Erosivity Factor Calculator for Small Construction Sites](https://www.epa.gov/rainfall-erosivity-factor-calculator-for-small-construction-sites), <<https://www.epa.gov/>> [as of May 20, 2021]

104 State Water Board, [Surface Water Quality Assessment Webpage](https://www.waterboards.ca.gov/water_issues/programs/water_quality_assessment/#impaired), <https://www.waterboards.ca.gov/water_issues/programs/water_quality_assessment/#impaired> [as of May 20, 2021]

105 State Water Board, [303\(d\) Integrated Report](https://www.waterboards.ca.gov/water_issues/programs/water_quality_assessment/2020_2022_integrated_report.html) <https://www.waterboards.ca.gov/water_issues/programs/water_quality_assessment/2020_2022_integrated_report.html> [as of June 21, 2022]

b. Effluent Standards

All dischargers are subject to the narrative effluent limitations specified in the General Permit. The narrative effluent limitations require stormwater discharges associated with construction activity to meet all applicable provisions of §§ 301 and 402 of the Clean Water Act. These provisions require controls of pollutant discharges that utilize BAT and BCT to reduce pollutants and any more stringent controls necessary to meet water quality standards.

Risk Level 2 dischargers that pose a medium risk to water quality are subject to numeric action levels for pH and turbidity, which were established based on best professional judgement. Risk Level 3 dischargers that pose a high risk to water quality are subject to numeric action levels for pH and turbidity, which were established based on best professional judgement.

c. Effluent Monitoring

Effluent monitoring is required for Risk Level 2 and 3 and linear underground and overhead project Type 2 and 3 project sites as described in the Order, Attachments D and E. Effluent monitoring results must be certified and submitted electronically through SMARTS.

d. Good Housekeeping

Proper handling and management of construction materials can help minimize threats to water quality. The discharger must consider good housekeeping measures for construction materials, waste management, vehicle storage and maintenance, landscape materials, and potential pollutant sources. Examples include conducting an inventory of products used, implementing proper storage and containment, and properly cleaning all leaks from equipment and vehicles.

e. Non-Stormwater Management

This General Permit's Order defines the specific authorized non-stormwater discharges allowed and necessary prohibitions on other non-stormwater discharges. Non-stormwater discharges directly connected to receiving waters or the storm drain system have the potential to negatively impact water quality. The discharger must implement measures to control all non-stormwater discharges (e.g., properly washing vehicles or equipment in contained areas, cleaning streets, and minimizing irrigation runoff) during construction, and construction-associated dewatering activities. This General Permit includes specific construction site dewatering provisions designed to eliminate or reduce pollutant impacts on receiving waters from these activities.

f. Erosion Control

The best way to minimize the risk associated with erosion and sedimentation during construction is to disturb as little of the land surface as possible by fitting the development to the terrain. Little grading is necessary and erosion potential

is lower when development is tailored to natural land contours. Other effective erosion control measures include preserving existing vegetation where feasible, limiting disturbance, timing disturbances around reduced precipitation conditions, and stabilizing and re-vegetating disturbed areas as soon as possible after grading or construction activities. Particular attention must be paid to large, mass-graded sites where the potential for soil exposure to the erosive effects of rainfall, snow melt, and wind is great and where there is potential for significant sediment discharge from the site to surface waters. Temporary soil stabilization can be the single most important factor in reducing construction site erosion. The discharger is required to consider measures such as: covering disturbed areas with mulch, temporary seeding and vegetation, soil stabilizers, non-toxic binders, fiber rolls or blankets, and permanent seeding. These erosion control measures are only examples of what should be considered and do not preclude the use of new or innovative approaches currently available or being developed. Erosion control BMPs should be the primary means of preventing stormwater contamination, and sediment control techniques should be used to capture any soil that becomes eroded.¹⁰⁶

Areas that convey stormwater run-off are required to be appropriately armored against in channel erosion. A California licensed professional engineer may need to provide system design and/or calculations to control the erosion in the conveyance of stormwater (drainage channels).

g. Establishing Vegetation

Planting a site may be necessary during the construction phase to establish vegetation prior to termination of the project. Planted vegetation should match surrounding pre-existing native vegetation. It is expected that local climatic conditions, timing, soil types, soil compaction, topography, and nutrients need to be evaluated to ensure seed germination and plant establishment. The employment of healthy soil¹⁰⁷ principles may provide additional guidance on vegetative establishment in dry conditions (e.g., in arid and semi-arid climates dischargers should apply seed prior to the application of mulch). Dischargers may consider the advantages and limitations for each project area in regard to seed planting method (direct drilling, broadcasting, and/or hydraulic applications).

106 U.S. EPA, [Developing Your Stormwater Pollution Prevention Plan: A Guide for Construction Sites](https://www3.epa.gov/npdes/pubs/sw_swppp_guide.pdf) (May 2007),
<https://www3.epa.gov/npdes/pubs/sw_swppp_guide.pdf> [as of May 20, 2021]

107 California Department of Food and Agriculture, [Healthy Soils Program Website](https://www.cdfa.ca.gov/oefi/healthysouils/)
<<https://www.cdfa.ca.gov/oefi/healthysouils/>> [as of May 20, 2021]

h. Sediment Control

Sediment control BMPs should be the secondary means of preventing polluted stormwater discharges. Sediment control techniques recover some of the soil that becomes eroded when erosion control techniques are ineffective. This General Permit requires dischargers to consider perimeter control measures such as installing silt fences or placing straw wattles below slopes. These sediment control measures are only examples of what should be considered and should not preclude new or innovative approaches currently available or being developed.

Additional requirements for the effective implementation of erosion and sediment controls year-round are imposed on Risk Level and Type 2 and 3 dischargers because these sites pose a higher risk to water quality. This General Permit authorizes the Regional Water Boards to require Risk Level 3 and linear underground and overhead project Type 3 dischargers to implement additional site-specific sediment control requirements when the implementation of other erosion or sediment controls are found to be inadequately protecting the receiving waters.

This General Permit requires the use of wildlife friendly BMPs that minimize wildlife entrapment and sets a prohibition on the discharge of trash and debris. Wildlife entrapment can be minimized by providing the means for wildlife to escape dig sites that are deeper than one meter and storing materials, like netting and tubing, in locations that are inaccessible to wildlife. Dischargers should use biodegradable wattles containing no plastic that can remain on a site when possible. Wattles containing plastic netting (including plastic specified as photo-degradable) become “trash” in the environment and/or a trap for wildlife. These are also considered “construction materials and waste” and must be disposed of properly per this General Permit.

i. Run-on and Runoff Control

Inappropriate management of run-on and runoff can result in excessive physical and chemical impacts to receiving waters from sediment and increased flows. The discharger is required to manage all run-on and runoff from a project site. Examples include installing berms and other temporary run-on and runoff diversions. Dischargers are responsible for commingled run-on (onto the site or within the site) from areas not related to the site’s construction activities and the pollutants contained in the commingled discharge.

j. Snow and Ice melt

Construction sites that are affected by snow and ice conditions shall use BMPs to avoid sedimentation migration and erosion from occurring.

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k. Inspection, Maintenance, and Repair

All measures must be periodically inspected, maintained, and repaired to ensure that receiving water quality is protected. Frequent inspections coupled with thorough documentation and timely repair is necessary to ensure that all measures are functioning as intended.

I.R.2. Linear Underground and Overhead Projects

a. Linear Underground and Overhead Risk Determination

Linear underground and overhead projects vary in complexity and water quality concerns based on project type. This General Permit has varying application requirements based on the project's risk to water quality. Factors that lead to the characterization of the project include location, sediment risk, and receiving water risk.

Linear projects are separated into project types based on the location and complexity of a project area or project segment/section area. Linear underground and overhead projects have been categorized into three project types as follows:

i. Type 1 linear projects are those construction projects where:

- 1) 70 percent or more of the construction activity occurs on a paved surface and where areas disturbed during construction will be returned to preconstruction conditions or equivalent protection established at the end of the construction activities for the day; or
- 2) Greater than 30 percent of construction activities occur within the non-paved shoulders or land immediately adjacent to paved surfaces, or where construction occurs on unpaved improved roads, including their shoulders or land immediately adjacent to them where:
 - a) Areas disturbed during construction will be returned to pre-construction conditions or equivalent protection established at the end of the construction activities for the day to minimize the potential for erosion and sediment deposition; and
 - b) Areas where established vegetation was disturbed during construction will be stabilized and re-vegetated by the end of project. When required, adequate temporary stabilization BMPs will be installed and maintained until vegetation is established to meet minimum cover final stabilization requirements established in this General Permit.

Type 1 linear underground and overhead projects typically do not have a high potential to impact stormwater quality because: (1) these construction activities are not typically conducted during precipitation events, (2) these

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projects are normally constructed over a short period of time¹⁰⁸, minimizing the duration that pollutants could potentially be exposed to precipitation, and (3) disturbed soils such as those from trench excavation are required to be hauled away, backfilled into the trench, and/or covered (e.g., metal plates, pavement, plastic covers over spoil piles) at the end of the site operating hours for the construction day.

Type 1 linear underground and overhead projects are determined during the risk assessment found in Attachment E.1 to be 1) low sediment risk and low receiving water risk; 2) low sediment risk and medium receiving water risk; and 3) medium sediment risk and low receiving water risk.

This General Permit requires the discharger to ensure a SWPPP is developed by a Qualified SWPPP Developer for these construction activities that is specific to linear underground and overhead project type, location, and characteristics.

ii. Type 2 Linear Underground and Overhead Projects

Type 2 linear underground and overhead projects are determined to have a combination of High, Medium, and Low project sediment risk along with High, Medium, and Low receiving water risk. Type 2 linear underground and overhead projects are typically constructed over a short period of time like Type 1 projects, however, Type 2 projects have a higher potential to impact water quality because they:

- 1) Typically occur outside urban or developed areas;
- 2) Have larger areas of soil disturbance that are not closed or restored at the end of the day;
- 3) May have on-site stockpiles of soil, spoil, and other materials;
- 4) Cross or occur in close proximity to a wide variety of sensitive resources that may include, but are not limited to, steep topography and/or water bodies; and
- 5) Have larger areas of disturbed soils that may be exposed for a longer time interval before final stabilization, cleanup, and/or reclamation occurs.

This General Permit requires the discharger to ensure a SWPPP is developed by a Qualified SWPPP Developer and is implemented these site-specific construction activities for the project type, location, and characteristics.

¹⁰⁸ Short period of time refers to a project duration of weeks to months, but typically less than one year in duration.

iii. Type 3 Linear Underground and Overhead Projects

Type 3 linear underground and overhead projects are determined to have a combination of High and Medium project sediment risk along with High and Medium receiving water risk. Similar to Type 2 projects, Type 3 projects have a higher potential to impact water quality because they:

- 1) Typically occur outside urban and developed areas;
- 2) Have larger areas of soil disturbance that are not closed or restored at the end of the day;
- 3) May have on-site stockpiles of soil, spoil, and other materials;
- 4) Cross or occur in close proximity to a wide variety of sensitive resources that may include, but are not limited to, steep topography and/or water bodies; and
- 5) Have larger areas of disturbed soils that may be exposed for a longer time interval before final stabilization, cleanup, and/or reclamation occurs.

This General Permit requires the discharger to ensure a SWPPP is developed by a Qualified SWPPP Developer and is implemented these site-specific construction activities for the project type, location, and characteristics.

b. Programmatic Permitting for Linear Underground and Overhead Projects

i. Regional Programmatic Permit Coverage:

Regionwide programmatic permit coverage allows a linear underground and overhead project discharger to submit one Notice of Intent for multiple non-contiguous linear underground and overhead projects, if the projects: 1) are located within one Regional Water Board office boundary, 2) are a group of projects of similar scopes with common construction activities, and 3) have the same Legally Responsible Person. Thus, a linear underground and overhead project discharger may be issued a single waste discharge identification number (WDID) for each group of projects (e.g., electrical transmission, gas line transmission, wildfire prevention, etc.) that meet the above criteria.

A linear underground and overhead project discharger opting to obtain regional programmatic permit coverage must submit a common SWPPP with its application that addresses all the construction activities and pollutant sources relevant to the project scope. The linear underground and overhead project discharger must also submit a Linear Construction Activity Notification in SMARTS for each individual project with site-specific information per Attachment E.2, allowing the Regional Water Board to

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enforce individual projects per the requirements in this Order. Each project will share a WDID and will be assigned a WDID extension to identify and track the individual projects. Each individual project is terminated separately through a Linear Construction Termination Notification in SMARTS, pending Regional Water Board staff approval.

Regionwide programmatic permitting was requested by utility stakeholders to improve administrative efficiency related to construction stormwater permitting, in part by training contractors on a common SWPPP that can be implemented on a site-specific basis.

ii. Statewide Programmatic Permit Coverage for Mandated Installation of Broadband Utilities:

Statewide programmatic permit coverage allows a linear underground and overhead project discharger responsible in deploying construction activities to comply with sections 7 – 13 of the Governor's [Executive Order N-73-20](#), or amendments thereto, to submit one Notice of Intent for multiple non-contiguous linear broadband underground and overhead projects, if the projects:

- Are located throughout two or more Regional Water Board boundaries,
- Are a group of projects for broadband utility installation outside of a construction project otherwise regulated by this General Order, and
- Have the same Legally Responsible Person.

The discharger will be issued a single waste discharge identification number (WDID) for each group of projects that meet the above criteria.

A linear underground and overhead project discharger opting to obtain statewide programmatic permit coverage must submit:

- A common SWPPP with its application that addresses all the construction activities and pollutant sources relevant to the project scope, and
- Project-specific additional pollution prevention measures to the common SWPPP, as applicable,

A Linear Construction Activity Notification in SMARTS for each individual project with site-specific and project-specific information per Attachment E.2.

Each individual project will share a common WDID and will be assigned a unique WDID extension corresponding to the Regional Water Board

jurisdiction and the project risk level. The unique project-specific extension number will allow the corresponding Regional Water Board to enforce individual projects per the requirements in this Order specific to the project risk level. Each individual project is terminated separately through the Linear Construction Termination Notification process in SMARTS, and the Notice of Termination process of this General Permit.

Statewide programmatic permitting was requested by the California Department of Transportation, the statewide agency primarily responsible for the construction activity that fully deploys Governor's Executive Order N-73-20, or amendments thereto, by July 2026. To improve internal project efficiencies to comply with the executive order by July 2026, the Department has reduced its standard design-to-construction procedures from several months to two-to-three weeks. The permit enrollment administrative efficiency provided by statewide programmatic permitting will allow the Department, and other linear project dischargers deploying the executive order, to obtain permit coverage for individual projects, compatible with shortened design-to construction timelines, without submitting repetitive application information for similar projects within different regions.

c. Linear Underground and Overhead Project Effluent Standards

All linear underground and overhead projects are subject to the narrative effluent limitations specified in the General Permit. Type 2 and Type 3 projects are subject to technology-based numeric action levels for pH and turbidity.

d. Linear Underground and Overhead Project Good Housekeeping

Improper use and handling of construction materials could potentially cause a threat to water quality. All linear underground and overhead project dischargers must comply with a minimum set of Good Housekeeping measures specified in Attachment E of this General Permit to ensure proper construction material site management.

e. Linear Underground and Overhead Project Non-Stormwater Management

All linear underground and overhead project dischargers must comply with the Non-Stormwater Management measures specified in Attachment E and Order of this General Permit in order to ensure control of all non-stormwater discharges during construction.

f. Linear Underground and Overhead Project Erosion Control

This General Permit requires all linear underground and overhead projects dischargers to implement effective wind erosion control measures, and soil cover for inactive areas. Type 3 linear underground and overhead projects

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posing a higher risk to water quality are additionally required to ensure the post-construction soil loss is equivalent to or less than the pre-construction levels.

g. Linear Underground and Overhead Project Sediment Control

All linear underground and overhead project dischargers must comply with the general Sediment Control measures specified in Attachment E or this General Permit in order to ensure control and containment of all sediment discharges. Additional requirements for sediment controls are imposed on Type 2 and 3 linear underground and overhead projects due to their higher risk to water quality.

h. Linear Underground and Overhead Projects Run-on and Runoff Control

Discharges originating outside of a project's perimeter and flowing onto the property can adversely affect the quantity and quality of discharges originating from a project site. All linear underground and overhead projects must comply with the run-on and runoff control measures specified in Attachment E of this General Permit in order to ensure proper management of run-on and runoff. Due to the lower risk of impacting water quality, Type 1 linear underground and overhead projects are not required to implement run-on and runoff controls unless deemed necessary by the discharger. Examples include installing berms and other temporary run-on and runoff diversions. Dischargers are responsible for commingled run-on (onto the site or within the site) from areas not related to the site's construction activities and the pollutants contained in the commingled discharge.

i. Linear Underground and Overhead Projects Inspection, Maintenance, and Repair

Proper inspection, maintenance, and repair activities are important to ensure the effectiveness of on-site measures to protect receiving water quality. All linear underground and overhead project dischargers are required to comply with the inspection, maintenance, and repair requirements specified in Attachment E of this General Permit in order to ensure that these activities are adequately performed.

I.S. Active Treatment System¹⁰⁹ Requirements

I.S.1. General

The requirements in Attachment F only apply when an active treatment system is implemented on a project site. An active treatment system is defined in this General Permit as "a controlled treatment system that employs chemical

¹⁰⁹ An active treatment system is a treatment system that employs chemical coagulation, chemical flocculation, or electrocoagulation in order to reduce turbidity caused by fine suspended sediment.

coagulation, chemical flocculation, or electrocoagulation to aid in the reduction of turbidity caused by fine suspended sediment.”

The active treatment system is designed to treat and reduce the turbidity level of construction stormwater discharges to meet water quality standards and the requirements of this General Permit at the flowrate required in the Active Treatment System Plans. The specified active treatment system flowrate is designed to dewater the basin within 10 hours. Typical equipment and materials may include pumps, manifolds, flocculants, filter bags, sand media filters, and other items designed to remove suspended materials from construction stormwater. The discharger is required to ensure the operators of the active treatment system are adequately trained and the appropriate professional designed the Active Treatment System Plan.

Bonded-fiber matrices, hydromulches, spray tackifiers, and other land-applied products used to stabilize soil are not considered active treatment nor passive treatment, but rather a form of erosion control.

The use of an active treatment system may be necessary when: (1) traditional erosion and sediment controls do not effectively control accelerated erosion at the construction site, (2) the construction site stormwater discharges may cause or contribute to an exceedance of a water quality standard, and/or (3) site constraints (e.g., very steep or long slope lengths,¹¹⁰ clay, highly erosive soils) inhibit the ability to construct a correctly sized sediment basin.

The active treatment system industry in California started in the mid-1990s and is relatively young, however many developers use these systems to treat stormwater discharges from their construction sites. The active treatment system requirements in this General Permit are based on those in place for small wastewater treatment systems, active treatment system regulations from the Central Valley Regional Water Quality Control Board (September 2005 memorandum “2005/2006 Rainy Season – Monitoring Requirements for Stormwater Treatment Systems that Utilize Chemical Additives to Enhance Sedimentation”), the State of Washington’s Department of Ecology Construction Stormwater Program, and recent advances in technology and knowledge of coagulant performance and aquatic safety.

The effective design of an active treatment system requires a detailed survey and analysis of site conditions. Properly planned and implemented active treatment system provide high-quality discharges and prevent significant impacts to surface water quality, even under extreme environmental conditions.

110 Pitt, R., S. Clark, and D. Lake. 2006. Construction Site Erosion and Sediment Controls: Planning, Design, and Performance. DEStech Publications. Lancaster, PA. 370pp.

These systems can be very effective in reducing the sediment in stormwater runoff, but the systems that use additives or polymers to enhance sedimentation also pose a potential risk to water quality (e.g., inadequate training, operational failure, equipment failure, additive or polymer release). The State Water Board is concerned about the potential acute and chronic impacts that the polymers and other chemical additives may have on fish and aquatic organisms if released in sufficient quantities or concentrations. The literature and anecdotal evidence of polymer releases causing aquatic toxicity in California supports this concern.¹¹¹ For example, cationic polymers have been shown to bind with the negatively charged gills of fish, resulting in mechanical suffocation.¹¹² This General Permit establishes residual polymer monitoring and toxicity testing requirements due to the potential toxicity impacts associated with the release of additives or polymers into receiving waters from construction sites utilizing an active treatment system.

The primary treatment process in an active treatment system is coagulation and flocculation. Active treatment systems operate on the principle that the added coagulant is bound to suspended sediment, forming floc, which is gravitationally settled in tanks or a basin, or removed by sand filters. A typical installation utilizes an injection pump upstream from the clarifier tank, basin, or sand filters, which is electronically metered to both flow rate and suspended solids level of the influent, assuring a constant dose. The coagulant mixes and reacts with the influent, forming a dense floc. The floc may be removed by gravitational setting in a clarifier tank or basin, or by filtration. Water from the clarifier tank, basin, or sand filters may be routed through cartridge(s) and/or bag filters for final polishing. Vendor-specific systems use various methods of dose control, sediment and floc removal, filtration, etc., that are detailed in project-specific documentation. The particular coagulant and/or flocculant used for a given project is determined based on the site water chemistry because the coagulants are specific in their reactions with various types of sediments. Appropriate selection of dosage must be carefully matched to the characteristics of each site. This General Permit prohibits the operation of an active treatment system or the batch storage to cause an uncontrolled release of chemicals used during the flocculation, coagulation, and/or filtration process for suspended sediment particles because these chemicals can negatively affect the beneficial uses of receiving waters and/or degrade water quality (e.g., acute and chronic toxicity).

Active treatment systems are operated in two differing modes, batch or flow-through. Batch treatment can be defined as Pump-Treat-Hold-Test-Release. In

111 RomØen, K., B. Thu, and Ø. Evensen. 2002. Immersion delivery of plasmid DNA II. A study of the potentials of chitosan-based delivery system in rainbow trout (*Onchorhynchus mykiss*) fry. *Journal of Controlled Release* 85: 215-225.

112 Bullock, G., V. Blazer, S. Tsukuda, and S. Summerfelt. 2000. Toxicity of acidified chitosan for cultured rainbow trout (*Oncorhynchus mykiss*). *Aquaculture* 185:273-280.

batch treatment, water is held in a basin or tank, and is not discharged until treatment is complete. Batch treatment involves holding or recirculating the treated water in a holding basin or tank(s) until treatment is complete or the basin or storage tank(s) is full. In flow-through treatment, water is pumped into the active treatment system directly from the runoff collection system or stormwater holding pond, where it is treated and filtered as it flows through the system and is then directly discharged. “Flow-through treatment” is also referred to as “continuous treatment.”

I.S.2. Active Treatment System Effluent Standards

This General Permit requires discharges of stormwater associated with construction activity that undergo active treatment to comply with special operational and effluent limitations to ensure that these discharges do not adversely affect the beneficial uses of the receiving waters or cause degradation of their water quality and establishes numeric effluent limitations for discharges from construction sites that utilize an active treatment system. An exceedance of the active treatment system numeric effluent limitation constitutes a General Permit violation. These systems lend themselves to technology-based numeric effluent limitations for turbidity and pH because of their known reliable treatment. Advanced systems have been in use in some form since the mid-1990s. An active treatment system is considered reliable, can consistently produce a discharge of less than 10 NTU, and has been used successfully at many sites in several states since 1995 to reduce turbidity to very low levels.

This General Permit contains “compliance storm (precipitation) event” exceptions from the technology-based numeric effluent limitations for active treatment system discharges. The rationale is that technology-based requirements are developed assuming a certain design storm (precipitation) event. The industry-standard active treatment system design storm is 10-year, 24-hour (as stated in Attachment F of this General Permit), so the compliance precipitation event has been established as the 10-year, 24-hour event as well to provide consistency.

I.T. Passive Treatment Requirements

The U.S. EPA’s 2022 NPDES General Permit for Stormwater Discharges from Construction Activities¹¹³ requires the regulation of any chemically enhanced stormwater treatment. Chemically enhanced treatments are split into two categories: active treatment systems and passive treatment technologies (passive treatment including chemical and products). More information regarding active treatment systems can be found in the Section I.S above.

113 U.S. EPA, [2022 NPDES General Permit for Discharges from Construction Activities](https://www.epa.gov/npdes/2022-construction-general-permit-cgp#2022cgp) (January 11, 2017), <<https://www.epa.gov/npdes/2022-construction-general-permit-cgp#2022cgp>>

Passive treatment chemicals and products bind fine soil particles together through chemical ionic processes allowing heavy particles to settle out of solution without a fully mechanical or engineered system. Passive treatment technologies in the construction industry typically use coagulants and flocculants such as polyacrylamides (PAMs).

Construction site operators and dischargers regularly use passive treatment to reduce the turbidity levels in construction stormwater runoff. The construction industry uses passive treatment technologies because these products are a cost-effective method of reducing turbidity for compliance with turbidity numeric action levels in this General Permit, especially compared to active treatment systems. Examples of chemically enhanced BMPs used to meet General Permit turbidity numeric action levels are blocks, wattles, or water-applied products.

Many other industries use passive treatment chemicals in water purification, food production, and other industrial applications to reduce the turbidity and concentration of other pollutants in the discharge.

The types of flocculants and coagulants that can be included in passive treatment for this General Permit are non-ionic and anionic flocculants and coagulants. Cationic flocculants and coagulants can be used in an active treatment system and are regulated in Attachment F. Research on applicable chemical information indicates that many commonly used flocculants are toxic or contain toxic components, and when discharged to surface water have the potential to impact aquatic life and other beneficial uses.

Many types of passive treatment chemicals are toxic to fish and other aquatic organisms. Cationic PAM-based flocculants are acutely toxic to aquatic species in small quantities and are neurotoxins. Other flocculant products such as anionic PAM-based flocculants are chronically toxic to aquatic species in large quantities.

The California Stormwater Quality Association developed past guidance¹¹⁴ on PAMs used in passive treatment technologies and included specific limitations to the use of soil binders containing PAMs:

- 1) Do not use PAMs on a slope that flows into a waterbody without passing through a sediment trap, sediment basin, or other sediment controls (e.g., wattles, silt fences, gravel bags);
- 2) The specific PAM copolymer formulation must be anionic. Cationic PAMs should not be used in any application because of known aquatic toxicity problems. Only the highest drinking water grade PAM certified for compliance with ANSI/NSF Standard 60 for drinking water treatment, should be used for soil applications;

- 3) PAMs designated for erosion and sediment control should be “water soluble” or “linear” or “non-cross linked”; and
- 4) PAMs should not be used as a stand-alone BMP to protect against water-based erosion. When combined with mulch, its effectiveness increases dramatically.

Additionally, a low-turbidity discharge from a passive treatment chemical application site does not always correspond to low levels of solids in the discharge and/or an improvement in water quality downstream because:

- 1) Turbidity monitoring solely measures small size solids suspended in the water; turbidity monitoring does not measure particle size, weight, or bed load of sediment from flocculated solids leaving a site; and
- 2) Passive treatment chemicals discharged either by aerial deposition or through stormwater runoff contributes similar toxicity threats to aquatic life.

This General Permit regulates the use of passive treatment in Attachment G, however, specific technology-based and/or water quality-based numeric effluent limitations have not been implemented in this General Permit for passive treatment chemicals because there is currently no consistent and proven data to determine the level of toxicity and water quality impacts that negatively outweighs the economic benefit associated with the use of passive treatment technologies.

I.U. Post-Construction Requirements

I.U.1. General

Past practices for new and redevelopment construction activities have resulted in modified natural watershed and stream processes. This is caused by altering the terrain, modifying the vegetation and soil characteristics, introducing impervious surfaces such as pavement and buildings, increasing drainage density through pipes and channels, and altering the condition of stream channels through straightening, deepening, and armoring. These changes result in a drainage system where sediment transport capacity is increased, and sediment supply is decreased. A receiving channel’s response is dependent on dominant channel materials and its stage of adjustment. Construction activity can lead to impairment of beneficial uses in two main ways:

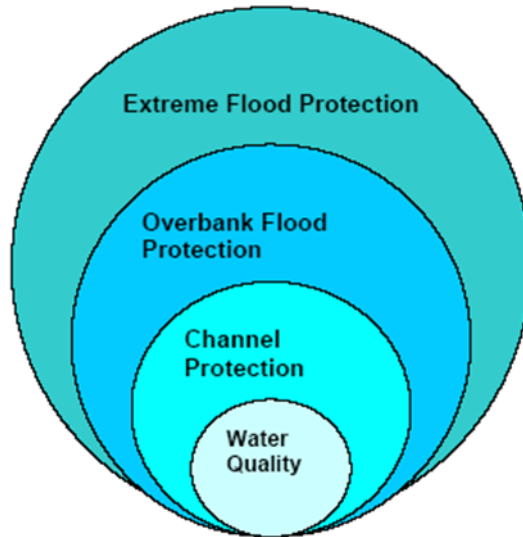
- a. Stormwater discharges occurring during the actual construction process can negatively affect the chemical, biological, and physical properties of downstream receiving waters. The most likely pollutant is sediment due to the disturbance of the landscape, however pH and other non-visible pollutants are also of great concern; and
- b. The finished project may result in significant modification of the site’s long-term response to precipitation after most construction activities are completed at a construction site. New development and redevelopment projects have almost

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always resulted in permanent post-construction water quality impacts because more precipitation ends up as runoff and less precipitation is intercepted, evaporated, and infiltrated.

An effective stormwater management strategy must address the full suite of precipitation events (water quality, channel protection, overbank flood protection, extreme flood protection) (Figure 1).

Figure 1 – Suite of Precipitation Events



The post-construction stormwater performance standards in this General Permit specifically address water quality and channel protection events. Overbank flood protection and extreme flood protection events are traditionally dealt with in local drainage and flood protection ordinances. However, measures in this General Permit to address water quality and channel protection also reduce overbank and extreme flooding impacts. This General Permit aims to match post-construction runoff to pre-construction runoff for the 85th percentile, 24-hour storm event, which reduces the risk of impact to the receiving water's channel morphology and provides some water quality protection.

Projects are exempt from the post-construction requirements in this General Permit if located within an area subject to post-construction standards of an active Phase I or II MS4 permit with approved post-construction requirements or if they are linear underground and overhead projects.

I.U.2. Water Quality

This General Permit requires dischargers to replicate the pre-project runoff water balance (defined as the amount of rainfall that ends up as runoff) for the smallest storms up to the 85th percentile storm event, or the smallest storm event that generates runoff, whichever is larger. Contemporary stormwater management

generally routes these flows directly to the drainage system, increasing pollutant loads and potentially causing adverse effects on receiving waters. These smaller water quality events happen much more frequently than larger events and generate much higher pollutant loads on an annual basis. There are other adverse hydrological impacts that result from not designing according to the site's pre-construction water balance. In Maryland, Klein¹¹⁵ noted that baseflow decreases as the extent of urbanization increases. Ferguson and Suckling¹¹⁶ noted a similar relation in watersheds in Georgia. On Long Island, Spinello and Simmons¹¹⁷ noted substantial decreases in base flow in intensely urbanized watersheds.

This General Permit emphasizes runoff reduction through on-site stormwater reuse, interception, evapotranspiration, and infiltration through non-structural controls and conservation design measures (e.g., downspout disconnection, soil quality preservation/enhancement, interceptor trees). Employing these measures close to the source of runoff generation is the easiest and most cost-effective way to comply with the pre-construction water balance standard. Using low-tech runoff reduction techniques close to the source is consistent with a number of recommendations in the literature.¹¹⁸ In many cases, BMPs implemented close to the source of runoff generation cost less than end-of the pipe measures.¹¹⁹ Dischargers are given the option of using the SMARTS Post-Construction Calculator to calculate the required runoff volume or a watershed process-based, continuous simulation model such as the EPA's Stormwater Management Model (SWMM) or Hydrologic Simulation Program Fortran. Such methods used by the

115 Klein 1979 as cited in Delaware Department of Natural Resources (DDNR). 2004. Green Technology: The Delaware Urban Runoff Management Approach. Dover, DE, p. 117.

116 Ferguson and Suckling 1990 as cited Delaware Department of Natural Resources (DDNR). 2004. Green Technology: The Delaware Urban Runoff Management Approach. Dover, DE, p. 117.

117 Center for Watershed Protection (CWP). 2000. The Practice of Watershed Protection: Techniques for protecting our nation's streams, lakes, rivers, and estuaries. Ellicott City, MD, p. 741.

118 Bay Area Stormwater Management Agencies Association (BASMAA). 1997. Start at the Source: Residential Site Planning and Design Guidance Manual for Stormwater Quality Protection. Palo Alto, CA;
McCuen, R.H. 2003 Smart Growth: hydrologic perspective. Journal of Professional Issues in Engineering Education and Practice. Vol (129), p. 151-154;
Moglen, G.E. and S. Kim.2007. Impervious imperviousness-are threshold-based policies a good idea? Journal of the American Planning Association, Vol 73 No.2. p. 161-171.

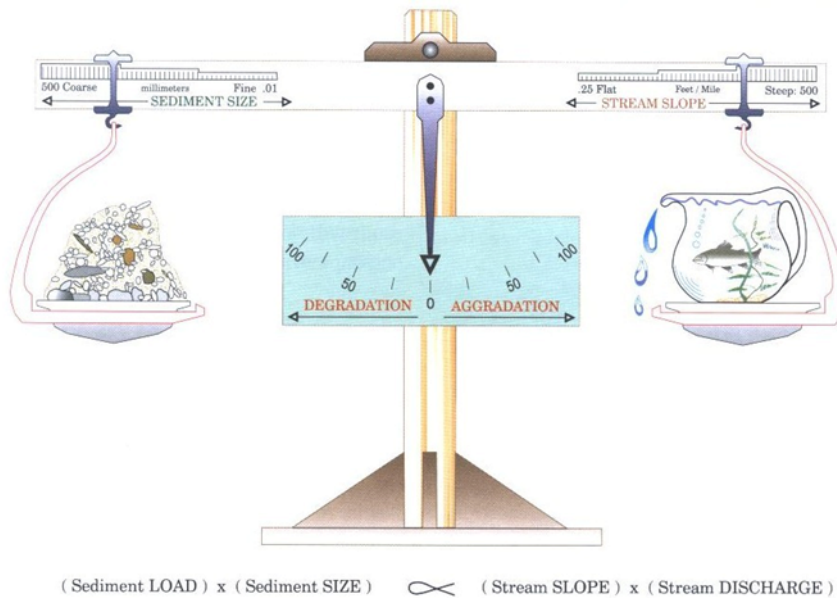
119 Delaware Department of Natural Resources (DDNR). 2004. Green technology: The Delaware Urban Runoff Management Approach. Dover, DE, p. 117.

discharger will be reviewed by the Regional Water Board upon Notice of Termination application.

I.U.3. Channel Protection

A basic understanding of fluvial geomorphic concepts is necessary to address channel protection. A dominant paradigm in fluvial geomorphology holds that streams adjust their channel dimensions (width and depth) in response to long-term changes in sediment supply and bank full discharge (1.5 to 2-year recurrence interval). The bank full stage corresponds to the discharge at which channel maintenance is the most effective (the discharge at which the moving sediment, forming or removing bars, forming or changing bends and meanders, and generally doing work that results in the average morphologic characteristics of channels).¹²⁰ Lane (1955 as cited in Rosgen 1996¹²¹) showed the generalized relationship between sediment load, sediment size, stream discharge, and stream slope (Figure 2). A change in any one of these variables sets up a series of mutual adjustments in the companion variables with a resulting direct change in the physical characteristics of the stream channel.

Figure 2 – Schematic of the Lane Relationship¹²²



Stream slope multiplied by stream discharge (the right side of the scale) is essentially an approximation of stream power, a unifying concept in fluvial

120 Dunne, T and L.B. Leopold. 1978. Water in Environmental Planning. San Francisco W.H. Freeman and Company.

121 Rosgen, D.L. 1996. Applied River Morphology. Pagosa Springs. Wildland Hydrology.

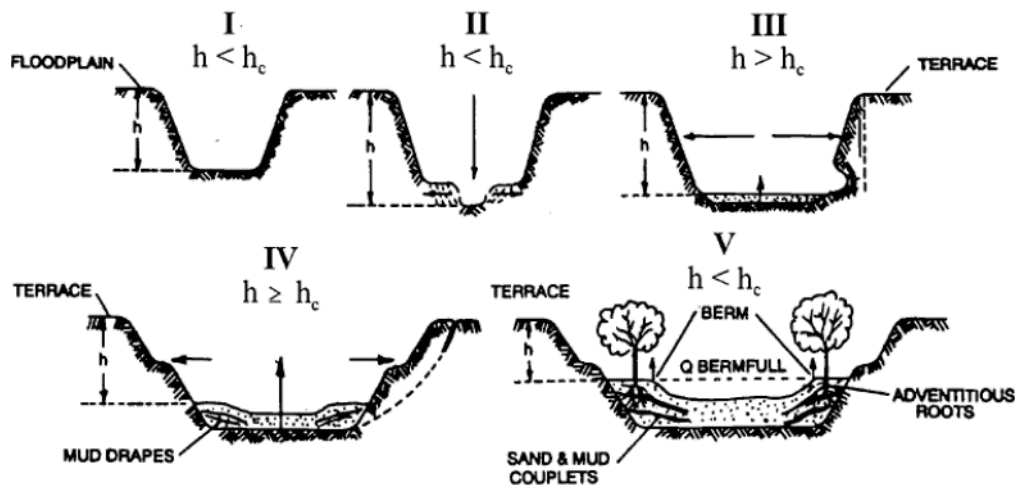
122 After Lane (1955) as cited in Rosgen (1996).

geomorphology (Bledsoe 1999). Urbanization generally increases stream power and affects the resisting forces in a channel (sediment load and sediment size represented on the left side of the scale).

Sediment loads can increase from 2 to 40,000 times over pre-construction levels during construction.¹²³ Most of this sediment is delivered to stream channels during large, episodic rain events.¹²⁴ This increased sediment load leads to an initial aggradation phase where stream depths may decrease as sediment fills the channel, leading to a decrease in channel capacity and increase in flooding and overbank deposition. A degradation phase initiates after construction is completed.

Schumm et. al (1984) developed a channel evolution model that describes the series of adjustments from initial downcutting, to widening, to establishing new floodplains at lower elevations (Figure 3).

Figure 3 – Channel Changes Associated with Urbanization¹²⁵



Channel incision (Stage II) and widening (Stages III and to a lesser degree, Stage IV) are due to a number of fundamental changes on the landscape. Connected impervious areas and compaction of pervious surfaces increase the frequency and

123 Goldman S.J., K. Jackson, and T.A. Bursztynsky. 1986. Erosion and Sediment Control Handbook. McGraw Hill. San Francisco.

124 Wolman 1967 as cited in Paul, M.P. and J.L. Meyer. 2001. Streams in the Urban Landscape. Annu. Rev. Ecol. Syst. 32, p. 333-365.

125 After incised Channel Evolution Sequence in Schumm et. al 1984.

volume of bank full discharges.¹²⁶ Increased drainage density (miles of stream length per square mile of watershed) also negatively impacts receiving stream channels.¹²⁷ Increased drainage density and hydraulic efficiency leads to an increase in the frequency and volume of bank full discharges because the time of concentration is shortened. Flows from engineered pipes and channels are also often “sediment starved” and seek to replenish their sediment supply from the channel.

Encroachment of stream channels can also lead to an increase in stream slope, which leads to an increase in stream power. In addition, watershed sediment loads and sediment size (with size generally represented as the median bed and bank particle size, or d_{50}) decrease during urbanization.¹²⁸ This means that even if pre- and post-development stream power is the same, more erosion will occur in the post-development stage because the smaller particles are less resistant (provided they are non-cohesive).

As shown in Stages II and III, the channel deepens and widens to accommodate the increased stream power¹²⁹ and decrease in sediment load and sediment size. Channels may actually narrow as entrained sediment from incision is deposited laterally in the channel. After incised channels begin to migrate laterally (Stage III), bank erosion begins, which leads to general channel widening.¹³⁰ At this point, a majority of the sediment that leaves a drainage area comes from within the channel, as opposed to the background and construction related hillslope

126 Booth, D.B. and C.R. Jackson. 1997. Urbanization of Aquatic Systems: Degradation Thresholds, Stormwater Detection, and the Limits of Mitigation. *Journal of the American Water Resources Association* Vol. 33, No. 5, p. 1077-1089.

127 May, C.W. 1998. Cumulative effects of urbanization on small streams in the Puget Sound Lowland ecoregion. Conference proceedings from Puget Sound Research '98 held March 12, 13 1998 in Seattle, WA;
Santa Clara Valley Urban Runoff Pollution Prevention Program. 2002.
Hydromodification Management Plan Literature Review, p. 80.

128 Finkenbine, J.K., D.S. Atwater, and D.S. Mavinic. 2000. Stream health after urbanization. *J. Am. Water Resour. Assoc.* 36, p. 1149-60;
Pizzuto, J.E. W.S. Hession, and M. McBride. 2000. Comparing gravel-bed rivers in paired urban rural catchments of southeastern Pennsylvania. *Geology* 28, p. 79-82.

129 Hammer 1973 as cited in Delaware Department of Natural Resources (DDNR). 2004. *Green Technology: The Delaware Urban Runoff Management Approach*. Dover, DE, p.117;
Booth, D.B. 1990. Stream Channel Incision Following Drainage Basin Urbanization. *Water Resour. Bull.* 26, p. 407-417.

130 Trimble, S.W. 1997. Contribution of Stream Channel Erosion to Sediment Yield from an Urbanizing Watershed. *Science*: Vol. 278 (21), p. 1442-1444.

contribution. Stage IV is characterized by more aggradation and localized bank instability. Stage V represents a new quasi-equilibrium channel morphology in balance with the new flow and sediment supply regime. In other words, stream power is in balance with sediment load and sediment size.

The magnitude of the channel morphology changes discussed above varies along a stream network as well as with the age of development, slope, geology (sand-bedded channels may cycle through the evolution sequence in a matter of decades whereas clay-dominated channels may take much longer), watershed sediment load and size, type of urbanization, and land use history. It is also dependent on a channel's stage in the channel evolution sequence when urbanization occurs. Management strategies must take into account a channel's stage of adjustment and account for future changes in the evolution of channel form (Stein and Zaleski 2005).¹³¹

Traditional structural water quality BMPs (e.g., detention basins and other devices used to store volumes of runoff) unless they are highly engineered to provide adequate flow duration control, do not adequately protect receiving waters from accelerated channel bed and bank erosion, do not address post-development increases in runoff volume, and do not mitigate the decline in benthic macroinvertebrate communities in the receiving waters,¹³² and suggest that structural BMPs are not as effective in protecting aquatic communities as a continuous riparian buffer of native vegetation. This is supported by the findings of Zucker and White,¹³³ where instream biological metrics were correlated with the extent of forested buffers.

This General Permit requires dischargers to maintain pre-development drainage densities and times of concentration in order to protect channels and encourages dischargers to implement setbacks to reduce channel slope and velocity changes that can lead to aquatic habitat degradation.

There are a number of other approaches for modeling fluvial systems, including statistical and physical models and simpler stream power models.¹³⁴ The use of

131 Stein, E.S. and S. Zaleski. 2005. Managing runoff to protect natural stream: the latest developments on investigation and management of hydromodification in California. Southern California Coastal Water Research Project Technical Report 475, p. 26.

132 Horner, R.R. 2006. Investigation of the Feasibility and Benefits of Low-Impact Site Design Practices (LID) for the San Diego Region.

133 Delaware Department of Natural Resources (DDNR). 2004. Green Technology: The Delaware Urban Runoff Management Approach. Dover, DE, p. 117.

134 Finlayson, D.P. and D.R. Montgomery. 2003. Modeling large-scale fluvial erosion in geographic information systems. *Geomorphology* (53), p.147-164.

these models in California is described in Stein and Zaleski (2005).¹³⁵ Rather than require a specific one-size-fits-all modeling method in this permit, the State Water Board intends to develop a stream power and channel evolution model-based framework to assess channels and develop a hierarchy of suitable analysis methods and management strategies. In time, this framework may become a State Water Board water quality control policy.

I.U.4. General Permit Linkage to Overbank and Extreme Flood Protection

Site design BMPs (e.g., rooftop and impervious disconnection, vegetated swales, setbacks and buffers) filter and settle out pollutants and provide for more infiltration than is possible for traditional centralized structural BMPs placed at the site's lowest point. They provide source control for runoff and lead to a reduction in pollutant loads. When implemented, they also help reduce the magnitude and volume of larger, less frequent storm events (e.g., 10-yr, 24-hour storm and larger), thereby reducing the need for expensive flood control infrastructure. Non-structural BMPs can also be a landscape amenity, instead of a large, isolated structure requiring substantial area for ancillary access, buffering, screening, and maintenance facilities. The multiple benefits of using non-structural benefits will be critically important as the state's population increases and imposes strains upon our existing water resources.

Maintaining predevelopment drainage densities and times of concentration will help reduce post-development peak flows and volumes in areas not covered under a municipal permit. The most effective way to preserve drainage areas and maximize time of concentration is to implement landform grading, incorporate site design BMPs and implement distributed structural BMPs (e.g., bioretention cells, rain gardens, rain cisterns).

This General Permit requires dischargers to maximize sheet flow and use an "open" drainage system (e.g., swales, ditches, vegetated channels) for concentrated flows to meet the drainage density requirement. Sheet flow areas, swales, ditches, and vegetated channels are not considered streams for the purpose of calculating drainage density.

This General Permit requires dischargers to use recommended methods in the applicable local hydraulic design or flood control manual to meet the time of concentration requirements. The discharger is required to use the time of concentration calculation method contained in the Natural Resources Conservation Service's Technical Release 55: Urban Hydrology for Small Watersheds if a recommended method does not exist.

¹³⁵ Stein, E.S. and S. Zaleski. 2005. Managing runoff to protect natural stream: the latest developments on investigation and management of hydromodification in California. Southern California Coastal Water Research Project Technical Report 475, p. 26.

Dischargers with active General Permit coverage are required to use the post-construction calculator in SMARTS or the approved post-construction standards of an applicable Phase I or Phase II Municipal Separate Storm Sewer System (MS4) NPDES permit to report compliance with this General Permit post-construction requirements.

This General Permit requires the discharger to utilize the post-construction calculator in SMARTS if: (1) a construction project (other than a linear and underground and overhead project that is not subject to this General Permit's post-construction requirements) was or is approved by the local municipality prior to the municipality having post-construction standards adopted pursuant to a Phase I or Phase II MS4 permit or (2) the project was not subject to the post-construction standards of a Phase I or Phase II entity.

I.V. Stormwater Pollution Prevention Plans (SWPPPs)

U.S. EPA's Construction General Permit requires that qualified personnel conduct inspections and defines qualified personnel as "a person knowledgeable in the principles and practice of erosion and sediment controls who possesses the skills to assess conditions at the construction site that could impact stormwater quality and to assess the effectiveness of any sediment and erosion control measures selected to control the quality of stormwater discharges from the construction activity."¹³⁶ U.S. EPA also suggests that qualified personnel prepare SWPPPs and points to numerous states that require certified professionals to be on construction sites at all times.

This General Permit requires that all SWPPPs be site-specific and are written, amended, and certified by a Qualified SWPPP Developer and includes the information needed to demonstrate compliance with all requirements of this General Permit to ensure that water quality is being protected. SWPPP development and updates are required to be based on actual site conditions and maintain continued compliance with requirements of this General Permit. This General Permit also requires the current SWPPP be kept on-site, made available for review, and uploaded through SMARTS.

Although the QSD can change over the life of a project, a QSD, representing the discharger, is expected to make necessary corrections and amendments to the original SWPPP throughout the life of the project to ensure the site's compliance plan with this General Permit is documented and current. Similarly, a QSP, representing the discharger, must also oversee the implementation of the site-specific BMPs described in the corresponding site-specific SWPPP.

¹³⁶ U.S. EPA, [Developing Your Stormwater Pollution Prevention Plan](https://www3.epa.gov/npdes/pubs/sw_swppp_guide.pdf) (May 2017), <https://www3.epa.gov/npdes/pubs/sw_swppp_guide.pdf> [as of May 20, 2021]

The local municipality cannot enforce General Permit requirements; this is done by the Regional Water Board inspectors. The local municipality is typically responsible for ensuring compliance with local stormwater ordinance which prohibits sediment and other pollutants from entering the MS4, and with a local grading ordinance that typically requires an erosion and sediment control plan (typically a sheet in the construction plan set) for projects with a grading permit. The local municipality may have a condition in their MS4 stormwater permit requiring the agency to check that certain items are included in the SWPPP. This does not constitute approval of the SWPPP, and the review is typically conducted prior to issuing a grading permit.

The previous versions of the General Permit required development and implementation of a SWPPP as the primary compliance mechanism. The SWPPP has three major objectives: (1) to help identify the sources of sediment and other pollutants that affect the quality of stormwater discharges, (2) to describe and ensure the implementation of site-specific BMPs to reduce or eliminate sediment and other pollutants in stormwater and non-stormwater discharges, and (3) to convey a plan to restore erosion protection and site hydrology post-construction. The SWPPP must include site-specific BMPs that address source control, pollutant control, and treatment control.

This General Permit shifts some of the previous measures into specific General Permit requirements, each individually enforceable as a General Permit term. This General Permit emphasizes the use of appropriately selected, correctly installed, and maintained site-specific BMPs. This approach provides the flexibility necessary to establish BMPs that can effectively control sources of pollutants during changing construction activities. These specific requirements also improve both the clarity and the enforceability of the General Permit so that the dischargers understand, and the Water Boards and public can determine whether the discharges comply with this General Permit's requirements.

The SWPPP must be implemented at the appropriate level to protect water quality at all times throughout all of the construction project phases. The SWPPP must remain on the site during construction activities, commencing with the initial mobilization and ending with the termination of coverage under the General Permit. Linear underground and overhead project dischargers are required to make the SWPPP available at the construction site during site operating hours while construction is occurring and shall be made available upon request by a State, Federal, or Municipal inspector. A site-specific SWPPP may be kept in electronic format. All maps and figures must be printed, hard copy, full size, and available on the construction site. Current copies of the BMPs and maps and drawings will be left with the field crew and the original SWPPP shall be made available via a request by radio or telephone when the original SWPPP is retained by a crewmember in a construction vehicle and is not currently at the construction site. The SWPPP shall be available from the SWPPP contact listed in the Permit Registration Documents until stabilization is achieved even when construction activities are complete.

A SWPPP must be appropriate for the type and complexity of a project and will be developed and implemented to address site-specific conditions. Some projects may have similarities or complexities, yet each project is unique in its progressive state that requires specific description and selection of BMPs needed to address all possible generated pollutants.

I.W. Total Maximum Daily Loads (TMDLs)

I.W.1. Introduction

Total Maximum Daily Loads (TMDLs) are regulatory tools that provide the maximum amount of a pollutant from potential sources in the watershed that a water body can receive while attaining water quality standards. A TMDL is defined as the sum of the allowable loads of a single pollutant from all contributing point sources (waste load allocations) and non-point sources (load allocations), plus the contribution from background sources. (40 Code of Federal Regulations § 130.2, subd. (i).) Discharges covered by this General Permit are considered to be point source discharges, and therefore must comply with effluent limitations that are “consistent with the assumptions and requirements of any available waste load allocation for the discharge prepared by the State and approved by EPA pursuant to 40 Code of Federal Regulations section 130.7.” (40 Code of Federal Regulations § 122.44, subd. (d)(1)(vii).) In addition, Water Code § 13263, subdivision (a), requires that waste discharge requirements implement relevant water quality control plans. Many TMDLs in existing water quality control plans include both waste load allocation and implementation requirements. Attachment H of this General Permit lists the watersheds with U.S. EPA-approved and U.S. EPA-established TMDLs that include TMDL requirements for dischargers covered by this General Permit.

TMDLs are adopted through a separate U.S. EPA and Regional Water Board public process. The previous permit included a list of potentially applicable TMDLs, and this list has been refined in this General Permit through consultation with the Regional Water Boards.

I.W.2. General Permit Implementation Requirements

Water Board staff evaluated and developed the following information in the development of the Attachment H implementation requirements:

- TMDL-specific requirements including implementation timelines, additional monitoring and reporting requirements, compliance determination language regarding compliance with numeric action levels, applicable TMDL-specific effluent limitations, and reporting requirements consistent with the applicable TMDL(s);

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- Information regarding this General Permit's TMDL-specific requirements, timelines, and deliverables consistent with the assumptions and requirements of applicable waste load allocation(s) to implement the TMDL(s);
- Information regarding the implementation of BMPs (as applicable) to comply with applicable waste load allocations;
- Concentration-based monitoring requirements and information regarding the required determination of compliance for numeric effluent limitations through concentration-based compliance monitoring, corresponding calculation methodology, and reporting; and
- Compliance deadlines, based on TMDL implementation schedules, were set for Responsible Dischargers to comply with the TMDL-specific requirements on, and after, the provided date. TMDLs that lacked or surpassed the implementation schedules prior to this issuance of this General Permit were assigned compliance deadlines set for the effective date of this General Permit.

I.W.3. TMDL Evaluation Steps

The State Water Board used the following process to evaluate and translate each TMDL in Attachment H:

- Step 1: Determined whether the TMDL applies to construction stormwater discharges and authorized non-stormwater discharges regulated by this General Permit (discharges regulated by this General Permit);
- Step 2: Identified the specific TMDL requirements that are applicable to discharges regulated by this General Permit;
- Step 3: Translated the TMDL requirements into TMDL-specific General Permit requirements, numeric action levels, or numeric effluent limitations;
- Step 4: Determined a compliance schedule that corresponds with the compliance date of the TMDL;
- Step 5: Developed monitoring and reporting requirements to determine compliance with waste load allocations;
- Step 6: Identified the existing General Permit requirements applicable to each constituent identified in the TMDLs, and evaluated if additional TMDL-specific requirements were required to implement the TMDL for discharges regulated by this General Permit; and
- Step 7: Provided explanation regarding how the State Water Board translated each TMDL into specific requirements.

I.W.4. Applicability

Responsible Dischargers are: (1) dischargers with Notice of Intent coverage under this General Permit who discharge stormwater associated with construction

activities and authorized-non-stormwater discharges, (2) either directly or through a municipal separate storm sewer system (MS4) to impaired water bodies identified in a U.S. EPA approved TMDL with an assigned waste load allocation to construction stormwater sources listed in Attachment H, and (3) have identified one or more TMDL-pollutants in the site's construction stormwater discharges.

Responsible Dischargers must comply with applicable TMDL-specific General Permit requirements in Attachment H and all other applicable provisions of this General Permit.

Each TMDL-specific permit requirement listed in Attachment H (Table H-2 for TMDL-specific General Permit Requirements) provides the specific translation and required actions for Responsible Dischargers as discussed below. Table H-2 includes the specific watershed, water body, or water bodies and additional tributaries to ensure Responsible Dischargers know which Table H-2 TMDL requirement applies depending on the receiving water body(ies) of the site.

This General Permit's pH and turbidity numeric action levels continue to apply in addition to the TMDL-specific requirements in Table H-2. The measurement of compliance with the TMDL-specific requirements, whether TMDL-related numeric action levels or numeric effluent limits, is defined in the Glossary (Attachment B). Stormwater discharges are intermittent in nature and many of the Attachment H TMDL waste load allocations are translated to numeric action levels or numeric effluent limitations for protection against acute impacts to beneficial uses in the receiving waters.

The following are examples to assist Responsible Dischargers in determining which water bodies are subject to the TMDLs in Table H-2:

- Watershed example: If the "Impaired Water Body/Watershed" column states "Napa River Watershed," the TMDL and its requirements are applicable to dischargers discharging directly or through an MS4 into water bodies within the Napa River Watershed.
- River and tributaries (Watershed) example: If the "Impaired Water Body/Watershed" column states "Los Angeles River and Tributaries," this TMDL and its requirements are applicable to the dischargers discharging directly or through an MS4 into the Los Angeles River watershed.
- Lagoon example: If the "Impaired Water Body/ Watershed" column states "Colorado Lagoon," this TMDL and its requirements are applicable to dischargers discharging directly or through an MS4 into the Colorado Lagoon.

TMDL-specific General Permit requirements do not apply to dischargers with a waiver or dischargers that meet the Notice of Non-Applicability (NONA) criteria.

There are currently few environmental laboratory accredited program (ELAP)-accredited laboratories capable of analyzing the following compounds (e.g.,

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chlordanes, dieldrin, total PCBs, total DDTs, 4,4-DDT, PAHs) to the low concentrations for some of the numeric action levels or numeric effluent limitations in Attachment H. Attachment H, Section I.G.5 provides a modified compliance protocol for Responsible Dischargers for the Los Angeles Area Lakes TMDL that are required to comply with TMDL-related numeric effluent limitations for Chlordane, Dieldrin, DDT, and PCBs. It is the expectation that the Water Boards will provide guidance and alternative methods for a Responsible Discharger to demonstrate compliance, if the Responsible Discharger has provided the Water Boards adequate information demonstrating that:

- It is infeasible to analyze a translated waste load allocation using an ELAP-accredited laboratory;
- The sample results would invalidate federally-required sufficiently sensitive methods; or
- No method in 40 Code of Federal Regulations Part 136 can detect and quantify the amount specified for the construction stormwater.

I.W.5. General Permit Summary

The following requirements, applicable to dischargers enrolled under this General Permit, were considered in determining the necessity of additional TMDL-specific permit implementation for applicable to Responsible Dischargers:

- **Storm Water Pollution Prevention Plan (SWPPP):** This General Permit requires dischargers to identify construction materials handled at the site and describe all potential sources of pollutants that could be discharged from their site and describe the BMPs that will be implemented to control their discharges. This General Permit requires Responsible Dischargers to revise their SWPPP whenever a significant change in monitoring or sampling occurs.
- **Non-Stormwater Discharges (NSWDs):** The only NSWDs authorized by this General Permit are described in the Order, and the discharge is prohibited unless regulated by a separate NPDES permit.
- **Visual Observations:** Dischargers are required to conduct pre, during, and post precipitation event site visual inspections which include: 1) monitoring of authorized NSWDs, 2) identification and elimination of unauthorized NSWDs, 3) identification of potential construction pollutant sources, and 4) necessary BMP maintenance and implementation.
- **Sampling and Analysis:** Dischargers must sample for all construction pollutants (with the potential to discharge to a waters of the United States) identified in their SWPPP in accordance with this General Permit. Dischargers are required to collect and analyze stormwater samples from construction site discharge locations over the reporting period in accordance with the requirements of this General Permit. When this previous permit's requirements were not sufficient to

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implement the TMDL, additional monitoring and sampling requirements are set forth in Attachment H's TMDL Compliance Table (Table H-2).

I.W.6. TMDL-Specific Requirements

Attachment H, Table H-2 contains TMDL-specific requirements for each TMDL with sources from discharges regulated by this General Permit. This Fact Sheet discusses TMDLs by pollutant since many of the TMDLs with the same pollutants are translated in the same manner. Table H-2 is organized by Regional Water Board jurisdiction and watershed, allowing the Responsible Dischargers to easily identify their applicable requirements.

a. Bacteria TMDLs

Nine Indicator Bacteria TMDLs (eight established by the Los Angeles Regional Water Quality Control Board and one by the U.S. EPA) apply to construction stormwater dischargers. Each TMDL addresses bacterial pollutants by establishing bacteria water quality objectives for one or more of the following Indicator Bacteria: Enterococcus, Escherichia coli (E. Coli), Fecal Coliform, and Total Coliform. These pollutants are referred to as Indicator Bacteria for the purpose of Attachment H and this Fact Sheet.

The water quality objectives for Indicator Bacteria are specific to fresh and marine waters and designated beneficial uses such as water contact recreation (REC-1), limited water contact recreation (LREC-1), and water non-contact recreation (REC-2).

Recreating in waters exceeding indicator bacteria water quality objectives has long been associated with adverse human health effects. Specifically, local and national epidemiological studies demonstrate that there is a causal relationship between adverse health effects and recreational water quality, as measured by bacterial indicator densities.¹³⁷

The Indicator Bacteria TMDLs and their beneficial uses are summarized below:

- Ballona Creek, Ballona Estuary, and Sepulveda Channel Bacteria TMDL¹³⁸: Fresh Waters (LREC-1, REC-1, REC-2) and Marine Waters (REC-1)

137 Ballona Creek, Estuary, and Tributary Bacteria TMDL, p. 2.

138 Los Angeles Regional Water Board, [Ballona Creek, Estuary, and Tributary Bacteria TMDL](https://www.waterboards.ca.gov/losangeles/water_issues/programs/tmdl/docs/R12-008_RB_BPA.pdf) (June 7, 2012), <https://www.waterboards.ca.gov/losangeles/water_issues/programs/tmdl/docs/R12-008_RB_BPA.pdf> [as of May 20, 2021]

- Harbor Beaches of Ventura County Bacteria TMDL¹³⁹: Marine Waters (REC-1)
- Long Beach City Beaches and Los Angeles River Estuary Bacteria TMDL¹⁴⁰: Marine Waters (REC-1)
- Los Angeles Harbor Bacteria TMDL¹⁴¹: Marine Waters (REC-1)
- Los Angeles River Bacteria TMDL¹⁴²: Fresh Waters (LREC-1)
- Malibu Creek Bacteria TMDL¹⁴³: Fresh Waters (REC-1) and Marine Waters (REC-1)
- Marina del Rey Bacteria TMDL¹⁴⁴: Marine Waters (REC-1)

139 Los Angeles Regional Water Quality Control Board, [Harbor Beaches of Ventura County \(Kiddie Beach and Hobie Beach\) Bacteria TMDL](#) (November 1, 2007), <https://www.waterboards.ca.gov/losangeles/water_issues/programs/tmdl/docs/2007-017_RB_BPA.pdf> [as of May 20, 2021]

140 United States Environmental Protection Agency IX, [Long Beach City Beaches and Los Angeles River Estuary Total Maximum Daily Loads for Indicator Bacteria](#) (March 26, 2012), <https://www.waterboards.ca.gov/losangeles/water_issues/programs/tmdl/Established/Longbeach/finalTMDLs-LongBeachCityBeaches-LARiverEstuaryBacteria.pdf> [as of April 28, 2022]

141 Los Angeles Regional Water Quality Control Board, [Los Angeles Harbor Bacteria TMDL \(Inner Cabrillo Beach Main Ship Channel\)](#) (July 1, 2004), <https://www.waterboards.ca.gov/losangeles/water_issues/programs/tmdl/docs/2004-011_RB_BPA.pdf> [as of May 20, 2021] (Los Angeles Harbor Bacteria TMDL)

142 Los Angeles Regional Water Quality Control Board, [Los Angeles River Watershed Bacteria TMDL](#) (July 9, 2010), <https://www.waterboards.ca.gov/losangeles/water_issues/programs/tmdl/docs/R10-007_RB_BPA1.pdf> [as of May 20, 2021] (Los Angeles Bacteria TMDL)

143 Los Angeles Regional Water Quality Control Board, [Malibu Creek and Lagoon Bacteria TMDL](#) (June 7, 2012), <https://www.waterboards.ca.gov/losangeles/water_issues/programs/tmdl/docs/R12-009_RB_BPA.pdf> [as of May 20, 2021] (Malibu Creek Bacteria TMDL)

144 Los Angeles Regional Water Quality Control Board, [Marina del Rey Harbor Mother's Beach and Back Basins Bacteria TMDL](#) (August 7, 2003), <https://www.waterboards.ca.gov/losangeles/water_issues/programs/tmdl/docs/2003-012_RB_BPA.pdf> [as of May 20, 2021] (Marina del Rey Bacterial TMDL)

- Santa Clara River Bacteria TMDL¹⁴⁵: Fresh Waters (REC-1) and Marine Waters (REC-1)
- Santa Monica Bay Beaches Bacterial TMDL¹⁴⁶: Marine Waters (REC-1)

The bacteria water quality objectives applicable to the beneficial uses associated with these water bodies are listed in Table 11 below.

Table 11 – Los Angeles Regional Water Quality Control Board Bacteria Water Quality Objectives

Beneficial Uses	E. Coli	Total Coliform	Fecal Coliform	Enterococcus	Total Coliform*
Fresh Waters REC-1	235/100 ml				
Fresh Waters LREC-1	576/100 ml				
Fresh Waters REC-2	4,000/100 ml				
Marine Waters REC-1		10,000/100 ml	400/100 ml	104/100 ml	1,000/100 ml

* If the fecal-to-total coliform ratio is greater than 0.1

- Source Analysis

The primary sources of elevated indicator bacteria densities include dry-weather urban runoff and stormwater conveyed to the impaired waters. Although construction stormwater dischargers are not expected to be significant sources of indicator bacteria, they are considered Responsible Dischargers for these TMDLs.

- Waste Load Allocation Translation

The Indicator Bacteria TMDLs assign the waste load allocations in two different ways:

- The TMDLs for the: (1) Harbor Beaches of Ventura County, (2) Santa Clara River, (3) Long Beach City Beaches, and (4) Los Angeles River

145 Los Angeles Regional Water Quality Control Board, [Santa Clara River Estuary and Reaches 3, 5, 6, and 7 Indicator Bacteria TMDL](https://www.waterboards.ca.gov/losangeles/water_issues/programs/tmdl/docs/R10-006_RB_BPA.pdf) (July 8, 2010), <https://www.waterboards.ca.gov/losangeles/water_issues/programs/tmdl/docs/R10-006_RB_BPA.pdf> [as of May 20, 2021] (Santa Clara River Bacteria TMDL)

146 Los Angeles Regional Water Quality Control Board, [Santa Monica Bay Beaches Bacteria TMDL](https://www.waterboards.ca.gov/losangeles/water_issues/programs/tmdl/docs/R12-007_RB_BPA1.pdf) (July 2, 2014), <https://www.waterboards.ca.gov/losangeles/water_issues/programs/tmdl/docs/R12-007_RB_BPA1.pdf>

assigns a waste load allocation of zero (0) allowable exceedance days of the Bacteria WQOs, listed in Table 11 above.

- ii. The TMDLs for the: (1) Ballona Creek, Ballona Estuary, and Sepulveda Channel, (2) Malibu Creek, Lagoon, and adjacent beach, (3) Marina del Rey Harbor, Mother's Beach, and Back Basins, (4) Los Angeles Harbor (including Inner Cabrillo Beach and Main Ship Channel), and (5) Santa Monica Bay Beaches assign waste load allocations to construction stormwater dischargers equal to the Bacteria WQOs.

The two waste load allocation definitions were translated similarly and require Responsible Dischargers to "meet and not exceed" the bacteria water quality objectives listed in Table 11. Responsible Dischargers will be required to implement minimum BMPs in order to comply with the translated waste load allocations because construction stormwater dischargers are not expected to be significant sources of indicator bacteria. This General Permit requires all dischargers to perform a pollutant source assessment and implement specific BMPs to prevent or eliminate any exceedance of water quality objectives contained within applicable TMDLs, including those for indicator bacteria. Therefore, compliance with this General Permit is consistent with the requirements and assumptions of the TMDL and sufficient to achieve compliance with the waste load allocation.

- Compliance Actions and Schedule

Responsible Dischargers with an applicable TMDL for Indicator Bacteria listed in Attachment H shall comply with the requirements of this General Permit.

Responsible Dischargers that identify on-site sources of indicator bacteria in the required pollutant source assessment are to implement BMPs specific to preventing or controlling stormwater exposure to indicator bacteria. The minimum bacteria source control BMPs include QSP-conducted training of site staff, sanitary septic waste management, and routine housekeeping of identified bacteria sources. Structural BMPs such as retention, infiltration, or diversion of stormwater reduce bacteria loading to receiving waters.

Responsible Dischargers that implement a suite of minimum BMPs to control stormwater exposure to source of indicator bacteria are expected to meet the assigned waste load allocation. If a BMP is observed failing, the Responsible Discharger is to evaluate the BMPs being used and identify and implement a strategy in the site's SWPPP to prevent potential exceedances of the waste load allocations in the future. The Regional Water Board may assign additional monitoring, reporting, and BMP requirements upon obtaining site-specific information about exceedances of the waste load allocation.

Compliance with Indicator Bacteria TMDLs shall be achieved by the effective date of this General Permit, as shown in Table H-2 in Attachment H.

b. Chloride and Salts TMDLs

Three TMDLs for chloride and other salts (Calleguas Creek, Santa Clara River Reach 3, and Upper Santa Clara River) apply to construction stormwater dischargers. Elevated levels of chloride and salts can impair a water body's beneficial uses associated with agricultural uses for irrigation of salt-sensitive crops and groundwater recharge to provide drinking water.

i. Calleguas Creek Watershed Salts TMDL¹⁴⁷

The Los Angeles Regional Water Quality Control Board adopted the TMDL for Boron, Chloride, Sulfate, and TDS (salts) on October 4, 2007, to protect and restore water quality in the Calleguas Creek watershed by controlling the loading and accumulation of salts.

- Source Analysis

Sources of salts in the watershed include water supply, water softeners that discharge to publicly treatment works (POTWS), POTW treatment chemicals, atmospheric deposition, pesticides and fertilizers, and indoor water use (e.g., chemicals, cleansers, food, etc.).¹⁴⁸ The salts are then transported through POTW discharges and runoff to surface water, shallow groundwater, or accumulate on the watershed within soils. Construction stormwater permittees are considered Responsible Dischargers for this TMDL.

- Waste Load Allocation Translation

The Calleguas Creek Watershed Salts TMDL assigns interim and final waste load allocations during dry-weather conditions, when instream flow rates are below the 86th percentile flow and there has been no measurable precipitation in the previous 24 hours.¹⁴⁹ Both the interim and final dry-weather waste load allocations, shown in Table 12 and Table 13 below, apply in the receiving water at the base of each subwatershed.

147 Los Angeles Regional Water Board, [Calleguas Creek Watershed Salts TMDL](https://www.waterboards.ca.gov/losangeles/water_issues/programs/tmdl/docs/2007-016_RB_BPA.pdf) (October 4, 2007), <https://www.waterboards.ca.gov/losangeles/water_issues/programs/tmdl/docs/2007-016_RB_BPA.pdf> [as of May 20, 2021]

148 Calleguas Creek Watershed Salts TMDL, p.3.

149 Calleguas Creek Watershed Salts TMDL, p. 7-8.

Table 12 – Calleguas Creek Interim Dry-Weather Waste Load Allocations

Pollutant	Interim Limit (mg/L)
Boron Total	1.3
Chloride Total	230
Sulfate Total	1289
TDS Total	1720

Table 13 – Calleguas Creek Final Dry-Weather Waste Load Allocations

Receiving Water	Critical Condition Flow Rate (mgd)	Chloride Allocation (lb/day)	TDS Allocation (lb/day)	Sulfate Allocation (lb/day)	Boron Allocation (lb/day)
Simi	1.39	1,738	9,849	2,897	12
Las Posas	0.13	157	887	261	N/A
Conejo	1.26	1,576	8,931	2,627	N/A
Camarillo	0.06	72	406	119	N/A
Pleasant Valley (Calleguas)	0.12	150	850	250	N/A
Pleasant Valley (Revolon)	0.25	314	1,778	523	2

Discharges that occur during dry-weather conditions are referred to as non-stormwater discharges (NSWDs) and are only authorized by this General Permit if dischargers meet the conditions of Order, Section IV.A to control the discharge of pollutants off-site. Section IV.B of this General Permit's Order prohibits all NSWDs not authorized under Section IV.A; therefore, all unauthorized NSWDs must be eliminated or have regulatory coverage under a separate NPDES permit. Authorized NSWDs, as defined in this General Permit, are authorized because these discharges are assumed to not commingle with stormwater associated with construction activity. The Los Angeles Regional Water Quality Control Board may impose additional requirements on NSWDs if deemed necessary per a site-specific analysis.

Wet-weather discharges are not assigned waste load allocations as flows transport a larger amount of salts at low concentrations for most construction stormwater dischargers, therefore meeting water quality objectives during wet weather.

- Compliance Actions and Schedule

Compliance with this General Permit's requirements is consistent with the assumptions and requirements of the Calleguas Creek Salts TMDL

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and is sufficient to achieve the assigned salts waste load allocations. If a BMP is observed failing, the Responsible Discharger shall evaluate the BMPs being used and identify and implement a strategy in the site's SWPPP to prevent potential exceedances of the waste load allocations in the future. Responsible Dischargers that perform pollutant assessments and implement BMPs specific to preventing or controlling stormwater exposure with salts are expected to meet the assigned waste load allocations. The Regional Water Board may assign additional monitoring, reporting, and BMP requirements upon obtaining site-specific information about exceedances of the waste load allocations.

The Calleguas Creek Watershed Salts TMDL's final compliance deadline is December 2, 2023. Therefore, the interim waste load allocations are applied to Responsible Dischargers upon the effective date of this General Permit.

ii. Santa Clara River Chloride Reach 3 TMDL¹⁵⁰

The U.S. EPA adopted the Santa Clara River Chloride Reach 3 TMDL on June 18, 2003, to address the chloride impairment of Santa Clara River, Reach 3. Exceedances of chloride water quality standards in the Santa Clara River can impair the water's use as agricultural irrigation supply.

The U.S. EPA's analysis of available flow and loading data concluded that exceedances of the chloride water quality objectives are most likely to occur during low-flow conditions. Therefore, setting the TMDL and associated allocations at levels sufficient to implement the objectives during low-flow conditions will also result in attainment of the objectives during higher flow conditions.¹⁵¹

- Source Analysis

The Santa Clara River Chloride Reach 3 TMDL identifies two major point sources (the Fillmore and Santa Paula Water Reclamation Plants) as well as a number of minor point sources, including runoff from construction sites. Construction stormwater permittees are therefore considered Responsible Dischargers for this TMDL. Sources of salts in the watershed include water supply, water softeners that discharge to

150 United States Environmental Protection Agency IX, [Total Maximum Daily Load for Chloride in the Santa Clara River, Reach 3](#) (June 18, 2003)

<https://www.waterboards.ca.gov/losangeles/water_issues/programs/tmdl/Established/Santa%20Clara%20River%20Reach%203%20Chloride%20TMDL/final%20SCR%20R3%20Cl%20TMDL.pdf> [as of May 20, 2021] (Santa Clara River Chloride Reach 3 TMDL)

151 Santa Clara River Chloride Reach 3 TMDL, p. 14.

publicly treatment works (POTWS), POTW treatment chemicals, atmospheric deposition, pesticides and fertilizers, and indoor water use (e.g., chemicals, cleansers, food, etc.).¹⁵² The salts are then transported through POTW discharges and runoff to surface water, shallow groundwater, or accumulate on the watershed within soils.

- Waste Load Allocation Translation

The Santa Clara River Chloride Reach 3 TMDL assigns a concentration-based chloride waste load allocation of 80 mg/L to Responsible Dischargers at the construction site's discharge location(s) for dry-weather discharges into Santa Clara River Reach 3.

Discharges that occur during dry-weather conditions are referred to as non-stormwater discharges (NSWDs) and are only authorized by this General Permit if dischargers meet the conditions of Order, Section IV.A to control the discharge of pollutants off the site. Order, Section IV.B prohibits all NSWDs not authorized under Section IV.A; therefore, all unauthorized NSWDs must be eliminated or have regulatory coverage under a separate NPDES permit. Authorized NSWDs, as defined in this General Permit, are authorized because these discharges are assumed to not commingle with stormwater associated with construction activities. The Los Angeles Regional Water Quality Control Board may impose additional requirements on NSWDs if deemed necessary per a site-specific analysis.

- Compliance Actions and Schedule

Compliance with this General Permit's requirements is consistent with the assumptions and requirements of the Santa Clara River Chloride Reach 3 TMDL and is consistent with the assigned chloride waste load allocation. If a BMP is observed failing, the Responsible Discharger shall evaluate the BMPs being used and identify and implement a strategy in the site's SWPPP to prevent potential exceedances of the waste load allocation in the future. Responsible Dischargers that perform pollutant assessments and implement BMPs specific to preventing or controlling stormwater exposure with salts are expected to meet the assigned waste load allocation. The Regional Water Board may assign additional monitoring, reporting, and BMP requirements upon obtaining site-specific information about exceedances of the waste load allocation.

The Santa Clara River Chloride Reach 3 TMDL does not have an implementation plan, nor compliance deadline, as it was established by the U.S. EPA rather than the Los Angeles Regional Water Quality

Control Board. Therefore, the discharger shall meet the assigned waste load allocation by the effective date of this General Permit.

iii. Upper Santa Clara River Chloride TMDL¹⁵³

The Los Angeles Regional Water Quality Control Board adopted the Revision of the Upper Santa Clara River Chloride TMDL on October 9, 2014, to address elevated chloride concentrations causing exceedances of water quality objectives for Reaches 5 and 6 of the Santa Clara River. Chloride-impaired water bodies that are used for agricultural irrigation supply can negatively impact the growth of salt-sensitive crops.

- Source Analysis

The primary sources of chloride into Reaches 5 and 6 of the river are discharges from the Saugus and Valencia Water Reclamation Plants, contributing roughly 70 percent of the load.¹⁵⁴ Other NPDES dischargers, including those covered under this General Permit, are considered minor contributors of chloride to the Upper Santa Clara River. Therefore, construction stormwater dischargers are considered Responsible Dischargers for this TMDL.

- Waste Load Allocation Translation

The Responsible Dischargers have been assigned a waste load allocation of 100 mg/L as 3-month rolling average. Compliance with the 3-month rolling average is currently beyond the scope of the monitoring and sampling requirements of this General Permit. A requirement to calculate a 3-month rolling average would put an undue burden on the Responsible Dischargers. Therefore, the rolling average limit will be translated into a numeric action level of 100 mg/L, to be met at the construction discharge location(s), as shown in Table 14 below. Translating the 3-month rolling average limit into a numeric action level with the same concentration ensures that the limit is stringent enough to achieve the surface water quality objectives.

Table 14 – Upper Santa Clara River Chloride Waste Load Allocation Translation

Pollutant	3-Month Rolling Average (mg/L)	Numeric Action Level (mg/L)
Chloride	100	100

¹⁵³ Los Angeles Regional Water Quality Control Board, [Upper Santa Clara River Chloride TMDL](https://www.waterboards.ca.gov/losangeles/water_issues/programs/tmdl/docs/R14-010_RB_BPA.pdf) (October 9, 2014), <https://www.waterboards.ca.gov/losangeles/water_issues/programs/tmdl/docs/R14-010_RB_BPA.pdf> [as of March 7, 2019]

¹⁵⁴ Upper Santa Clara River Chloride TMDL, p. 4.

Responsible Dischargers that perform the required pollutant source assessment and implement BMPs specific to preventing or controlling stormwater exposure to chloride, as is required in this General Permit, are expected to meet the translated numeric action level. Therefore, compliance with this General Permit's requirements is consistent with the assumptions and requirements of the Upper Santa Clara River Chloride TMDL and is sufficient to achieve the assigned waste load allocation.

- Compliance Actions and Schedule

Responsible Dischargers shall comply with the requirements of this General Permit. Responsible Dischargers that identify on-site sources of chloride through the required pollutant source assessment shall compare all non-visible sampling and analytical results to the chloride numeric action level. If an exceedance or failure of a BMP is observed, the Responsible Discharger shall evaluate the BMPs implemented and identify a strategy in the site's SWPPP to prevent potential exceedances of the numeric action level in the future. The Regional Water Board may assign additional monitoring, reporting, and BMP requirements upon obtaining site-specific information about exceedances of the numeric action level.

The Upper Santa Clara River Chloride TMDL assigns the waste load allocation to Responsible Dischargers upon the effective date of the TMDL. Because the TMDL did not specify a final compliance deadline for construction stormwater dischargers, the numeric action level is applicable upon the effective date of this General Permit.

c. Diazinon TMDLs

One TMDL for diazinon applies to construction stormwater dischargers. Diazinon is an organophosphate pesticide that does not sorb to sediment but is instead mobilized through soils by dissolving in water. Discharges of stormwater containing diazinon, can cause exceedances of water quality objectives for toxicity in aquatic life in inland surface and estuarine waters. Diazinon was once used in both agricultural and urban settings but has since been banned for non-agricultural uses by the California Department of Pesticide Regulation.

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i. Chollas Creek Diazinon TMDL¹⁵⁵

The San Diego Regional Water Quality Control Board adopted the Chollas Creek Diazinon TMDL on August 14, 2002, to address the impairment of the Chollas Creek Watershed due to diazinon.

- Source Analysis

The Chollas Creek Diazinon TMDL identifies urban stormwater flows as a significant source of diazinon and lists the Construction General Permit as a means of regulating discharges of diazinon.¹⁵⁶ Therefore, construction stormwater dischargers covered by this General Permit are considered Responsible Dischargers. However, the TMDL did not include a separate waste load allocation assigned to construction stormwater discharges.

- Compliance Actions and Schedule

Compliance with this General Permit is consistent with the requirements and assumptions of this TMDL's waste load allocation(s). No additional requirements are incorporated into this General Permit to implement the Chollas Creek Diazinon TMDL. The Regional Water Board may assign additional monitoring, reporting, and BMP requirements upon obtaining site-specific information about any exceedances of the waste load allocations.

d. Nutrients TMDLs

Seven Nutrient TMDLs apply to construction stormwater discharges and incorporate waste load allocations for one or more of the following pollutants: nitrogen compounds (e.g., ammonia, nitrate, nitrite) and phosphorous (e.g., orthophosphates). Excessive nutrient loading to water bodies and watersheds can cause eutrophic effects that negatively impact beneficial uses related to recreation, wildlife, and drinking water supply.

155 San Diego Regional Water Quality Control Board, [Chollas Creek Diazinon Total Maximum Daily Load](#) (August 14, 2002)

<https://www.waterboards.ca.gov/sandiego/water_issues/programs/tmdls/chollascreek/diazinon.html> [as of May 20, 2021]. (Chollas Creek Diazinon TMDL)

156 Chollas Creek Diazinon TMDL, p. 2 and 7.

i. Pajaro River Basin Nutrients TMDL¹⁵⁷

The Central Coast Regional Water Quality Control Board adopted the Pajaro River Basin Nutrients TMDL on July 30, 2015, to address the discharges of nitrogen compounds and orthophosphate within the Pajaro River Basin. These exceedances of nutrient and nutrient-related water quality objectives can have negative impacts on beneficial uses such as municipal and domestic drinking water supply (MUN, GWR) and a range of aquatic habitats uses (WILD, COLD, WARM, MIGR, SPWN, BIOL, RARE).¹⁵⁸

- Source Analysis

Industrial and construction NPDES-permitted stormwater discharges were determined to be potential sources of ammonia, nitrate, and orthophosphate loading to receiving waters in the Pajaro River Basin.

- Waste Load Allocation Translation

This Pajaro River Basin Nutrients TMDL assigns waste load allocations as concentration-based, single sample limits to construction stormwater dischargers for ammonia, nitrate, total nitrogen, and orthophosphate, to be met in the receiving waters. Therefore, dischargers covered under this General Permit are considered Responsible Dischargers for this TMDL, if they identify sources of these pollutants on their site through the required pollutant source assessment. The waste load allocation for un-ionized ammonia is applied to all streams within the Pajaro River Basin, while waste load allocations for nitrate, total nitrogen, and orthophosphate are specific to individual water bodies in the basin. The waste load allocations are translated from single sample limits to numeric action levels, as shown in Tables 15 through 24 below.

Table 15 – All Streams in Pajaro River Basin – Un-Ionized Ammonia Waste Load Allocation Translation

Pollutant	Waste Load Allocation Single Sample Limit (mg/L)	Numeric Action Level (mg/L)
Un-ionized Ammonia	0.025	0.025

157 Central Coast Regional Water Quality Control Board, [Total Maximum Daily Loads for Nitrogen Compounds and Orthophosphate in Streams of the Pajaro River Basin](https://www.waterboards.ca.gov/centralcoast/water_issues/programs/tmdl/docs/pajaro_nutrients/basin_plan_amend.pdf) (July 30, 2015), <https://www.waterboards.ca.gov/centralcoast/water_issues/programs/tmdl/docs/pajaro_nutrients/basin_plan_amend.pdf> [as of April 29, 2022] (Pajaro River Basin Nutrients TMDL)

158 Pajaro River Basin Nutrients TMDL, p. 1.

Table 16 – All Streams in Pajaro River Basin (with MUN Beneficial Uses) Waste Load Allocation Translation

Pollutant	Waste Load Allocation Single Sample Limit (mg/L)	Numeric Action Level (mg/L)
Nitrate-N	10	10

Table 17 – Pajaro River (All Reaches) and Pajaro River Estuary Waste Load Allocation Translation

Pollutant	Waste Load Allocation Single Sample Limit (mg/L)	Numeric Action Level (mg/L)
Dry-Weather Nitrate-N	3.9	3.9
Dry-Weather Orthophosphate-P	0.14	0.14
Wet-Weather Nitrate-N	8.0	8.0
Wet-Weather Orthophosphate-P	0.3	0.3

Table 18 – Corralitos Creek and Salsipuedes Creek (All Reaches) Waste Load Allocation Translation

Pollutant	Waste Load Allocation Single Sample Limit (mg/L)	Numeric Action Level (mg/L)
Dry-Weather Nitrate-N	1.8	1.8
Dry-Weather Orthophosphate-P	0.14	0.14
Wet-Weather Nitrate-N	8.0	8.0
Wet-Weather Orthophosphate-P	0.3	0.3

Table 19 – Beach Road Ditch and McGowan Ditch Waste Load Allocation Translation

Pollutant	Waste Load Allocation Single Sample Limit (mg/L)	Numeric Action Level (mg/L)
Dry-Weather Nitrate-N	3.3	3.3
Dry-Weather Orthophosphate-P	0.14	0.14
Wet-Weather Nitrate-N	8.0	8.0
Wet-Weather Orthophosphate-P	0.3	0.3

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Table 20 – Llagas Creek (Downstream of Cheseboro Reservoir), Carnadero Creek, Uvas Creek, and Furlong Creek (All Reaches) Waste Load Allocation Translation

Pollutant	Waste Load Allocation Single Sample Limit (mg/L)	Numeric Action Level (mg/L)
Dry-Weather Nitrate-N	1.8	1.8
Dry-Weather Orthophosphate-P	0.05	0.05
Wet-Weather Nitrate-N	8.0	8.0
Wet-Weather Orthophosphate-P	0.3	0.3

Table 21 – San Juan Creek and West Branch of San Juan Creek (All Reaches) Waste Load Allocation Translation

Pollutant	Waste Load Allocation Single Sample Limit (mg/L)	Numeric Action Level (mg/L)
Dry-Weather Nitrate-N	3.3	3.3
Dry-Weather Orthophosphate-P	0.12	0.12
Wet-Weather Nitrate-N	8.0	8.0
Wet-Weather Orthophosphate-P	0.3	0.3

Table 22 – Tequisquita Slough Waste Load Allocation Translation

Pollutant	Waste Load Allocation Single Sample Limit (mg/L)	Numeric Action Level (mg/L)
Dry-Weather Nitrate-N	2.2	2.2
Dry-Weather Orthophosphate-P	0.12	0.12
Wet-Weather Nitrate-N	8.0	8.0
Wet-Weather Orthophosphate-P	0.3	0.3

Table 23 – Watsonville Slough, Harkins Slough, Gallighan Slough, and Struve Slough (All Reaches) Waste Load Allocation Translations

Pollutant	Waste Load Allocation Single Sample Limit (mg/L)	Numeric Action Level (mg/L)
Dry-Weather Total Nitrogen-N	2.1	2.1
Dry-Weather Orthophosphate-P	0.14	0.14
Wet-Weather Total Nitrogen-N	8.0	8.0
Wet-Weather Orthophosphate-P	0.3	0.3

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Table 24 – Millers Canal (All Reaches) Waste Load Allocation Translations

Pollutant	Waste Load Allocation Single Sample Limit (mg/L)	Numeric Action Level (mg/L)
Dry-Weather Total Nitrogen-N	1.1	1.1
Dry-Weather Orthophosphate-P	0.04	0.04
Wet-Weather Total Nitrogen-N	8.0	8.0
Wet-Weather Orthophosphate-P	0.3	0.3

The Pajaro River Basin Nutrients TMDL assigns concentration-based waste load allocation to Responsible Dischargers for dry-weather discharges into the individual water bodies listed in Tables 15 through 24. Non-stormwater discharges are authorized in this General Permit if Order, Section IV.A terms and conditions are met to control the discharge of pollutants from the construction site. Order, Section IV.B prohibits all non-stormwater dischargers not authorized under Order, Section IV.A; therefore, all unauthorized non-stormwater dischargers must be either eliminated or have regulatory coverage under a separate NPDES permit. Authorized non-stormwater dischargers, as defined in this General Permit, are authorized because these discharges do not commingle with stormwater associated with construction activity. The Regional Water Board may impose additional requirements on non-stormwater dischargers if deemed necessary per site-specific analysis.

This General Permit requires that Responsible Dischargers meet the assigned wet-weather waste load allocations as numeric action levels at the construction site's discharge locations, rather than the applicable receiving waters as stated in the Pajaro River Basin Nutrients TMDL. The decision to establish numeric action levels, instead of numeric effluent limitations, was made considering that construction stormwater discharges are not expected to contribute a significant load of nutrients to receiving waters. An exceedance of the waste load allocation in the receiving waters would likely be attributed to sources other than construction stormwater discharges. Since different sources of stormwater runoff are often comingled, it is difficult to identify where the nutrient loading originates. Monitoring at the discharge location would be more indicative of an exceedance of the nutrient-related water quality objectives that is associated with a specific construction site. Furthermore, compliance monitoring at the receiving waters can be infeasible or impractical as Responsible Dischargers may have restricted access to or be far-removed from the compliance points.

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- Compliance Actions and Schedule

At the time the Pajaro River Basin Nutrient TMDL was written, NPDES stormwater-permitted construction sites were generally expected to be meeting the proposed waste load allocations through the requirements of the previous permit or any subsequent Construction General Permit. However, available information did not conclusively demonstrate that all construction sites were meeting the waste load allocations.¹⁵⁹ Therefore, in addition to complying with the requirements of this General Permit, Responsible Dischargers identifying on-site sources of ammonia, nitrate, total phosphorus, or total nitrogen shall compare all non-visible sampling and analytical results to the numeric action levels for the identified nutrients.

If an exceedance or failure of a BMP is observed, the Responsible Discharger shall evaluate the BMPs being used and identify and implement a strategy in the site's SWPPP to prevent potential exceedances of the numeric action levels in the future. Responsible Dischargers that perform the required pollutant source assessment and implement BMPs specific to preventing or controlling stormwater exposure to nutrient sources, are expected to meet the numeric action levels. The Regional Water Board may assign additional monitoring, reporting, and BMP requirements upon obtaining site specific information about exceedances of the numeric action levels.

The Pajaro River Basin Nutrient TMDL's implementation schedule indicates that the waste load allocations are to be achieved within 25 years of the TMDL's effective date July 12, 2016. Therefore, the TMDL's compliance deadline is July 12, 2041. Since the compliance deadline is in the far future, compliance with this General Permit is considered compliance with the TMDL. Future reissuances of this General Permit may incorporate additional or revised compliance requirements or interim targets to progress towards the required final compliance by July 12, 2041.

- ii. Los Angeles Area Lakes Nutrients TMDL¹⁶⁰

The U.S. EPA adopted the Los Angeles Area Lakes TMDL on March 26, 2012, to address the impairment of Peck Road Park Lake, Echo Park, Legg

159 Pajaro River Basin TMDL, p. 21.

160 United States EPA Region IX, [Los Angeles Area Lakes Total Maximum Daily Loads for Nitrogen, Phosphorus, Mercury, Trash, Organochlorine Pesticides and PCBs](#) (March 26, 2012),

Lakes, and Puddingstone Reservoir due to nitrogen and phosphorus. Peck Road Park Lake, Echo Park Lake, and Legg Lakes are located in the Los Angeles River watershed and Puddingstone Reservoir is located in the San Gabriel River watershed.

- Source Analysis

Nutrient loadings into Peck Road Park Lake, Echo Park, Legg Lakes, and Puddingstone Reservoir originate from a variety of sources, including discharges from storm drain outlets containing construction stormwater discharges from sites within the watershed.

- Waste Load Allocation Translation

The Los Angeles Area Lakes TMDL assigns concentration-based waste load allocations for nitrogen and phosphorus to Responsible Dischargers at the site's discharge location(s) for construction stormwater discharges into Peck Road Park Lake, Echo Park, Legg Lakes, and Puddingstone Reservoir. Therefore, dischargers covered under this General Permit are considered Responsible Dischargers for this TMDL. The waste load allocations for nitrogen and phosphorus differ depending on the receiving waters. The waste load allocations assigned to Responsible Dischargers for nitrogen and phosphorus are translated as shown in Table 25 and Table 26 below. The waste load allocations were set at monthly averages. The TMDL also states that "[a] three-year average will be used to evaluate compliance." Because of the variable nature of stormwater, monthly or yearly averages are not necessarily representative of pollutant loading, and the nitrogen waste load allocation was translated into a numeric action level.

In addition to the explanation set forth in Section I.G.5.d of this Fact Sheet, implementation of the TMDL through numeric action levels is consistent with the assumptions and requirements of the waste load allocations because it is expected that compliance with this Permit will prevent exceedances of the numeric action levels. This TMDL was developed by U.S. EPA, and the Regional Board has not yet adopted an implementation plan. The TMDL also states, "if applicable water quality criteria for ammonia, dissolved oxygen and pH, and the chlorophyll- α target are met in the lake, then the total phosphorus and total nitrogen allocations are considered attained." Because an individual discharger

<https://www.waterboards.ca.gov/losangeles/water_issues/programs/tmdl/Established/Lakes/LALakesTMDLsEntireDocument.pdf> [as of May 20, 2021] (Los Angeles Area Lakes Nutrients TMDL)

cannot determine whether the applicable water quality criteria were being met at the time of their discharge, the waste load allocation is more appropriately translated into an action level. As further explained in Section I.G.5.d of this Fact Sheet, dischargers must take corrective actions in response to any numeric action level exceedance and this iterative process will protect water quality consistent with the requirements and assumptions set forth in this TMDL.

Table 25 – Total Nitrogen Waste Load Allocation Translation

Water Body	Waste Load Allocation Monthly Average (mg/L)	Numeric Action Level (mg/L)
Peck Road Park Lake	3.61	3.61
Echo Park Lake	1.33	1.33
Legg Lakes	1.8	1.8
Puddingstone Reservoir	2.0	2.0

Table 26 – Total Phosphorus Waste Load Allocation Translation

Pollutant	Waste Load Allocation Monthly Average (mg/L)	Numeric Effluent Limitation (mg/L)
Peck Road Park Lake	0.37	0.37
Echo Park Lake	0.16	0.16
Legg Lakes	0.64	0.64
Puddingstone Reservoir	0.4	0.4

This General Permit requires that Responsible Dischargers meet the assigned waste load allocations at the construction site’s discharge location(s), which is consistent with requirements and assumptions of the TMDL.

- **Compliance Actions and Schedule**

Responsible Dischargers shall comply with the requirements of this General Permit. Responsible Dischargers that identify on-site sources of phosphorus and nitrogen shall compare all non-visible sampling and analytical results to the numeric action levels or numeric effluent limitations for the identified nutrients. If an exceedance or failure of a BMP is observed, the Responsible Discharger shall evaluate the BMPs being used and identify and implement a strategy in the site’s SWPPP to prevent potential exceedances of the numeric action levels or numeric effluent limitations in the future. Responsible Dischargers that perform the required pollutant source assessment and implement BMPs specific to preventing or controlling stormwater exposure to nutrient sources, are expected to meet the numeric action levels or numeric effluent

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limitations. The Regional Water Board may assign additional monitoring, reporting, and BMP requirements upon obtaining site specific information about exceedances of the numeric action levels or numeric effluent limitations.

The Los Angeles Regional Water Quality Control Board has not adopted an Implementation Plan or a compliance schedule for the Los Angeles Area Lakes TMDL. The numeric action levels and numeric effluent limitations described above are applicable upon the effective date of this General Permit.

iii. Los Angeles River Nutrients TMDL¹⁶¹

The Los Angeles Regional Water Quality Control Board adopted the Los Angeles River Nutrients TMDL on December 6, 2012, to address impairment of the Los Angeles River due to nitrogen compounds (ammonia, nitrite, and nitrate) and related effects (algae, pH, odor, and scum).

- Source Analysis

The TMDL lists urban runoff as a point source which includes stormwater runoff from construction sites and other urban runoff sources such as industrial, municipal, and the California Department of Transportation.¹⁶²

- Waste Load Allocation Translation

The Los Angeles River Nutrients TMDL assigns concentration-based waste load allocations for nitrogen compounds to minor point sources, including construction stormwater runoff. Therefore, construction stormwater dischargers covered under this General Permit are considered Responsible Dischargers for this TMDL. The waste load allocations for ammonia are given as one-hour averages and thirty-day averages, for discharges into the Los Angeles River above LA-Glendale Water Reclamation Plant, Los Angeles River below LA-Glendale Water Reclamation Plant, or to tributaries discharging into the Los Angeles River above or below the LA-Glendale Water Reclamation Plant. Because stormwater is an intermittent discharge, only the acute one-hour averages are appropriate to apply to Responsible Dischargers. The waste load allocation translations from one-hour averages to numeric

161 Los Angeles Regional Water Quality Control Board, [Los Angeles River Nitrogen Compounds and Related Effects TMDL](#) (July 10, 2003), <https://www.waterboards.ca.gov/losangeles/water_issues/programs/tmdl/docs/R12-010_RB_BPA.pdf> [as of May 20, 2021] (Los Angeles River Nutrients TMDL)

162 Los Angeles River Nutrients TMDL, p. 5.

action levels for the three different reaches of the Los Angeles River are shown in Tables 27 through 29 below. The one-hour averages are appropriate to translate into action levels because of the variable nature of stormwater, and when the non-visible sampling requirements are triggered, the effluent sampling results are not averaged.

The Los Angeles River Nutrients TMDL assigns concentration-based waste load allocations for nitrate-nitrogen, nitrite-nitrogen, and nitrate-nitrogen plus nitrite-nitrogen as thirty-day averages to Responsible Dischargers into all reaches and tributaries of the Los Angeles River. The waste load allocations are translated to numeric action levels as shown in Table 30 below, since compliance with monthly averages is not appropriate to monitor stormwater due to its intermittent and variable nature.

The May 2021 draft of the Construction Stormwater General Permit reissuance proposed a translation of the ammonia, nitrate-nitrogen, nitrite-nitrogen, and nitrate-nitrogen plus nitrite-nitrogen waste load allocations into numeric effluent limitations as the waste load allocations were concentration-based and assigned at the point of discharge. However, the Permit was revised to implement nitrogen-based nutrient waste load allocations as numeric action levels because numeric action levels are consistent with the assumptions and requirements of the waste load allocations.

Implementation of the TMDL through numeric action levels is consistent with the assumptions and requirements of the waste load allocation because it is expected that compliance with this Permit will prevent exceedances of the waste load allocations. Consistent with the explanation set forth in Section I.G.5.d of this Fact Sheet, the critical condition identified in the TMDL is low flow conditions (p.8). The TMDL also indicates that a majority of nutrient loading originates from major point sources such as water reclamation plants and other publicly owned treatment works,¹⁶³ while sources in stormwater runoff requires further evaluation.

¹⁶³ For example, the principal source of nitrogen compounds identified in this TMDL are the water reclamation plants, which contribute 84.1 percent of the total dry weather nitrogen load (p.3). The TMDL states that stormwater may also contribute nitrate loads and that further evaluation of these sources is set forth in the implementation plan, but the implementation plan does not provide further detail about stormwater as a source.

Table 27 – Los Angeles River above LA-Glendale WRP Waste Load Allocation Translation

Pollutant	Waste Load Allocation One-Hour Average (mg/L)	Numeric Action Level (mg/L)
Ammonia	4.7	4.7

Table 28 – Los Angeles River below LA-Glendale WRP Waste Load Allocation Translation

Pollutant	Waste Load Allocation One-Hour Average (mg/L)	Numeric Action Level (mg/L)
Ammonia	8.7	8.7

Table 29 – Los Angeles River Tributaries Waste Load Allocation Translation

Pollutant	Waste Load Allocation One-Hour Average (mg/L)	Numeric Action Level (mg/L)
Ammonia	10.1	10.1

Table 30 – Los Angeles River Tributaries Waste Load Allocation Translation

Pollutant	Translated Numeric Action Level (mg/L)
Nitrate-Nitrogen	8.0
Nitrite-Nitrogen	1.0
Nitrate plus Nitrite-Nitrogen	8.0

This General Permit requires that Responsible Dischargers meet the numeric action levels at the construction site's discharge location(s), which is consistent with requirements and assumptions of the Los Angeles River Nutrients TMDL.

- Compliance Actions and Schedule

Responsible Dischargers shall comply with the requirements of this General Permit. Responsible Dischargers that identify on-site sources of ammonia, nitrate, or nitrite shall compare all non-visible sampling and analytical results to the numeric action levels for the identified nutrients. If an exceedance or failure of a BMP is observed, the Responsible Discharger shall evaluate the BMPs being used and identify and implement a strategy in the site's SWPPP to prevent potential exceedances of the numeric action levels in the future. Responsible Dischargers that perform the required pollutant source assessment and implement BMPs specific to preventing or controlling stormwater exposure to nitrogen compound sources, are expected to meet the assigned numeric action levels. The Regional Water Board may assign additional monitoring, reporting, and BMP requirements upon obtaining site specific information about exceedances of the numeric action levels.

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The Los Angeles River Nutrients TMDL's final compliance deadline for the waste load allocations was March 23, 2004. Since this compliance deadline has already passed, the numeric action levels are applicable upon the effective date of this General Permit.

iv. Machado Lake Nutrients TMDL¹⁶⁴

The Los Angeles Regional Water Quality Control Board adopted the Machado Lake Nutrients TMDL on May 1, 2008, to address the impairment of Machado Lake due to eutrophication, algae, ammonia, and odors caused by an excess of nutrient loadings. These pollutants can have negative impacts on the beneficial uses of Machado Lake including recreation (REC-1 and REC-2), aquatic wildlife (WARM, WILD, RARE, and WET) and water supply (MUN).

- Source Analysis

Stormwater discharges from the municipal separate storm sewer system (MS4), California Department of Transportation, and general construction and industrial discharges are identified as point sources of nutrients into Machado Lake.

- Waste Load Allocation Translation

The Machado Lake Nutrients TMDL assigns waste load allocations as concentration-based monthly averages to construction stormwater dischargers for total phosphorus and total nitrogen based on in-lake concentrations. Therefore, dischargers covered under this General Permit are considered Responsible Dischargers for this TMDL. The waste load allocations apply to discharges to Machado Lake or through the following subdrainage systems: Drain 553, Wilmington Drain, Project 77/510, and Walteria Lake. The waste load allocations are translated to numeric action levels, as shown in Table 31 below, because this TMDL assigned these waste load allocations in the receiving water (in-lake) instead of at the point of discharge from the construction site. This TMDL assigned the waste load allocations as monthly averages; however, precipitation events are intermittent and variable. Compliance with the waste load allocations based on monthly averages is inconsistent with the monitoring and reporting requirements in this General Permit.

164 Los Angeles Regional Water Quality Board, [Total Maximum Daily Load for Eutrophic, Algae, Ammonia, and Odors \(Nutrient\) in Machado Lake](https://www.waterboards.ca.gov/losangeles/water_issues/programs/tmdl/docs/2008-006_RB_BPA.pdf) (May 1, 2008), <https://www.waterboards.ca.gov/losangeles/water_issues/programs/tmdl/docs/2008-006_RB_BPA.pdf> [as of May 20, 2021] (Machado Lake Nutrients TMDL)

Table 31 – Machado Lake Nutrient Waste Load Allocations Translation

Pollutant	Waste Load Allocation Monthly Average (mg/L)	Numeric Action Level (mg/L)
Total Phosphorus	0.1	0.1
Total Nitrogen	1.0	1.0

This General Permit requires Responsible Dischargers to meet the numeric action levels at the construction site’s discharge location(s), which is consistent with requirements and assumptions of the TMDL.

- Compliance Actions and Schedule

Responsible Dischargers shall comply with the requirements of this General Permit. Responsible Dischargers that identify on-site sources of phosphorus and nitrogen shall compare all non-visible sampling and analytical results to the numeric action levels for the identified nutrients. If an exceedance or failure of a BMP is observed, the Responsible Discharger shall evaluate the BMPs being used and identify and implement a strategy in the site’s SWPPP to prevent potential exceedances of the numeric action levels in the future. Responsible Dischargers that perform the required pollutant source assessment and implement BMPs specific to preventing or controlling stormwater exposure to nutrient sources, are expected to meet the numeric action levels. The Regional Water Board may assign additional monitoring, reporting, and BMP requirements upon obtaining site specific information about exceedances of the numeric action levels.

The Machado Lake Nutrients TMDL’s effective date was March 11, 2009, with a final compliance deadline set for September 11, 2018. Since the compliance deadline for this TMDL has passed, the discharger shall comply with the numeric action levels by the effective date of this General Permit.

- v. Santa Clara River Nitrogen Compounds TMDL¹⁶⁵

The Los Angeles Regional Water Quality Control Board adopted the Santa Clara River Nitrogen Compounds TMDL on August 7, 2003, to address nutrient-related impairment of Santa Clara River Reach 3 and Reach 7. In specific, biostimulatory substances such as ammonia, nitrate, and nitrite can lead to excessive algae growth and low dissolved oxygen in the receiving water body.

165 Los Angeles Regional Water Quality Control Board, [Santa Clara River Nitrogen Compounds TMDL](#) (August 7, 2003),

<https://www.waterboards.ca.gov/losangeles/water_issues/programs/tmdl/docs/2003-011_RB_BPA.pdf> [as of April 28, 2022]

- Source Analysis

The primary sources of these nitrogen compounds in the Santa Clara River can be attributed to local water reclamation and treatment plants. However, stormwater discharges were also identified as potential point sources of the nitrogen compounds.

- Waste Load Allocation Translation

The Santa Clara River Nitrogen Compounds TMDL assigns concentration-based waste load allocations for ammonia and nitrate plus nitrite as nitrogen to construction stormwater sources regulated under NPDES permits. Therefore, construction stormwater dischargers covered under this General Permit are considered Responsible Dischargers for this TMDL.

Ammonia and nitrate plus nitrite as nitrogen waste load allocations are established to address both acute effects (one-hour average concentration) and chronic effects (30-day average concentration) on aquatic life. Because stormwater is an intermittent discharge, only the acute one-hour average waste load allocations for ammonia are appropriate to apply to Responsible Dischargers. The translation of one-hour average waste load allocations to numeric action levels for the two reaches of the Santa Clara River are shown in Table 32 and Table 33 below. The one-hour average waste load allocations appropriately translate into numeric action levels due to the variable nature of stormwater. Nitrate plus nitrite as nitrogen waste load allocations were not translated as they were only established as 30-day averages.

Table 32 – Santa Clara River Reach 3 Ammonia as Nitrogen Waste Load Allocation Translation

Pollutant	Waste Load Allocation One-Hour Average (mg/L)	Numeric Action Level (mg/L)
Ammonia	4.2	4.2

Table 33 – Santa Clara River Reach 7 Ammonia as Nitrogen Waste Load Allocation Translation

Pollutant	Waste Load Allocation One-Hour Average (mg/L)	Numeric Action Level (mg/L)
Ammonia	5.2	5.2

This General Permit requires that Responsible Dischargers comply with the numeric action levels at the construction site discharge location(s), consistent with requirements and assumptions of the TMDL.

The May 2021 draft of the Construction Stormwater General Permit reissuance proposed a translation for the ammonia waste load

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allocations into numeric effluent limitations as the waste load allocations were concentration-based and assigned at the point of discharge. However, the Permit was revised to implement nitrogen-based nutrient waste load allocations as numeric action levels because numeric action levels are consistent with the assumptions and requirements of the waste load allocations.

As set forth in Section I.G.5.d of this Fact Sheet, the source analysis found that the principal source of ammonia, nitrite, and nitrate to the Santa Clara River is discharges from water reclamation plants and publicly owned public treatment works (BPA, p.2). The TMDL also acknowledged that stormwater discharge may contribute nitrate loads. But the allocations were set at the water quality objectives for receiving waters. The most critical conditions for water quality in the Santa Clara River are low-flow conditions, in particular at the end of the dry season (p. 72).

The TMDL also noted that “mass emission monitoring data conducted for MS4 NPDES Permit compliance indicate that the MS4 discharges are below the waste load allocation in both wet and dry weather samples.”¹⁶⁶ (p.62) CGP dischargers subject to this TMDL are located within a MS4.

- Compliance Actions and Schedule

Responsible Dischargers shall comply with the requirements of this General Permit. Responsible Dischargers that identify on-site sources of ammonia, nitrate, and nitrite shall compare all non-visible sampling and analytical results to the numeric action levels for the identified nutrients. If an exceedance or failure of a BMP is observed, the Responsible Discharger shall evaluate the BMPs being used and identify and implement a strategy in the site’s SWPPP to prevent potential exceedances of the numeric action levels in the future. Responsible Dischargers that perform the required pollutant source assessment and implement BMPs specific to preventing or controlling stormwater exposure to nitrogen compound sources, are expected to meet the numeric action levels. The Regional Water Board may assign additional monitoring, reporting, and BMP requirements upon obtaining site specific information about exceedances of the numeric action levels.

The Santa Clara River Nitrogen Compounds TMDL’s compliance deadline for the waste load allocations was March 23, 2004. Since this

166 Staff Report, p. 62, available at

https://www.waterboards.ca.gov/losangeles/board_decisions/basin_plan_amendments/technical_documents/2003-011/03_0523/StaffReport06-16.pdf.

compliance deadline has passed, the numeric effluent limitations are applicable upon the effective date of this General Permit.

vi. Ventura River Algae TMDL¹⁶⁷

The Los Angeles Regional Water Quality Control Board adopted the Ventura River Algae TMDL on December 6, 2016, to address nutrient-related impairments in the Ventura River and its tributaries. Nutrient-related listings negatively impact beneficial uses such as water contact recreation, non-water contact recreation, warm and cold freshwater habitat, wetland habitat, rare/threatened/endangered species habitat, migration of aquatic organisms, and spawning.

- Source Analysis

Discharges conveyed via the municipal separate storm sewer (MS4), including stormwater and non-stormwater discharges, are estimated to contribute 21.3 percent of nutrient loading in dry weather and 28.3 percent in wet weather.

- Waste Load Allocation Translation

The Ventura River Algae TMDL assigns concentration-based waste load allocations for nitrogen and phosphorus to construction stormwater dischargers during dry and wet-weather discharges. Therefore, construction stormwater dischargers covered under this General Permit are considered Responsible Dischargers for this TMDL. No translation is necessary for the dry and wet-weather waste load allocations as they were already expressed as concentration-based limitations.

1) Dry-Weather Waste Load Allocations

The Ventura River Algae TMDL assigns concentration-based waste load allocations for dry-weather total nitrogen and total phosphorus, shown in Table 34 below, with compliance assessed by averaging two grab samples.

Discharges that occur during dry-weather conditions are referred to as non-stormwater and only are authorized in this General Permit if the conditions in Order Section IV.A are met to control the discharge of pollutants from the construction site. Authorized non-stormwater discharges, as defined in this General Permit, are authorized

167 Los Angeles Regional Water Quality Control Board, [Total Maximum Daily Load for Algae, Eutrophic Conditions, and Nutrients in the Ventura River and its Tributaries](#) (December 6, 2012)

<https://www.waterboards.ca.gov/losangeles/water_issues/programs/tmdl/docs/R12-011_RB_BPA.pdf> [as of April 28, 2022] (BPA)

because these discharges do not commingle with stormwater associated with construction activity. Order Section IV.B prohibits all NSWDS not authorized under Section IV.A; therefore, all unauthorized NSWDS must be either eliminated or have regulatory coverage under a separate NPDES permit. A dry-weather discharge to the Ventura River watershed with concentrations greater than the total nitrogen and total phosphorus waste load allocations would therefore be prohibited. The Regional Water Board may impose additional requirements on NSWDS if deemed necessary per site-specific analysis.

Table 34 – Ventura River Algae Dry-Weather Waste Load Allocations

Pollutant	Total Nitrogen Waste Load Allocation (mg/L)	Total Phosphorus Waste Load Allocation (mg/L)
Dry weather	1.15	0.115

2) Wet-Weather Waste Load Allocations

The wet-weather waste load allocations for nitrate plus nitrite as nitrogen, or total nitrogen where indicated, in Table 35 below are expressed as event mean concentrations or the average concentration for all samples taken per precipitation event resulting in discharge.

Table 35 – Ventura River Algae Wet-Weather Waste Load Allocations

Reach	Nitrate Plus Nitrite as Nitrogen Numeric Action Levels (mg/L)
Estuary	*
Reach 1	*
Reach 2	10
Cañada Larga	10
Reach 3	5
San Antonio Creek	5
Reach 4	5
Reach 5	5

* The waste load allocations for the Estuary and Reach 1 are for total nitrogen at a concentration of 7.4 mg/L

The May 2021 draft of the Construction Stormwater General Permit reissuance proposed a translation for nitrate-nitrogen plus nitrite-nitrogen and total nitrogen waste load allocations into numeric effluent limitations as the waste load allocations were concentration-based and assigned at the point of discharge. However, the Permit was revised to implement nitrogen-based nutrient waste load

allocations as numeric action levels because numeric action levels are consistent with the assumptions and requirements of the waste load allocations.

The TMDL states that, “[t]he discharges from the general NPDES permits are intermittent and considered negligible for the purposes of this source assessment.” (Staff Report, p.40)¹⁶⁸ Accordingly, “[t]he loadings from the general NPDES permits [were] not quantified” in the source assessment. (Staff Report, p.40) According to the TMDL, the critical condition for the TMDL is dry weather, “and it is the dry-weather loading that results in water quality impairments.” (BPA, p.5) “The watershed nutrient wet-weather loads are generally delivered directly to the ocean and thus do not contribute to exceedance of the biostimulatory substances...” (BPA, p.8) “Based on the linkage analysis, wet-weather loads do not have a significant impact on receiving water quality in the Ventura River and its tributaries or the Estuary and biostimulatory objectives are attained.” (Staff Report, p.79) The TMDL acknowledged that maintaining existing discharge quality would ensure that no further loading would occur in the receiving water. (BPA, p.8) The wet-weather loads were set to attain site-specific water quality objectives, (Staff Report, p.79) but “[f]or Reach 1 and Estuary, Wet-weather waste load allocations for stormwater sources are equal to existing water quality in stormwater discharges.” (BPA, p.6) This suggests that the TMDL assumed that reductions in stormwater discharges were not necessary. Dry-weather waste load allocations were set at in-stream nutrient concentrations to meet biomass numeric targets. (Staff Report, p.76) All these statements support implementation of the TMDL through numeric action levels.

Although the implementation language specifies that the TMDL should be implemented as numeric water quality-based effluent limitations, the underlying assumptions contained in the TMDL support implementation via numeric action levels.

168 Los Angeles Regional Water Quality Control Board, [Algae, Eutrophic Conditions, and Nutrients Total Maximum Daily Loads for Ventura River and Its Tributaries](#) (December 6, 2012)

<https://www.waterboards.ca.gov/losangeles/board_decisions/basin_plan_amendments/technical_documents/73_New/Docs/Mar%202013/Staff%20report_Final%20120612.pdf> [as of June 28, 2022] (Staff Report)

- Compliance Actions and Schedule

Responsible Dischargers shall comply with the requirements of this General Permit. Responsible Dischargers that identify on-site sources of nitrogen and/or phosphorus shall compare all non-visible sampling and analytical results to the numeric action level for the identified nutrients, when a wet-weather discharge occurs. If an exceedance or failure of a BMP is observed, the Responsible Discharger shall evaluate the BMPs being used and identify and implement a strategy in the site's SWPPP to prevent potential exceedances of the numeric action levels the future. Responsible Dischargers that perform the required pollutant source assessment and implement BMPs specific to preventing or controlling stormwater exposure to nitrogen and phosphorous sources, are expected to meet the assigned numeric action levels. The Regional Water Board may assign additional monitoring, reporting, and BMP requirements upon obtaining site specific information about exceedances of the numeric action levels.

The Ventura River Algae TMDL's compliance deadline for the waste load allocations was June 28, 2013. Since the compliance deadline has passed, the numeric action levels are applicable upon the effective date of this General Permit.

vii. San Diego Creek and Newport Bay Watershed Nutrients TMDL¹⁶⁹

The Santa Ana Regional Water Quality Control Board adopted the San Diego Creek and Newport Bay Watershed Nutrients TMDL in 1998 to address nutrient-related impairments in Newport Bay, San Diego Creek, and its tributaries. Nutrients contribute to seasonal algal blooms that negatively impact recreational, aesthetic, and wildlife habit beneficial uses in these waters.

- Source Analysis

The predominant source of nutrients are the tailwaters from agricultural crops and from commercial nurseries, however, runoff from construction sites can also contribute to nutrient loading through the erosion of sediment containing phosphorus.

169 Santa Ana Regional Water Quality Control Board, [Nutrient TMDL for the Newport Bay/San Diego Creek Watershed](#) (1998)

<https://www.waterboards.ca.gov/santaana/water_issues/programs/tmdl/> [as of May 20, 2021] (San Diego Creek and Newport Bay Watershed Nutrients TMDL)

- Waste Load Allocation Translation

Construction stormwater dischargers are assigned an annual, mass-based waste load allocation for total phosphorus, aiming to reduce the loading of phosphorus by 50 percent. Therefore, construction stormwater dischargers covered under this General Permit are considered Responsible Dischargers for this TMDL if they identify sources of phosphorus on their site via the required pollutant source assessment. All construction sites were expected to achieve compliance with the annual waste allocation of 12,810 lbs/year total phosphorus by 2007.

Requiring Responsible Dischargers to directly implement the waste load allocation and sample for the pollutant(s) would be impractical, costly, and not aligned with the requirements of this General Permit. It is infeasible to translate a mass-based annual waste load allocation applicable to all construction stormwater discharges to an effluent limitation that is applicable to an individual site. As mentioned in the source analysis, phosphorus loadings from construction stormwater discharges are in particulate form and associated with wet weather. Therefore, the following will address this TMDL:

- 1) Comply with the site-specific erosion and sediment control, and post-construction requirements in this General Permit.
- 2) For each phase of the construction project, install erosion controls that will result in predicted erosion rates that are as protective as pre-construction (e.g., undisturbed vegetation for the area) conditions. Calculate the predicted erosion rates by using RUSLE2 modeling as described in Attachment H.

- Compliance Actions and Schedule

Responsible Dischargers shall comply with the requirements of this General Permit. Responsible Dischargers that identify on-site sources of phosphorus through the required pollutant source assessment are to implement BMPs specific to preventing or controlling stormwater exposure to the sources of phosphorus. Furthermore, Responsible Dischargers are to comply with the RUSLE2 modeling requirements in Attachment H, Section I.D.2. The Regional Water Board may assign additional monitoring, reporting, and BMP requirements upon obtaining site specific information about exceedances of the waste load allocations.

The San Diego Creek and Newport Bay Watershed Nutrients TMDL has waste load allocation compliance deadline set in 2007 for construction sites. Since this compliance deadline has passed, the compliance

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actions are applicable to the Responsible Dischargers upon the effective date of this General Permit.

e. Sediment TMDLs

Twenty-five (25) sediment TMDLs are translated for this General Permit. Sediment is the loose sand, clay, silt, and other soil particles that settle at the bottom of a body of water. Sediment can be detrimental to aquatic life by interfering with photosynthesis, respiration, growth, reproduction, and oxygen exchange in water bodies.¹⁷⁰ Sediment can be transported in construction site discharges due to excessive erosion.¹⁷¹ At construction sites, the rate of erosion is increased due to increased amount of exposed and disturbed soil. Therefore, construction sites that discharge into the watersheds of these water bodies are considered Responsible Dischargers and shall comply with the requirements set forth in these TMDLs.

i. Albion River Sediment TMDL¹⁷²

The United States Environmental Protection Agency (U.S. EPA) established the Albion River Sediment TMDL on December 20, 2001, to address the impairment on the Albion River and its tributaries due to sediment.

The implementation requirements for the Albion River Sediment TMDL in this General Permit are based on the North Coast Sediment TMDL Implementation Policy¹⁷³ adopted on November 29, 2004. The North Coast Sediment TMDL Implementation Policy requires the use of existing permitting and enforcement tools to pursue compliance with sediment-related standards by all dischargers of sediment waste.¹⁷⁴ Construction

170 California Stormwater Quality Association, [Construction Stormwater Best Management Practice Handbook](http://www.casqa.org/) (August 2011), <<http://www.casqa.org/>> [as of May 20, 2021] (CASQA Construction BMP Handbook)

171 CASQA Construction BMP Handbook, p. 1-7.

172 United States Environmental Protection Agency Region IX, [Albion River Sediment TMDL for Sediment](https://www.waterboards.ca.gov/northcoast/water_issues/programs/tmdls/albion_river/pdf/albionfinaltmdl.pdf) (December 2001), <https://www.waterboards.ca.gov/northcoast/water_issues/programs/tmdls/albion_river/pdf/albionfinaltmdl.pdf> [as of May 20, 2021] (Albion River Sediment TMDL)

173 North Coast Regional Water Quality Control Board, [Total Maximum Daily Load Implementation Policy Statement for Sediment-Impaired Receiving Waters in the North Coast Region](https://www.waterboards.ca.gov/northcoast/water_issues/programs/tmdls/sediment_tmdl_implementation/) (November 29, 2004). <https://www.waterboards.ca.gov/northcoast/water_issues/programs/tmdls/sediment_tmdl_implementation/> [as of May 20, 2021] (North Coast Sediment TMDL Implementation Policy)

174 North Coast Sediment TMDL Implementation Policy, p. 3.

stormwater dischargers covered under this General Permit are considered Responsible Dischargers for the Albion River Sediment TMDL.

- Waste Load Allocation Translation

This TMDL set the sediment waste load allocation for point sources at zero (0) because there are no significant point sources of sediment in the Albion River watershed.¹⁷⁵

- Compliance Actions and Schedule

Responsible Dischargers shall comply with the requirements of this General Permit and the Sediment TMDL Requirements in Attachment H. The Regional Water Quality Control Board may assign additional monitoring, reporting, and BMP requirements upon obtaining site specific information about exceedances of the waste load allocations. The North Coast Sediment TMDL Implementation Policy does not include an implementation date for this TMDL. Responsible Dischargers are required to comply with this TMDL upon the effective date of this General Permit.

ii. Big River Sediment TMDL¹⁷⁶

The U.S. EPA established the Big River Sediment TMDL on December 20, 2001, to address the impairment of Big River Sediment TMDL and its tributaries due to sediment.

The implementation requirements for the Big River Sediment TMDL in this General Permit are based on the North Coast Sediment TMDL Implementation Policy adopted on November 29, 2004. The Sediment TMDL Implementation Policy requires the use of existing permitting and enforcement tools to pursue compliance with sediment-related standards by all dischargers of sediment waste.¹⁷⁷ Construction stormwater dischargers covered under this General Permit are considered Responsible Dischargers for the Big River Sediment TMDL.

175 Albion River Sediment TMDL, p. 35.

176 United States Environmental Protection Agency Region IX, [Big River Total Maximum Daily Load for Sediment](#) (December 2001)

<https://www.waterboards.ca.gov/northcoast/water_issues/programs/tmdls/big_river/pdf/bigfinaltmdl.pdf> [as of May 20, 2021] (Big River Sediment TMDL)

177 North Coast Sediment TMDL Implementation Policy, p. 3.

- Waste Load Allocation Translation

This TMDL set the sediment waste load allocation for point sources at zero (0) because there are no significant point sources of sediment in the Big River Sediment TMDL watershed.¹⁷⁸

- Compliance Actions and Schedule

Responsible Dischargers shall comply with the requirements of this General Permit and the Sediment TMDL Requirements in Attachment H. The Regional Water Board may assign additional monitoring, reporting, and BMP requirements upon obtaining site specific information about exceedances of the waste load allocations. The North Coast Sediment TMDL Implementation Policy does not include an implementation date for this TMDL. Responsible Dischargers are required to comply with this TMDL upon the effective date of this General Permit.

iii. Eel River – Lower Main Sediment TMDL¹⁷⁹

The U.S. EPA established the Eel River – Lower Main Sediment TMDL on December 18, 2007, to address the impairment of the Lower Eel River and its tributaries due to sediment.

The implementation requirements for the Eel River – Lower Main Sediment TMDL in this General Permit are based on the North Coast Sediment TMDL Implementation Policy¹⁸⁰ adopted on November 29, 2004. The North Coast Sediment TMDL Implementation Policy requires the use of existing permitting and enforcement tools to pursue compliance with sediment-related standards by all dischargers of sediment waste.¹⁸¹ Construction stormwater dischargers covered under this General Permit are considered Responsible Dischargers for the Eel River – Lower TMDL.

178 Big River Sediment TMDL, p. 36.

179 United States Environmental Protection Agency Region IX, [Lower Eel River Total Maximum Daily Loads for Temperature and Sediment](https://www.waterboards.ca.gov/northcoast/water_issues/programs/tmdls/eel_river_lower/pdf/LER-TMDL-final-121807-signed.pdf) (December 18, 2007) <https://www.waterboards.ca.gov/northcoast/water_issues/programs/tmdls/eel_river_lower/pdf/LER-TMDL-final-121807-signed.pdf> [as April 28, 2022] (Eel River-Lower Main Sediment TMDL)

180 North Coast Regional Water Quality Control Board, [Total Maximum Daily Load Implementation Policy Statement for Sediment-Impaired Receiving Waters in the North Coast Region](https://www.waterboards.ca.gov/northcoast/water_issues/programs/tmdls/sediment_tmdl_implementation/) (November 29, 2004) <https://www.waterboards.ca.gov/northcoast/water_issues/programs/tmdls/sediment_tmdl_implementation/> [as of May 20, 2021] (North Coast Sediment TMDL Implementation Policy)

181 North Coast Sediment TMDL Implementation Policy, p. 3.

- Waste Load Allocation Translation

The source analysis supporting the allocations in Table 36 evaluated sediment loading at a subwatershed scale. The source analysis did not attempt to distinguish sediment loading at the scale of specific land ownerships nor did the analysis distinguish loading between land areas subject to NPDES regulation, or land areas not subject to NPDES regulation. Therefore, this TMDL includes separate but identical load allocations for non-point sources and waste load allocations for diffuse NPDES-permitted sources for each subarea. The diffuse NPDES-permitted pollutant sources are addressed in the statewide NPDES municipal stormwater permit for the California Department of Transportation, this statewide Construction Stormwater General Permit, the statewide Industrial Stormwater General Permit, and the City of Fortuna NPDES municipal stormwater permit.¹⁸²

Table 36 – Sediment Load Allocations for the Lower Eel River Watershed and its Tributaries

Sediment Source	Load Allocation (tons/mi ² /year)	1955-2003 Loading (tons/mi ² /year)	Percent Reduction
Road (Episodic)	9	43	80 percent
Road (Chronic)	17	115	85 percent
Bank Erosion	6	21	70 percent

Construction sites covered by this General Permit are considered to be human related sources of sediment to the watershed and therefore, Responsible Dischargers. Responsible Dischargers are not to exceed the load allocations assigned to roads (episodic and chronic) and bank erosion, as the allocations assigned to timber harvest and skid trails do not typically apply to construction sites. Responsible Dischargers calculate their annual loading by multiplying the area of the site with these load allocations.

- Compliance Actions and Schedule

Responsible Dischargers shall comply with the requirements of this General Permit and the Sediment TMDL Requirements in Attachment H. The Regional Water Board may assign additional monitoring, reporting, and BMP requirements upon obtaining site specific information about exceedances of the waste load allocations. The North Coast Sediment TMDL Implementation Policy does not include an implementation date for this TMDL. Therefore, Responsible Dischargers are required to comply with this TMDL upon the effective date of this General Permit.

iv. Eel River – Middle Fork Sediment TMDL¹⁸³

The U.S. EPA established the Eel River – Middle Fork Sediment TMDL in December 2003 to address the impairment of the Middle Fork Eel River and tributaries due to sediment.

The implementation requirements for the Eel River – Middle Fork Sediment TMDL in this General Permit are based on the North Coast Sediment TMDL Implementation Policy adopted on November 29, 2004. The North Coast Sediment TMDL Implementation Policy requires the use of existing permitting and enforcement tools to pursue compliance with sediment-related standards by all dischargers of sediment waste.¹⁸⁴ Construction stormwater dischargers covered under this General Permit are considered Responsible Dischargers for the Eel River – Middle Fork Sediment TMDL.

- Waste Load Allocation Translation

This TMDL identified discharges under the Construction General Permit and Caltrans Statewide Permit as current and prospective point sources that may discharge sediment in the watershed. Discharges from these point sources cannot be readily determined and possible loading from these sources is not distinguished from general management-related loading in the source analysis. Therefore, this TMDL set the load allocations for nonpoint sources to also represent waste load allocations for point sources that would be covered by general NPDES permits.¹⁸⁵

Table 37 – Sediment Load Allocations for the Middle Fork Eel River Watershed and its Tributaries (tons/mi²/yr)

Sediment Source	Black Butte	Elk Creek	Round Valley	Upper Middle Fork	Williams/ Thatcher	Basin-wide Load
Small Management Sources	7	41	9	9	19	23
Percent Reduction	0 percent	32 percent	95 percent	0 percent	89 percent	70 percent

¹⁸³ United States Environmental Protection Agency Region IX, [Final Middle Fork Eel River Total Maximum Daily Loads for Temperature and Sediment](https://www.waterboards.ca.gov/northcoast/water_issues/programs/tmdls/eel_river_middle_fork/pdf/tmdl.pdf) (December 2003) <https://www.waterboards.ca.gov/northcoast/water_issues/programs/tmdls/eel_river_middle_fork/pdf/tmdl.pdf> [as of April 28, 2022] (Eel River – Middle Fork Sediment TMDL)

¹⁸⁴ North Coast Sediment TMDL Implementation Policy.

¹⁸⁵ Eel River – Middle Fork Sediment TMDL, p. 45.

The construction sites covered by this General Permit are considered to be human related sources of sediment to the watershed. Responsible Dischargers are not to exceed the load allocations or reductions assigned to “small management sources.” These allocations vary by subwatershed, as noted in Table 37 above. Responsible Dischargers calculate their annual loading by multiplying the area of the site with the appropriate load allocation.

- Compliance Actions and Schedule

Responsible Dischargers shall comply with the requirements of this General Permit and the Sediment TMDL Requirements in Attachment H. The Regional Water Board may assign additional monitoring, reporting, and BMP requirements upon obtaining site specific information about exceedances of the waste load allocations. The North Coast Sediment TMDL Implementation Policy does not include an implementation date for this TMDL. Therefore, Responsible Dischargers are required to comply with this TMDL upon the effective date of this General Permit.

- v. Eel River – Middle Main Sediment TMDL¹⁸⁶

The U.S. EPA established the Eel River – Middle Main Sediment TMDL on December 31, 2005, to address the impairment of the Middle Main Eel River (from Dos Rios to the South Fork Eel River) and its tributaries due to sediment. A portion of the watershed is part of the Round Valley Indian Country. This TMDL does not apply to lands under tribal jurisdiction.

The implementation requirements for the Eel River – Middle Main Sediment TMDL in this General Permit are based on the North Coast Sediment TMDL Implementation Policy adopted on November 29, 2004. The Sediment TMDL Implementation Policy requires the use of existing permitting and enforcement tools to pursue compliance with sediment-related standards by all dischargers of sediment waste.¹⁸⁷ Construction stormwater dischargers covered under this General Permit are considered Responsible Dischargers for the Eel River – Middle Main Sediment TMDL.

186 United States Environmental Protection Agency Region IX, [Final Middle Main Eel River and Tributaries Total Maximum Daily Loads for Temperature and Sediment](#) (December 31, 2005)

<https://www.waterboards.ca.gov/northcoast/water_issues/programs/tmdls/eel_river_middle_main/pdf/mainmdl-eel-final.pdf> [as of April 28, 2022] (Eel River – Middle Main Sediment TMDL)

187 North Coast Sediment TMDL Implementation Policy.

- Waste Load Allocation Translation

This TMDL set the sediment waste load allocation for point sources at zero (0) for construction sites because this source is not significant.¹⁸⁸

- Compliance Actions and Schedule

Responsible Dischargers shall comply with the requirements of this General Permit and the Sediment TMDL Requirements in Attachment H. The Regional Water Board may assign additional monitoring, reporting, and BMP requirements upon obtaining site specific information about exceedances of the waste load allocations. The North Coast Sediment TMDL Implementation Policy does not include an implementation date for this TMDL. Therefore, Responsible Dischargers are required to comply with this TMDL upon the effective date of this General Permit.

vi. Eel River – North Fork Sediment TMDL¹⁸⁹

The U.S. EPA established the Eel River – North Fork Sediment TMDL on December 30, 2002, to address the impairment of the North Fork Eel River and its tributaries due to sediment. These TMDLs do not apply to lands under tribal jurisdiction.

The implementation requirements for the Eel River – North Fork Sediment TMDL in this General Permit are based on the North Coast Sediment TMDL Implementation Policy adopted on November 29, 2004. The North Coast Sediment TMDL Implementation Policy requires the use of existing permitting and enforcement tools to pursue compliance with sediment-related standards by all dischargers of sediment waste.¹⁹⁰ Construction stormwater dischargers covered under this General Permit are considered Responsible Dischargers for the Eel River – North Fork Sediment TMDL.

- Waste Load Allocation Translation

This TMDL set the sediment waste load allocation for point sources at zero (0) because there are no significant point sources of sediment in the North Fork Eel River watershed.¹⁹¹

188 Eel River – Middle Main Sediment TMDL, p. 45.

189 United States Environmental Protection Agency Region IX, [Final North Fork Eel River Total Maximum Daily Loads for Sediment and Temperature](https://www.waterboards.ca.gov/northcoast/water_issues/programs/tmdls/eel_river_north_fork/pdf/final.pdf) (December 30, 2002) <https://www.waterboards.ca.gov/northcoast/water_issues/programs/tmdls/eel_river_north_fork/pdf/final.pdf> [as of April 28, 2022] (Eel River – North Fork Sediment TMDL)

190 North Coast Sediment TMDL Implementation Policy.

191 Eel River – North Fork Sediment TMDL, p. 23.

- Compliance Actions and Schedule

Responsible Dischargers shall comply with the requirements of this General Permit and the Sediment TMDL Requirements in Attachment H. The Regional Water Board may assign additional monitoring, reporting, and BMP requirements upon obtaining site specific information about exceedances of the waste load allocations. The North Coast Sediment TMDL Implementation Policy does not include an implementation date for this TMDL. Therefore, Responsible Dischargers are required to comply with this TMDL upon the effective date of this General Permit.

vii. Eel River – Upper Main Sediment TMDL¹⁹²

The U.S. EPA established the Eel River – Upper Main Sediment TMDL on December 29, 2004, to address the Impairment of the Upper Main Eel River (including Tomki Creek, Outlet Creek, and Lake Pillsbury) and its tributaries due to sediment.

The implementation requirements for the Eel River – Upper Main Sediment TMDL in this General Permit are based on the North Coast TMDL Implementation Policy adopted on November 29, 2004. The North Coast Sediment Implementation Policy requires the use of existing permitting and enforcement tools to pursue compliance with sediment-related standards by all dischargers of sediment waste.¹⁹³ Construction stormwater dischargers covered under this General Permit are considered Responsible Dischargers for the Eel River – Upper Main Sediment TMDL.

- Waste Load Allocation Translation

This TMDL identified discharges under the Construction General Permit and Caltrans Statewide Permit as current and prospective point sources that may discharge sediment in the watershed and are therefore Responsible Dischargers. Discharges from these point sources cannot be readily determined and possible loading from these sources is not distinguished from general management-related loading in the source analysis. Therefore, this TMDL set the load allocations for nonpoint

192 United States Environmental Protection Agency Region IX, [Final Upper Main Eel River and Tributaries \(including Tomki Creek, Outlet Creek and Lake Pillsbury\) Total Maximum Daily Loads for Temperature and Sediment](https://www.waterboards.ca.gov/northcoast/water_issues/programs/tmdls/eel_river_upper_main/pdf/uer-tmdl-final-12-28.pdf) (December 29, 2004)
<https://www.waterboards.ca.gov/northcoast/water_issues/programs/tmdls/eel_river_upper_main/pdf/uer-tmdl-final-12-28.pdf> [as of May 20, 2021] (Eel River – Upper Main Sediment TMDL)

193 North Coast Sediment TMDL Implementation Policy.

sources to also represent waste load allocations for point sources that would be covered by general NPDES permits.¹⁹⁴

Table 38 – Sediment Load Allocations for the Upper Main Eel River Watershed and its Tributaries

Sediment Source	Load Allocation (tons/mi ² /year)	1940-2004 Loading (tons/mi ² /year)	Percent Reduction
Large Features (>3,000 yds ³)	36	71	49 percent
Road Related (Small Features)	14	28	50 percent

Construction sites covered by this General Permit are considered to be human (land management) related sources of sediment to the watershed. Responsible Dischargers are not to exceed the load allocations assigned to road related projects or “large features” as this General Permit regulates projects that disturb an acre or greater of land. Responsible Dischargers calculate their annual loading by multiplying the area of the site with these load allocations.

- Compliance Actions and Schedule

Responsible Dischargers shall comply with the requirements of this General Permit and the Sediment TMDL Requirements in Attachment H. The Regional Water Board may assign additional monitoring, reporting, and BMP requirements upon obtaining site specific information about exceedances of the waste load allocations. The North Coast Sediment TMDL Implementation Policy does not include an implementation date for this TMDL. Therefore, Responsible Dischargers are required to comply with this TMDL upon the effective date of this General Permit.

viii. Eel River – South Fork Sediment TMDL¹⁹⁵

The U.S. EPA established the Eel River – South Fork TMDL on December 16, 1999, to address the impairment of the South Fork Eel River and its tributaries due to sediment. These TMDLs do not apply to lands under tribal jurisdiction.

The implementation requirements for the Eel River – South Fork Sediment TMDL in this General Permit are based on the North Coast Sediment TMDL Implementation Policy adopted on November 29, 2004. The North Coast Sediment TMDL Implementation Policy requires the use of existing

¹⁹⁴ Eel River – Upper Main Sediment TMDL, p. 54.

¹⁹⁵ United States Environmental Protection Agency Region IX, [South Fork Eel River Total Maximum Daily Loads for Sediment and Temperature](https://www.waterboards.ca.gov/northcoast/water_issues/programs/tmdls/eel_river_south_fork/pdf/eel.pdf) (December 16, 1999) <https://www.waterboards.ca.gov/northcoast/water_issues/programs/tmdls/eel_river_south_fork/pdf/eel.pdf> [as of April 28, 2022] (Eel River – South Fork Sediment TMDL)

permitting and enforcement tools to pursue compliance with sediment-related standards by all dischargers of sediment waste.¹⁹⁶ Construction stormwater dischargers covered under this General Permit are considered Responsible Dischargers for the Eel River – South Fork Sediment TMDL.

- Waste Load Allocation Translation

This TMDL set the sediment waste load allocation for point sources at zero (0) because there are no significant point sources of sediment in the North Fork Eel River watershed.¹⁹⁷

- Compliance Actions and Schedule

Responsible Dischargers shall comply with the requirements of this General Permit and the Sediment TMDL Requirements in Attachment H. The Regional Water Board may assign additional monitoring, reporting, and BMP requirements upon obtaining site specific information about exceedances of the waste load allocations. The North Coast Sediment TMDL Implementation Policy does not include an implementation date for this TMDL. Therefore, Responsible Dischargers are required to comply with this TMDL upon the effective date of this General Permit.

ix. Gualala River Sediment TMDL¹⁹⁸

The U.S. EPA established the Gualala River Sediment TMDL in December 2001 to address the impairment of the Gualala River and its tributaries due to sediment.

The implementation requirements for the Gualala River Sediment TMDL in this General Permit are based on the North Coast TMDL Implementation Policy adopted on November 29, 2004. The Sediment TMDL Implementation Policy requires the use of existing permitting and enforcement tools to pursue compliance with sediment-related standards by all dischargers of sediment waste.¹⁹⁹ Construction stormwater dischargers covered under this General Permit are considered Responsible Dischargers for the Gualala River Sediment TMDL.

196 North Coast Sediment TMDL Implementation Policy.

197 Eel River – North Fork Sediment TMDL, p. 23

198 United States Environmental Protection Agency Region IX, [Gualala River Total Maximum Daily Load for Sediment](#) (December, 2001)

<https://www.waterboards.ca.gov/northcoast/water_issues/programs/tmdls/gualala_river/110707/gualalafinaltmdl.pdf> [as of May 20, 2021] (Gualala River Sediment TMDL)

199 North Coast Sediment TMDL Implementation Policy.

- Waste Load Allocation Translation

This TMDL set the sediment waste load allocation for point sources at zero (0) because there are no significant individual point sources of sediment in the Gualala River watershed.²⁰⁰

- Compliance Actions and Schedule

Responsible Dischargers shall comply with the requirements of this General Permit and the Sediment TMDL Requirements in Attachment H. The Regional Water Board may assign additional monitoring, reporting, and BMP requirements upon obtaining site specific information about exceedances of the waste load allocations. The North Coast Sediment TMDL Implementation Policy does not include an implementation date for this TMDL. Therefore, Responsible Dischargers are required to comply with this TMDL upon the effective date of this General Permit.

x. Mad River Sediment TMDL²⁰¹

The U.S. EPA established the Mad River Sediment TMDL on December 21, 2007, to address the impairment of the Mad River and its tributaries due to sediment.

The implementation requirements for the Mad River Sediment TMDL in this General Permit are based on the North Coast TMDL Implementation Policy adopted on November 29, 2004. The Sediment TMDL Implementation Policy requires the use of existing permitting and enforcement tools to pursue compliance with sediment-related standards by all dischargers of sediment waste.²⁰² Construction stormwater dischargers covered under this General Permit are considered Responsible Dischargers for the Mad River Sediment TMDL.

- Waste Load Allocation Translation

The source analysis evaluated sediment loading at a subwatershed scale. The source analysis did not attempt to distinguish sediment loading at the scale of specific land ownerships nor did it distinguish loading between land areas subject to NPDES regulation and land areas not subject to NPDES regulation. Therefore, this TMDL includes separate but identical load allocations for nonpoint sources and waste

200 Gualala River Sediment TMDL, p. 17.

201 United States Environmental Protection Agency Region IX, [Mad River Total Maximum Daily Loads for Sediment and Turbidity](#) (December 21, 2007)

<https://www.waterboards.ca.gov/northcoast/water_issues/programs/tmdls/mad_river/pdf/Mad-TMDL-122107-signed.pdf> [as of May 20, 2021] (Mad River Sediment TMDL)

202 North Coast Sediment TMDL Implementation Policy.

load allocations for diffuse point sources. Construction activities permitted under this General Permit are considered diffuse point sources and are therefore Responsible Dischargers for this TMDL. This TMDL assigns a waste load allocation for permitted construction activities equivalent to the load allocation for roads.²⁰³

Table 39 – Sediment Load Allocations for the Mad River Watershed

Sediment Source	Load Allocation (tons/mi ² /year)	1940-2004 Loading (tons/mi ² /year)	Percent Reduction
Roads (Total Sediment)	174	1,540	89 percent

Responsible Dischargers are not to exceed the load allocations for total sediment. Responsible Dischargers are required to calculate their project site annual loading by multiplying the area of the site with this load allocation.

- Compliance Actions and Schedule

Responsible Dischargers shall comply with the requirements of this General Permit and the Sediment TMDL Requirements in Attachment H. The Regional Water Board may assign additional monitoring, reporting, and BMP requirements upon obtaining site specific information about exceedances of the waste load allocation. The North Coast Sediment TMDL Implementation Policy does not include an implementation date for this TMDL. Therefore, Responsible Dischargers are required to comply with this TMDL upon the effective date of this General Permit.

xi. Mattole River Sediment TMDL²⁰⁴

The U.S. EPA established the Mattole River Sediment TMDL on December 30, 2002, to address the impairment of the Mattole River and its tributaries due to sediment.

The implementation requirements for the Mattole River Sediment TMDL in this General Permit are based on the North Coast TMDL Implementation Policy adopted on November 29, 2004. The Sediment TMDL Implementation Policy requires the use of existing permitting and enforcement tools to pursue compliance with sediment-related standards by all dischargers of sediment waste.²⁰⁵ The discharge of soil, silt, bark,

203 Mad River Sediment TMDL, p. 91.

204 United States Environmental Protection Agency Region IX, [Mattole River Total Maximum Daily Loads for Sediment and Temperature](https://www.waterboards.ca.gov/northcoast/water_issues/programs/tmdls/mattole_river/110707/mattole.pdf) (December 30, 2002) <https://www.waterboards.ca.gov/northcoast/water_issues/programs/tmdls/mattole_river/110707/mattole.pdf> [as of May 20, 2021] (Mattole River Sediment TMDL)

205 North Coast Sediment TMDL Implementation Policy.

sawdust, or other organic and earthen material from construction activities in quantities deleterious to fish, wildlife, or other beneficial uses is prohibited.²⁰⁶ Construction stormwater dischargers covered under this General Permit are considered Responsible Dischargers for the Mattole River Sediment TMDL.

- Waste Load Allocation Translation

This TMDL set the sediment waste load allocation for point sources at zero (0) because there are no point sources of sediment in the Mattole River watershed.²⁰⁷

- Compliance Actions and Schedule

Responsible Dischargers shall comply with the requirements of this General Permit and the Sediment TMDL Requirements in Attachment H. The Regional Water Board may assign additional monitoring, reporting, and BMP requirements upon obtaining site specific information about exceedances of the waste load allocations. The North Coast Sediment TMDL Implementation Policy does not include an implementation date for this TMDL. Therefore, Responsible Dischargers are required to comply with this TMDL upon the effective date of this General Permit.

xii. Navarro River Sediment TMDL²⁰⁸

The U.S. EPA established the Navarro River Sediment TMDL in December 2000 to address the impairment of the Navarro River and its tributaries due to sediment.

The implementation requirements for the Navarro River Sediment TMDL in this General Permit are based on the North Coast TMDL Implementation Policy adopted on November 29, 2004. The Sediment TMDL Implementation Policy requires the use of existing permitting and enforcement tools to pursue compliance with sediment-related standards by all dischargers of sediment waste.²⁰⁹ The discharge of soil, silt, bark, sawdust, or other organic and earthen material from construction activities in quantities deleterious to fish, wildlife, or other beneficial uses is

206 Mattole River Sediment TMDL p. 9.

207 Mattole River Sediment TMDL, p. 41.

208 United States Environmental Protection Agency Region IX, [Navarro River Total Maximum Daily Loads for Temperature and Sediment](https://www.waterboards.ca.gov/northcoast/water_issues/programs/tmdls/navarro_river/110708/navarro.pdf) (December 2000) <https://www.waterboards.ca.gov/northcoast/water_issues/programs/tmdls/navarro_river/110708/navarro.pdf> [as of May 20, 2021] (Navarro River Sediment TMDL)

209 North Coast Sediment TMDL Implementation Policy.

prohibited.²¹⁰ Construction stormwater dischargers covered under this General Permit are considered Responsible Dischargers for the Navarro River Sediment TMDL.

- Waste Load Allocation Translation

This TMDL set the sediment waste load allocation for point sources at zero (0) because there are no known point sources of sediment in the Navarro River and its tributaries.

- Compliance Actions and Schedule

Responsible Dischargers shall comply with the requirements of this General Permit and the Sediment TMDL Requirements in Attachment H. The Regional Water Board may assign additional monitoring, reporting, and BMP requirements upon obtaining site specific information about exceedances of the waste load allocations. The North Coast Sediment TMDL Implementation Policy does not include an implementation date for this TMDL. Therefore, Responsible Dischargers are required to comply with this TMDL upon the effective date of this General Permit.

xiii. Noyo River Sediment TMDL²¹¹

The U.S. EPA established the Noyo River Sediment TMDL on December 16, 1999, to address the impairment of Noyo River due to sediment.

The implementation requirements for the Noyo River Sediment TMDL in this General Permit are based on the North Coast TMDL Implementation Policy adopted on November 29, 2004. The Sediment TMDL Implementation Policy requires the use of existing permitting and enforcement tools to pursue compliance with sediment-related standards by all dischargers of sediment waste.²¹² The discharge of soil, silt, bark, sawdust, or other organic and earthen material from construction activities in quantities deleterious to fish, wildlife, or other beneficial uses is prohibited.²¹³ Construction stormwater dischargers covered under this General Permit are considered Responsible Dischargers for the Noyo River Sediment TMDL.

210 Navarro River Sediment TMDL, p. 3.

211 United States Environmental Protection Agency Region IX, [Noyo River Total Maximum Daily Load for Sediment](https://www.waterboards.ca.gov/northcoast/water_issues/programs/tmdls/noyo_river/pdf/noyo.pdf) (December 16, 1999) <https://www.waterboards.ca.gov/northcoast/water_issues/programs/tmdls/noyo_river/pdf/noyo.pdf> [as of May 20, 2021] (Noyo River Sediment TMDL)

212 North Coast Sediment TMDL Implementation Policy.

213 Noyo River Sediment TMDL, p. 10.

- Waste Load Allocation Translation

This TMDL set the sediment waste load allocation for point sources equal to zero (0) because there are no point sources of sediment in Noyo River.

- Compliance Actions and Schedule

Responsible Dischargers shall comply with the requirements of this General Permit and the Sediment TMDL Requirements in Attachment H. The Regional Water Board may assign additional monitoring, reporting, and BMP requirements upon obtaining site specific information about exceedances of the waste load allocations. The North Coast Sediment TMDL Implementation Policy does not include an implementation date for this TMDL. Therefore, Responsible Dischargers are required to comply with this TMDL upon the effective date of this General Permit.

xiv. Scott River Sediment TMDL²¹⁴

The North Coast Regional Water Quality Control Board adopted the Scott River Sediment TMDL on December 7, 2005, to address the impairment of Scott River due to sediment.

The implementation requirements for the Scott River Sediment TMDL in this General Permit are based on the Scott River TMDL Action Plan²¹⁵ which describes the specific implementation actions necessary to fulfill the obligations of the Sediment TMDL Implementation Policy. The Sediment TMDL Implementation Policy requires the use of existing permitting and enforcement tools to pursue compliance with sediment-related standards by all dischargers of sediment waste.²¹⁶ Construction stormwater dischargers covered under this General Permit are considered Responsible Dischargers for the Scott River Sediment TMDL.

214 United States Environmental Protection Agency Region IX, [Scott River Total Maximum Daily Load for Sediment](#) (December 7, 2005)
<https://www.waterboards.ca.gov/northcoast/water_issues/programs/tmdls/scott_river/> [as of May 20, 2021] (Scott River Sediment TMDL)

215 North Coast Regional Water Quality Control Board, [Action Plan for the Scott River Sediment and Temperature TMDLs](#) (August 11, 2006)
<https://www.waterboards.ca.gov/northcoast/water_issues/programs/tmdls/scott_river/060307/bpl/Basin_Plan_Language.pdf> [as of May 20, 2021] (Scott River TMDL Action Plan)

216 North Coast Sediment TMDL Implementation Policy.

- Waste Load Allocation Translation

Construction sites covered by this General Permit are considered to be anthropogenic related sources of sediment to the watershed. Responsible Dischargers are not to exceed the sum of load allocations assigned to road surface erosion and large or small discrete streamside features, which totals to 69 tons/mi²/year.²¹⁷ Responsible Dischargers calculate their annual loading by multiplying the area of the site with this load allocation.

- Compliance Actions and Schedule

The Scott River TMDL Action Plan describes the implementation actions necessary to achieve the TMDL within 40 years of U.S. EPA approval of the action plan or September 8, 2046. Since the compliance deadline is in the far future, compliance with this General Permit is considered compliance with the TMDL. Future reissuances of this General Permit may incorporate additional or revised compliance requirements or interim targets to progress towards the required final compliance by September 8, 2046. The Regional Water Board may assign additional monitoring, reporting, and BMP requirements upon obtaining site specific information about exceedances of the waste load allocation.

xv. Ten Mile River Sediment TMDL²¹⁸

The U.S. EPA established the Ten Mile River Sediment TMDL in December 2000 to address the impairment of Ten Mile River due to sediment.

The implementation requirements for the Ten Mile River Sediment TMDL in this General Permit are based on the North Coast TMDL Implementation Policy adopted on November 29, 2004. The Sediment TMDL Implementation Policy requires the use of existing permitting and enforcement tools to pursue compliance with sediment-related standards by all dischargers of sediment waste.²¹⁹ Construction stormwater dischargers covered under this General Permit are considered Responsible Dischargers for the Ten Mile River Sediment TMDL.

217 Scott River TMDL Action Plan, p. 4-5.00.

218 United States Environmental Protection Agency Region IX, [Ten Mile River Total Maximum Daily Load for Sediment](#) (December 2000)

<https://www.waterboards.ca.gov/northcoast/water_issues/programs/tmdls/ten_mile_river/pdf/tenmile.pdf> [as of May 20, 2021] (TMDL Mile River Sediment TMDL)

219 North Coast Sediment TMDL Implementation Policy.

- Waste Load Allocation Translation

This TMDL set a sediment waste load allocation for point sources at zero (0) as there are no point sources of discharge in the basin.²²⁰

- Compliance Actions and Schedule

Responsible Dischargers shall comply with the requirements of this General Permit and the Sediment TMDL Requirements in Attachment H. The Regional Water Quality Control Board may assign additional monitoring, reporting, and BMP requirements upon obtaining site specific information about exceedances of the waste load allocations. The North Coast Sediment TMDL Implementation Policy does not include an implementation date for this TMDL. Therefore, Responsible Dischargers are required to comply with this TMDL upon the effective date of this General Permit.

xvi. Trinity River Sediment TMDL²²¹

The U.S. EPA established the Trinity River Sediment TMDL on December 20, 2001, to address the impairment of the Trinity River and its tributaries due to sediment. This TMDL does not apply to lands under tribal jurisdiction and South Fork Trinity River.

The implementation requirements for the Trinity River Sediment TMDL in this General Permit are based on the Sediment TMDL Implementation Policy adopted on November 29, 2004. The Sediment TMDL Implementation Policy directs the use of existing permitting and enforcement tools to pursue compliance with sediment-related standards by all dischargers of sediment waste.²²²

- Waste Load Allocation Translation

This TMDL identified discharges under the Construction General Permit from construction sites larger than 5 acres as current and prospective point sources that may discharge sediment in the watershed and are therefore considered Responsible Dischargers. The source analysis evaluated sediment loading at a subarea scale. The source analysis did not attempt to distinguish sediment loading at the scale of specific land ownerships nor did it distinguish between land areas subject to NPDES

220 Ten Mile River Sediment TMDL, p. 5.

221 United States Protection Agency Region IX, [Trinity River Total Maximum Daily Load for Sediment](#) (December 20, 2001)

<https://www.waterboards.ca.gov/northcoast/water_issues/programs/tmdls/trinity_river/pdf/finaltrinitytmdl.pdf> [as of September 7, 2018] (Trinity River Sediment TMDL)

222 North Coast Sediment TMDL Implementation Policy.

regulation and land areas not subject to NPDES regulation. Therefore, this TMDL includes separate but identical load allocations for nonpoint sources and waste load allocations for each subarea.²²³

Table 40 – TMDL and Allocations by Source Category for Upper Area (tons/mi²/year)

Source Categories	Reference Subwatersheds ¹	Westside Tributaries ²	Upper Trinity ³	East Fork Tributaries ⁴	Eastside Tributaries ⁵
Total Management	281	105	690	65	60
Percent Reduction	25 percent	33 percent	46 percent	83 percent	37 percent

¹ Stuarts Fork, Swift Creek, Coffee Creek

² Stuart Arm Area, Stoney Creek, Mule Creek, East Fork Stuart Fork, West Side Trinity Lake, Hatchet Creek, Buckeye Creek

³ Upper Trinity River, Tangle Blue, Sunflower, Graves, Bear Upper Trinity Mainstem Area, Ramshorn Creek, Ripple Creek, Minnehaha Creek, Snowslide Gulch Area, Scorpion Creek

⁴ East Fork Trinity, Cedar Creek, Squirrel Gulch Area

⁵ East Side Tributaries, Trinity Lake

Table 41 – TMDL and Allocations by Source Category for Upper Middle Area (tons/mi²/year)

Source Categories	Weaver and Rush Creeks	Deadwood Creek, Hoadley Gulch, and Poker Bar Area	Lewiston Lake Area	Grass Valley Creek ¹	Indian Creek	Reading and Browns Creek
Total Management	169	68	49	44	81	66
Percent Reduction	41 percent	88 percent	74 percent	97 percent	96 percent	82 percent

¹ The rate in Grass Valley Creek do not account for the amount of sediment trapped by Buckhorn Dam and Hamilton Ponds

**Table 42 – TMDL and Allocations by Source Category for Lower Middle Area
 (tons/mi²/year)**

Source Categories	Reference Subwatersheds ¹	Canyon Creek ²	Upper Tributaries ³	Middle Tributaries ⁴	Lower Tributaries ⁵
Total Management (tons/mi ² /year)	24	326	67	53	55
Percent Reduction	0 percent	87 percent	50 percent	35 percent	39 percent

¹ New River, Big French, Manzanita, North Fork, East Fork, North Fork

² Canyon Creek

³ Dutch, Soldier, Oregon Gulch, Conner Creek Area

⁴ Big Bar Area, Prairie Creek, Little French Creek

⁵ Swede, Italian, Canadian, Cedar Flat, Mill, McDonald, Hennessy, Quinby Creek Area, Hawkins, Sharber

**Table 43 – TMDL and Allocations by Source Category for Lower Area
 (tons/mi²/year)**

Source Categories	Reference Subwatersheds ¹	Mill Creek and Tish Tang	Willow Creek	Campbell Creek and Supply Creek	Lower Mainstem Area and Coon Creek ²
Total Management (tons/mi ² /year)	528	210	94	1961	63
Percent Reduction	11 percent	74 percent	91 percent	87 percent	44 percent

¹ Horse Linto Creek

² Since background rates for Lower Mainstem Area and Coon Creek were not available from GMA (2001), EPA used the same rate as was calculated for the Quinby Creek Area, which is immediately upstream, because Quinby Creek Area is comparable in size and underlain by the same geology type (Galice Formation).

The U.S. EPA expects the waste load allocations to be evaluated on a ten-year rolling average basis because of the natural variability in sediment delivery rates and does not expect the load allocation to be met for every square mile within a source category.²²⁴ Responsible Dischargers are not to exceed the load allocations or reductions assigned to the “Total Management” source category, provided in tons/mi²/yr. These allocations vary by subwatershed, as noted in Table 40 through Table 43 above. Responsible Dischargers calculate their

annual loading by multiplying the area of the site with the appropriate load allocation.

- Compliance Actions and Schedule

Responsible Dischargers shall comply with the requirements of this General Permit and the Sediment TMDL Requirements in Attachment H. The Regional Water Board may assign additional monitoring, reporting, and BMP requirements upon obtaining site specific information about exceedances of the waste load allocations. The North Coast Sediment TMDL Implementation Policy does not include an implementation date for this TMDL. Therefore, Responsible Dischargers are required to comply with this TMDL upon the effective date of this General Permit.

xvii. Van Duzen River Sediment TMDL²²⁵

The U.S. EPA established the Van Duzen River Sediment TMDL on December 16, 1999, to address the impairment of the Van Duzen River and its tributaries due to sediment. These TMDLs do not apply to lands under tribal jurisdiction.

The implementation requirements for the Van Duzen River Sediment TMDL in this General Permit are based on the North Coast Sediment TMDL Implementation Policy adopted on November 29, 2004. The North Coast Sediment TMDL Implementation Policy requires the use of existing permitting and enforcement tools to pursue compliance with sediment-related standards by all dischargers of sediment waste.²²⁶ Construction stormwater dischargers covered under this General Permit are considered Responsible Dischargers for the Van Duzen River Sediment TMDL.

- Waste Load Allocation Translation

This TMDL set the sediment waste load allocation for point sources at zero (0) because there are no point sources of sediment in the Van Duzen River watershed.²²⁷

- Compliance Actions and Schedule

Responsible Dischargers shall comply with the requirements of this General Permit and the Sediment TMDL Requirements in Attachment H.

225 United States Environmental Protection Agency Region IX, [Van Duzen River and Yager Creek Total Maximum Daily Load for Sediment](#) (December 16, 1999) <https://www.waterboards.ca.gov/northcoast/water_issues/programs/tmdls/vanduzen_river/pdf/vanduzen.pdf> [as of May 20, 2021] (Van Duzen River Sediment TMDL)

226 North Coast Sediment TMDL Implementation Policy.

227 Van Duzen River Sediment TMDL, p. 46.

The Regional Water Board may assign additional monitoring, reporting, and BMP requirements upon obtaining site specific information about exceedances of the waste load allocation. The North Coast Sediment TMDL Implementation Policy does not include an implementation date for this TMDL. Therefore, Responsible Dischargers are required to comply with this TMDL upon the effective date of this General Permit.

xviii. Lagunitas Creek Sediment TMDL²²⁸

The San Francisco Bay Regional Water Quality Control Board adopted the Lagunitas Creek Sediment TMDL on June 11, 2014, to address the impairment of Lagunitas Creek due to sediment. Point sources of sediment in the watershed contribute minimal sediment loading and are associated with municipal and construction stormwater runoff, which are regulated through NPDES permits. Construction sites that discharge into the Lagunitas Creek watershed are therefore considered Responsible Dischargers.

- Waste Load Allocation Translation

The Lagunitas Creek Sediment TMDL set the sediment waste load allocation for construction stormwater runoff at 30 tons/year, which is equivalent to the current load from construction sites. Per the implementation measures of this TMDL, complying with the requirements of this General Permit is appropriate in addressing this waste load allocation.

- Compliance Actions and Schedule

Responsible Dischargers shall comply with the requirements of this General Permit upon its effective date. The Regional Water Board may assign additional monitoring, reporting, and BMP requirements upon obtaining site specific information about exceedances of the waste load allocation.

The final compliance deadline for the Lagunitas Creek Sediment TMDL is June 11, 2034. Future reissuances of this General Permit may incorporate additional or revised compliance requirements or interim targets to progress towards the required final compliance by June 11, 2034.

228 San Francisco Bay Regional Water Quality Control Board, [Lagunitas Creek Fine Sediment Reduction and Habitat Enhancement Plan](#) (March 10, 2014), <https://www.waterboards.ca.gov/sanfranciscobay/water_issues/programs/TMDLs/lagunitascrksediment/LagunitasSedimentHabitat%20StaffReportPublicReviewDraft.pdf> [as of April 28, 2022] (Lagunitas Creek Sediment TMDL)

xix. Napa River Sediment TMDL²²⁹

The San Francisco Bay Regional Water Quality Control Board adopted the Napa River Sediment TMDL on September 9, 2009, to address the impairment of Napa River due to sediment. Point sources of sediment that were identified as contributors of sediment to the watershed are associated with urban stormwater runoff, including construction stormwater runoff, and wastewater treatment plants, which are regulated by NPDES permits. Construction sites that discharge into the Napa River watershed are therefore considered Responsible Dischargers.

- Waste Load Allocation Translation

The Napa River Sediment TMDL set the sediment waste load allocation for construction stormwater runoff at 500 tons/year, which is equivalent to the current load from construction sites. Per the implementation measures of this TMDL, complying with the requirements of this General Permit is appropriate in addressing this waste load allocation.

- Compliance Actions and Schedule

Responsible Dischargers shall comply with the requirements of this General Permit upon its effective date. The Regional Water Board may assign additional monitoring, reporting, and BMP requirements upon obtaining site specific information about exceedances of the waste load allocation.

The final compliance deadline for the Napa River Sediment TMDL is September 9, 2029. Future reissuances of this General Permit may incorporate additional or revised compliance requirements or interim targets to progress towards the required final compliance by September 9, 2029.

xx. Pescadero and Butano Creek Sediment TMDL²³⁰

The San Francisco Bay Regional Water Quality Control Board adopted the Pescadero and Butano Creek Sediment TMDL on June 13, 2018, to

229 San Francisco Bay Regional Water Quality Control Board, [Napa River Sediment Reduction and Habitat Enhancement Plan](#) (September 15, 2009), <https://www.waterboards.ca.gov/rwqcb2/water_issues/programs/TMDLs/napariverse dimenttmdl.html#:~:text=The%20Napa%20River%20Sediment%20TMDL,healthy%20 fishery%20in%20this%20watershed.> [as of April 28, 2022] (Napa River Sediment TMDL)

230 San Francisco Bay Regional Water Quality Control Board, [Pescadero-Butano Watershed Sediment TMDL and Habitat Enhancement Plan](#) (December 11, 2018),

address the impairment of Pescadero and Butano Creek due to sediment. The only known point sources of sediment to the watershed are associated with stormwater runoff from state highways, municipalities, and construction sites; which are regulated by NPDES permits. Construction sites that discharge into the Pescadero-Butano Creek watershed are therefore considered Responsible Dischargers.

- Waste Load Allocation Translation

The Pescadero and Butano Creek Sediment TMDL set the sediment waste load allocation for construction stormwater runoff at 150 tons/year, which is equivalent to the current load from construction sites. Per the implementation measures of this TMDL, complying with the requirements of this General Permit is appropriate in addressing this waste load allocation.

- Compliance Actions and Schedule

Responsible Dischargers shall comply with the requirements of this General Permit upon its effective date. The Regional Water Board may assign additional monitoring, reporting, and BMP requirements upon obtaining site specific information about exceedances of the waste load allocations.

The final compliance deadline for the Pescadero and Butano Creek Sediment TMDL is June 13, 2038. Future reissuances of this General Permit may incorporate additional or revised compliance requirements or interim targets to progress towards the required final compliance by June 13, 2038.

xxi. Sonoma Creek Sediment TMDL²³¹

The San Francisco Bay Regional Water Quality Control Board adopted the Sonoma Creek Sediment TMDL on December 10, 2008, to address the impairment of Sonoma Creek due to sediment. The only known point sources of sediment to the watershed are associated with urban stormwater runoff from state highways, municipalities, industrial facilities, and construction sites; which are regulated by NPDES permits. Construction

<https://www.waterboards.ca.gov/sanfranciscobay/water_issues/programs/TMDLs/pescadero/BPA%20FINAL.pdf> [as of May 20, 2021] (Pescadero and Butano Creek Sediment TMDL)

231 San Francisco Bay Regional Water Quality Control Board, [Sonoma Creek Watershed Sediment TMDL and Habitat Enhancement Plan](#) (December 12, 2008),

<https://www.waterboards.ca.gov/rwqcb2/water_issues/programs/TMDLs/napariverse/dimenttmdl.html> [April 28, 2022] (Sonoma Creek Sediment TMDL)

sites that discharge into the Sonoma Creek watershed are therefore considered Responsible Dischargers.

- Waste Load Allocation Translation

The Sonoma Creek Sediment TMDL set the sediment waste load allocation for construction stormwater runoff at 300 tons/year, which is equivalent to the current load from construction sites. Per the implementation measures of this TMDL, complying with the requirements of this General Permit is appropriate in addressing this waste load allocation.

- Compliance Actions and Schedule

Responsible Dischargers shall comply with the requirements of this General Permit upon its effective date. The Regional Water Board may assign additional monitoring, reporting, and BMP requirements upon obtaining site specific information about exceedances of the waste load allocation.

The final compliance deadline for the Sonoma Creek Sediment TMDL is December 10, 2028. Future reissuances of this General Permit may incorporate additional or revised compliance requirements or interim targets to progress towards the required final compliance by December 10, 2028.

xxii. San Lorenzo River Sediment TMDL²³²

The Central Coast Regional Water Quality Control Board adopted the San Lorenzo River Sediment TMDL on May 16, 2003, to address the sediment related impairment of San Lorenzo River which is accelerated by anthropogenic watershed disturbances. The source analysis did not distinguish sediment loading between point and nonpoint sources, but rather assigned load allocations to water bodies within the San Lorenzo River watershed. Construction activities were included under the load allocation for Other Urban and Rural Lands sediment category. Therefore, construction sites covered under this General Permit are considered Responsible Dischargers.

232 Central Coast Regional Water Quality Control Board, [San Lorenzo River Total Maximum Daily Load and Implementation Plan for Sediment Including Carbonera Creek, Lompico Creek, and Shingle Mill Creek](#) (May 16, 2003),

<https://www.waterboards.ca.gov/centralcoast/water_issues/programs/tmdl/docs/san_lorenzo/sediment/index.html> [as of May 20, 2021] (San Lorenzo River Sediment TMDL)

- Waste Load Allocation Translation

The San Lorenzo River Sediment TMDL did not establish a waste load allocation for construction sites, as it is included in the load allocation for the Other Urban and Rural Lands sediment category as indicated in Table 44 below.

Table 44 – Other Urban and Rural Land Load Allocations for San Lorenzo River Sediment TMDL

Water Body	Allocation (tons/yr)
Carbonara Creek	2,622
Lompico Creek	965
Shingle Mill Creek	310
San Lorenzo River	43,368

Per the San Lorenzo River Sediment TMDL implementation plan, complying with the requirements of this General Permit is appropriate to meet the load allocations.

- Compliance Actions and Schedule

Responsible Dischargers shall comply with the requirements of this General Permit upon its effective date. The Regional Water Board may assign additional monitoring, reporting, and BMP requirements upon obtaining site specific information about excessive sediment loading. The final compliance deadline for the San Lorenzo River Sediment TMDL is May 16, 2028. Future reissuances of this General Permit may incorporate additional or revised compliance requirements or interim targets to progress towards the required final compliance by May 16, 2028.

xxiii. Squaw Creek Sediment TMDL²³³

The Lahontan Regional Water Quality Control Board adopted the Squaw Creek Sediment TMDL in April 2006 to address the impairment of Squaw Creek due to sediment. Accelerated hillslope erosion from land disturbances related to development in natural erosion-prone areas contribute to excess sediment delivery to the creek. Therefore, construction sites covered under this General Permit are considered Responsible Dischargers.

233 Lahontan Regional Water Quality Control Board, [Total Maximum Daily Load for Sediment, Squaw Creek, Placer County](#) (April 2006),

<https://www.waterboards.ca.gov/lahontan/water_issues/programs/tmdl/squaw_creek/docs/basin_plan_amendment_final.pdf> [as of May 20, 2021] (Squaw Creek Sediment TMDL)

EXHIBIT "C" (Stormwater Pollution Prevention Plan)

- Waste Load Allocation Translation

There are currently no NPDES-regulated point sources in the watershed; therefore, the waste load allocation is zero (0).²³⁴ Additionally, the load allocations are not viewed as appropriate for discharge specifications in permits as they are broad estimates. Based on the assumptions for assigning the requirements of this TMDL, complying with the requirements of this General Permit is appropriate in addressing this waste load allocation.

- Compliance Actions and Schedule

Responsible Dischargers shall comply with the requirements of this General Permit upon its effective date. The Regional Water Board may assign additional monitoring, reporting, and BMP requirements upon obtaining site specific information about excessive sediment loading.

The final compliance deadline for the Squaw Creek Sediment TMDL was estimated to be 20 years, or April 2026. Future reissuances of this General Permit may incorporate additional or revised compliance requirements or interim targets to progress towards the required final compliance by April 2026.

xxiv. Truckee River Sediment TMDL²³⁵

The Lahontan Regional Water Quality Control Board adopted the Truckee River Sediment TMDL in May 2008 to address the impairment of the Middle Truckee River Watershed due to sediment discharges during high-flow events such as those caused by thunderstorms. Primary sources of sediment include runoff from urban areas, dirt roads, legacy erosion sites, and graded ski runs. Although not explicitly stated, construction sites within urban areas or that utilize dirt roads, covered under this General Permit, can contribute to sediment loading in the Truckee River watershed and are therefore considered Responsible Dischargers.

- Waste Load Allocation Translation

This TMDL set a total waste load allocation for all sediment point sources at 4,936 tons/yr. The source analysis did not attempt to distinguish sediment loading at the scale of specific land ownerships.

234 Squaw Creek Sediment TMDL, p. 2.

235 Lahontan Regional Water Quality Control Board, [Total Maximum Daily Load for Sediment Middle Truckee River Watershed](https://www.waterboards.ca.gov/lahontan/water_issues/programs/tmdl/truckee/docs/adopted_basinplan_amendment.pdf) (May 2008), <https://www.waterboards.ca.gov/lahontan/water_issues/programs/tmdl/truckee/docs/adopted_basinplan_amendment.pdf> [as of May 20, 2021] (Truckee River Sediment TMDL)

NPDES-regulated point sources are expected to achieve compliance through the requirements of their respective NPDES permits. Per the implementation plan of the Truckee River Sediment TMDL, compliance with this General Permit is appropriate in addressing this waste load allocation.

- Compliance Actions and Schedule

Responsible Dischargers shall comply with the requirements of this General Permit upon its effective date. The Regional Water Board may assign additional monitoring, reporting, and BMP requirements upon obtaining site specific information about excessive sediment loading.

The final compliance deadline for the Truckee River Sediment TMDL was estimated to be 20 years, or May 2028. Future reissuances of this General Permit may incorporate additional or revised compliance requirements or interim targets to progress towards the required final compliance by May 2028.

xxv. San Diego Creek and Newport Bay Sediment TMDL²³⁶

The Santa Ana Regional Water Quality Control Board adopted the San Diego Creek and Newport Bay Sediment TMDL on April 16, 1999, to address the erosion in the San Diego Creek watershed and resultant siltation in Newport Bay. Anthropogenic activities such as extensive grading for development and increased runoff due to urbanization contribute to sediment loading in this watershed. Construction sites covered under this General Permit are considered Responsible Dischargers for this TMDL.

- Load Allocation Translation

The San Diego Creek and Newport Bay Sediment TMDL assigns a load allocation of 13,000 tons/yr to construction sites that discharge to Newport Bay and 13,000 tons/yr to construction sites that discharge into the San Diego Creek watershed. The load allocations are shared amongst all construction sites within the Newport Bay/San Diego Creek watershed and are implemented as a 10-year running annual average. The primary implementation measure for this TMDL is complying with the requirements of this General Permit which is expected to be appropriate to address this load allocation.

236 Santa Ana Regional Water Quality Control Board, [Basin Plan Amendment Total Maximum Daily Load for Sediment in the Newport Bay/San Diego Creek Watershed](#) (April 16, 1999)

<https://www.waterboards.ca.gov/santaana/water_issues/programs/tmdl/docs/tmdl02.pdf> [as of May 20, 2021] (San Diego Creek and Newport Bay Sediment TMDL)

Responsible Dischargers shall comply with the requirements of this General Permit upon its effective date. The Regional Water Board may assign additional monitoring, reporting, and BMP requirements upon obtaining site specific information about excessive sediment loading.

The San Diego Creek and Newport Bay Sediment TMDL does not include a deadline to achieve compliance. Therefore, Responsible Dischargers are required to comply with this TMDL upon the effective date of this General Permit.

xxvi. Los Peñasquitos Lagoon Sediment TMDL²³⁷

The San Diego Regional Water Quality Control Board adopted the Los Peñasquitos Lagoon Sediment TMDL on June 13, 2012, to address the impairment of Los Peñasquitos Lagoon due to sediment.

The watershed sources of sediment consist of point and non-point source discharges in the watershed draining into Los Peñasquitos Lagoon. Anthropogenic activities such as land development exacerbate erosive processes by exposing sediment and creating more impervious surfaces which increases the velocity and volume of runoff. The Los Peñasquitos Lagoon Sediment TMDL identifies construction stormwater discharges as contributing sediment to the Lagoon and are therefore considered Responsible Dischargers.²³⁸ According to the Los Peñasquitos Lagoon Sediment TMDL staff report, the potential contribution of pollutant loadings from construction stormwater is low because non-stormwater discharges are prohibited or authorized under strict permit circumstances.²³⁹

- Waste Load Allocation Translation

The Los Peñasquitos Lagoon Sediment TMDL assigns a final waste load allocation of 2,580 tons/year to the combined responsible parties for discharges into the Los Peñasquitos Lagoon Watershed.²⁴⁰ Responsible

237 San Diego Regional Water Quality Control Board, [Amendment to the Water Quality Control Plan for the San Diego Basin \(9\) to Incorporate the Sediment Total Maximum Daily Load \(TMDL\) for Los Peñasquitos Lagoon](https://www.waterboards.ca.gov/sandiego/board_decisions/adopted_orders/2012/R9-2012-0033_Attach_A.pdf) (June 13, 2012) <https://www.waterboards.ca.gov/sandiego/board_decisions/adopted_orders/2012/R9-2012-0033_Attach_A.pdf> [as of May 20, 2021] (Los Peñasquitos Lagoon Sediment TMDL)

238 Los Peñasquitos Lagoon Sediment TMDL, p. A-5.

239 San Diego Regional Water Quality Control Board, [Sediment TMDL for Los Peñasquitos Lagoon Staff Report](https://www.waterboards.ca.gov/sandiego/water_issues/programs/tmdls/docs/los_peñasquitos_lagoon/updates071212/Staff_Report.pdf) (June 13, 2012), <https://www.waterboards.ca.gov/sandiego/water_issues/programs/tmdls/docs/los_peñasquitos_lagoon/updates071212/Staff_Report.pdf> [as of May 20, 2021]

240 Los Peñasquitos Lagoon Sediment TMDL, p. A-6.

parties include: Phase I Municipal Separate Storm Sewer Systems (MS4s) co-permittees (the County of San Diego, City of San Diego, City of Del Mar, and City of Poway), Phase II MS4 permittees, the California Department of Transportation, and general construction and industrial stormwater NPDES permittees. The Phase I MS4 co-permittees and the California Department of Transportation are responsible for assuming the lead role in coordinating and carrying out the necessary actions, compliance monitoring requirements, and successful implementation of the adaptive management framework required as part of this TMDL. Responsible Dischargers are expected to cooperate with all responsible parties to reduce their collective sediment load.

Responsible Dischargers are required to monitor sediment discharges from their sites to demonstrate progress towards compliance with final waste load allocations.²⁴¹ Monitoring flow rates for construction stormwater discharges is not required for all dischargers in this General Permit and is specific to Responsible Dischargers located in the Los Peñasquitos Lagoon Watershed to assess the correlation between flow and sediment deposition in this water body.

- Compliance Actions and Schedule

Responsible Dischargers shall comply with the requirements of this General Permit and are required to provide an estimate of a representative flow rate from their construction site for at least one precipitation event that generates discharge within the reporting year. Monitoring flow rate values should be consistent with the monitoring, calculation, and reporting methods and framework used by the Phase I MS4 co-permittees. Responsible Dischargers shall submit the representative flow estimate as a PDF attachment to the Annual Report required in this General Permit.²⁴² The Regional Water Board may assign additional monitoring, reporting, and BMP requirements upon obtaining site specific information about exceedances of the waste load allocations.

Compliance actions will be required upon the effective date of this General Permit. The final compliance deadline for the Los Peñasquitos Lagoon TMDL is July 14, 2034. Future reissuances of this General Permit may incorporate additional or revised compliance requirements or

241 Los Peñasquitos Lagoon Sediment TMDL, p. A-8.

242 Unless another alternative electronic method in SMARTS is provided by the Water Boards.

interim targets to progress towards the required final compliance by July 14, 2034.

f. Temperature TMDLs

Seven Temperature TMDLs, established by the U.S. EPA, are applicable to construction stormwater dischargers. These include the Temperature TMDLs for the Mattole River,²⁴³ Navarro River,²⁴⁴ Scott River²⁴⁵ and the Lower Main,²⁴⁶ Middle Main,²⁴⁷ North Fork,²⁴⁸ and Upper Main²⁴⁹ extents of the Eel River.

243 United States Environmental Protection Agency Region IX, [Mattole River TMDL for Sediment and Temperature](#) (December 30, 2002), <https://www.waterboards.ca.gov/northcoast/water_issues/programs/tmdls/mattole_river/110707/mattole.pdf> [as of May 20, 2021] (Mattole River Temperature TMDL)

244 United States Environmental Protection Agency Region IX, [Navarro River TMDL for Sediment and Temperature](#) (November 2004), <https://www.waterboards.ca.gov/northcoast/water_issues/programs/tmdls/navarro_river/110708/navarro.pdf> [as of May 20, 2021] (Navarro River Temperature TMDL)

245 North Coast Regional Water Quality Control Board, [Scott River TMDL](#) (June 2018), Ch. 4, p. 65, <https://www.waterboards.ca.gov/northcoast/water_issues/programs/tmdls/scott_river> [as of April 28, 2022] (Scott River Temperature TMDL)

246 United States Environmental Protection Agency Region IX, [Lower Eel River Total Maximum Daily Loads for Temperature and Sediment](#) (December 18, 2007) <https://www.waterboards.ca.gov/northcoast/water_issues/programs/tmdls/eel_river_lower/pdf/LER-TMDL-final-121807-signed.pdf> [as of April 28, 2022] (Eel River – Lower Main Temperature TMDL)

247 United States Environmental Protection Agency Region IX, [Final Middle Main Eel River and Tributaries \(from Dos Rios to the South Fork\) Total Maximum Daily Loads for Temperature and Sediment](#) (December 31, 2005) <https://www.waterboards.ca.gov/northcoast/water_issues/programs/tmdls/eel_river_middle_main/pdf/mainmdl-eel-final.pdf> [April 28, 2022] (Eel River – Middle Main Temperature TMDL)

248 United States Environmental Protection Agency Region IX, [North Fork Eel River Total Maximum Daily Loads for Sediment and Temperature](#) (December 30, 2002) <https://www.waterboards.ca.gov/northcoast/water_issues/programs/tmdls/eel_river_north_fork/pdf/final.pdf> [as of April 28, 2022] (Eel River – North Fork Temperature TMDL)

249 United States Environmental Protection Agency Region IX, [Final Upper Main Eel River and Tributaries \(including Tomki Creek, Outlet Creek and Lake Pillsbury\) Total Maximum Daily Loads for Temperature and Sediment](#) (December 29, 2004) <https://www.waterboards.ca.gov/northcoast/water_issues/programs/tmdls/eel_river_upper_main/pdf/uer-tmdl-final-12-28.pdf> [as of April 28, 2022] (Eel River – Upper Main Temperature TMDL)

EXHIBIT "C" (Stormwater Pollution Prevention Plan)

Stream temperature is a critical physical characteristic of aquatic habitats that directly impacts salmonid species. Metabolism, food requirements, growth rates, timing of adult migration upstream, timing of juvenile migration downstream, and sensitivity to diseases are all affected by stream temperature. Although stream temperatures in Northern California naturally provide a wide range of summer conditions for rearing salmonids, the removal of riparian vegetation from road building and urbanization are amongst the sources observed to increase stream temperatures. Excessive sediment input also raises stream temperature by widening stream channels, filling pools, and eliminating riparian vegetation during flood events.²⁵⁰

The requirements set forth in these TMDLs apply to all point sources within the watersheds of these water bodies, which was assumed to include construction stormwater discharges. Therefore, dischargers covered under this General Permit are considered Responsible Dischargers for the Temperature TMDLs.

The Temperature TMDLs for the Klamath River, Shasta River, and the Middle Fork of the Eel River were not translated for this General Permit. These TMDLs had no known point sources that increase stream temperature and therefore did not assign any waste load allocations.

- Waste Load Allocation Translation

The Temperature TMDLs define the waste load allocations in two different ways:

1. The TMDL for the Lower Main Eel River assigns a waste load allocation of “zero (0) net increase in receiving water temperature” to construction sites subject to this General Permit.
2. The TMDLs for the Mattole River, Navarro River, Scott River and the Middle Main, North Fork, and Upper Main extents of the Eel River set the waste load allocation at zero (0), as no point sources are considered to contribute to the total loading of the respective water bodies.

The two waste load allocation definitions will be translated similarly and require that the Responsible Dischargers do not produce discharges that result in elevated stream temperatures.

The implementation requirements for the Temperature TMDLs in this General Permit are based on the Temperature Implementation Policy adopted by the North Coast Regional Water Quality Control Board on March 13, 2014. The North Coast Temperature Implementation Policy requires the use of existing permitting and enforcement tools such as NPDES permits to pursue compliance with the water quality objectives for temperature.

Additionally, the Temperature Implementation Policy²⁵¹ relies on the Sediment TMDL Implementation Policy²⁵² as a means of addressing elevated water temperatures associated with excess sediment discharges.²⁵³ The effective implementation of erosion and sediment controls, as well as meeting post-construction standards, required by this General Permit are expected to achieve the waste load allocation. Therefore, complying with the requirements of this General Permit is consistent with the assumptions and requirements of the Temperature and Sediment TMDL Implementation Policies.

- Compliance Actions and Schedule

Compliance with this General Permit's requirements is consistent with the assumptions and requirements of the Temperature Implementation Policy and is sufficient to achieve the assigned waste load allocation. Responsible Dischargers that implement BMPs specific to preventing or controlling stormwater exposure with sediment and comply with post-construction standards are expected to meet the assigned waste load allocation. If a BMP is observed failing, the Responsible Discharger shall evaluate the BMPs being used and implement a strategy in the site's SWPPP to prevent potential exceedances of the waste load allocation in the future. The Regional Water Quality Control Boards may assign additional monitoring, reporting, and BMP requirements upon obtaining site-specific information about exceedances of the waste load allocation.

The North Coast Temperature Implementation Policy does not include an implementation deadline for Temperature TMDLs. Therefore, Responsible Dischargers are required to comply with the Temperature TMDLs upon the effective date of this General Permit, as listed in Table H-2 of Attachment H.

251 North Coast Regional Water Quality Control Board, [Policy for the Implementation of the Water Quality Objectives for Temperature](https://www.waterboards.ca.gov/northcoast/water_issues/programs/basin_plan/temperature_amendment/) (March 13, 2014), <https://www.waterboards.ca.gov/northcoast/water_issues/programs/basin_plan/temperature_amendment/> [as of May 20, 2021], (North Coast Temperature Implementation Policy)

252 North Coast Regional Water Quality Control Board, [Total Maximum Daily Load Implementation Policy Statement for Sediment-Impaired Receiving Waters in the North Coast Region](https://www.waterboards.ca.gov/northcoast/water_issues/programs/tmdls/sediment_tmdl_implementation/) (November 29, 2004), <https://www.waterboards.ca.gov/northcoast/water_issues/programs/tmdls/sediment_tmdl_implementation/> [as of May 20, 2021] (North Coast Sediment TMDL Implementation Policy)

253 North Coast Temperature Implementation Policy, p.4.200.

g. Metals and Toxics TMDLs

Seventeen (17) Metals and/or Toxics TMDLs are translated for this General Permit. Metals can be toxic to aquatic life and cause impairments of beneficial uses within water bodies. Many of the artificial surfaces of the urban environment (e.g., galvanized metal, paint, automobiles, or preserved wood) contain metals, which enter stormwater as the surfaces corrode, flake, dissolve, decay, or leach.²⁵⁴

Other toxic pollutants in stormwater include organochlorine (OC) pesticides (chlordane, DDD, DDE, DDT, dieldrin, and toxaphene), polycyclic aromatic hydrocarbons (PAHs), and polychlorinated biphenyls (PCBs), which can contribute to the impairment of beneficial uses within water bodies. The use of these pollutants has been banned for many years because of potential human health and environmental harm, however, the physio-chemical properties of the pollutants allow them to persist in the environment, bioaccumulate through the food web, and pose risks to aquatic life, wildlife, and human health.

The primary transport mechanism for the metals and toxics is the mobilization of fine sediment via stormwater and authorized NSWDS. OC pesticides, PAHs, PCBs, and metals have an affinity for organic matter and will partition from water and sorb to organic substances such as sediment. Sediment and particulates transported through construction stormwater discharges eventually settle in the bed of the receiving water.

Some of the TMDLs addressed in this Section have receiving water sediment numeric targets translated to dry-weight sediment concentration waste load allocations to be met by Responsible Dischargers at the site's discharge location(s). The sediment targets address receiving waterbed-toxicity. Because these TMDLs associate receiving waterbed-toxicity targets to discharges of metals, OC pesticides, PAHs, and PCBs bound to sediment particulates, these TMDLs are addressed by implementing sediment control measures so that sediment-bound particulates do not leave a construction site's area and settle in the receiving waterbed via stormwater discharges and authorized NSWDS.

This General Permit currently requires implementation of site-specific erosion and sediment controls to minimize sediment in construction runoff. The site-specific erosion control requirements address erosion in downstream channels and banks, upgradient run-on flow diversion conveyances, and cut and fill slopes.

254 CASQA, [California Stormwater Best Management Practice Handbook: Construction](https://www.casqa.org/resources/bmp-handbooks/construction) (July 2015). <<https://www.casqa.org/resources/bmp-handbooks/construction>>. [as of May 20, 2021]. (CASQA Construction BMP Handbook).

In addition, Responsible Dischargers with the potential to discharge into a TMDL watershed, water body, or reach are required to install erosion controls that will result in predicted erosion rates that are as protective as pre-construction conditions (e.g., undisturbed vegetation for the area) for each phase of the construction project. The Responsible Discharger shall use RUSLE2 to calculate the predicted erosion rates, as described in Attachment H.

Sediment produced by erosion occurring in channels is not estimated by RUSLE2²⁵⁵. This General Permit controls channel erosion by requiring engineered conveyance of up gradient run-on water, channel and streambank erosion control, and peak flowrate and volume controls.

Other TMDLs addressed in this Section assign waste load allocations to Responsible Dischargers in one of the following ways:

- A fixed concentration-based waste load allocation as a solution of effluent, where a concentration-based waste load allocation is assigned directly to Responsible Dischargers at the point of discharge;
- A fixed concentration-based waste load allocation as dry-weight sediment, where a concentration-based waste load allocation is assigned directly to Responsible Dischargers at the point of discharge;
- A hardness-based floating concentration waste load allocation, where the waste load allocation is hardness dependent on receiving water; or
- A waste load allocation that assigned both a mass-based waste load allocation and a concentration-based waste load allocation

Concentration-based waste load allocations, where applicable, were translated into numeric action levels or numeric effluent limitations for Responsible Dischargers to comply with.

i. Ballona Creek Metals TMDL²⁵⁶

The Los Angeles Water Quality Control Board (Los Angeles Regional Water Quality Control Board) adopted the Ballona Creek Metals TMDL on

255 USDA-Agricultural Research Service, [DRAFT User's Reference Guide Revised Universal Soil Loss Equation Version 2](http://fargo.nserl.purdue.edu/rusle2_dataweb/userguide/RUSLE2_User_Ref_Guide_2008.pdf) (May 2008), p. 22-23
<http://fargo.nserl.purdue.edu/rusle2_dataweb/userguide/RUSLE2_User_Ref_Guide_2008.pdf> [as of May 20, 2021]

256 Los Angeles Regional Water Quality Control Board, [Proposed Amendment to the Water Quality Control Plan – Los Angeles Region to incorporate the Ballona Creek Metals TMDL](https://www.waterboards.ca.gov/losangeles/water_issues/programs/tmdl/docs/Ballona20Metals/R13-010M_RB_BPA.pdf)
<https://www.waterboards.ca.gov/losangeles/water_issues/programs/tmdl/docs/Ballona20Metals/R13-010M_RB_BPA.pdf> [as of April 28, 2022] (Ballona Creek Metals TMDL)

September 6, 2007, to address the impairment of Ballona Creek and Sepulveda Canyon Channel due to copper, lead, and zinc.

- Source Analysis

Storm drains convey a large percentage of metals loadings during dry weather. During wet weather, most of the metals loadings in Ballona Creek are in particulate form and are associated with wet-weather storm flows.²⁵⁷

- Waste Load Allocation Translation

- 1) Dry-Weather Waste Load Allocation

The Ballona Creek Metals TMDL assigns a dry-weather waste load allocation of zero (0) for Responsible Dischargers. Non-Stormwater Discharges (NSWDs) are authorized in this General Permit if Order, Section IV.A terms and conditions are met to control the discharge of pollutants from the construction site. Order, Section IV.B prohibits all NSWDs not authorized under Order, Section IV.A; therefore, all unauthorized NSWDs must be either eliminated or have regulatory coverage under a separate NPDES permit. Authorized NSWDs, as defined in this General Permit, are authorized because these discharges do not comingle with stormwater associated with construction activity. The Regional Water Board may impose additional requirements on NSWDs if deemed necessary per site-specific analysis.

- 2) Wet-Weather Waste Load Allocations

The Ballona Creek Metals TMDL assigns mass-based waste load allocations per construction area in grams per day per acre (g/day/acre) for copper, lead, and zinc. The waste load allocations for metals are shown in Table 45 below.

Table 45 – Ballona Creek and Sepulveda Channel Waste Load Allocations

Pollutant	Waste Load Allocation (g/day/acre)
Copper	$1.673 \times 10^{-10} \times \text{Daily storm volume (L)}$
Lead	$9.369 \times 10^{-10} \times \text{Daily storm volume (L)}$
Zinc	$1.279 \times 10^{-9} \times \text{Daily storm volume (L)}$

Directly implementing the copper, lead, and zinc waste load allocations will result in a unique mass load for each Responsible Discharger dependent on the area of the construction site. Requiring

Responsible Dischargers to calculate the construction site's specific mass loading of a pollutant(s) would be impractical, costly, and not aligned with the requirements of this General Permit. However, as mentioned in the source analysis, most metal loadings in this watershed are in particulate form and associated with wet-weather flows. Therefore, the following will address this TMDL:

- a) Comply with the site-specific erosion and sediment control, and post-construction requirements in this General Permit.
- b) For each phase of the construction project, install erosion controls that will result in predicted erosion rates that are as protective as pre-construction (e.g., undisturbed vegetation for the area) conditions. Calculate the predicted erosion rates by using RUSLE2 modeling as described in Attachment H.

- Compliance Actions and Schedule

Responsible Dischargers shall comply with the requirements of this General Permit. Responsible Dischargers that identify on-site sources of the copper, lead, and zinc, through the required pollutant source assessment, are to implement BMPs specific to preventing or controlling stormwater exposure to the identified metals. Furthermore, Responsible Dischargers are to comply with the RUSLE2 modeling requirements in Attachment H, Section I.G.2.

The TMDL's final compliance deadline was January 11, 2015. Since this compliance deadline has passed, the Responsible Dischargers shall comply with the requirements of this General Permit and the RUSLE2 modeling requirements in Attachment H, Section I.G.2, upon the effective date of this General Permit.

- ii. Ballona Creek Estuary Toxics TMDL²⁵⁸

The Los Angeles Regional Board adopted the Ballona Creek Estuary Toxics TMDL on July 7, 2005, to address the impairment of Ballona Creek and Ballona Creek Estuary (Ballona Watershed) due to cadmium, chlordane, copper, DDT, lead, polychlorinated biphenyls (PCBs), polyaromatic hydrocarbons (PAHs), silver, toxicity in sediment, and zinc. Chlordane and DDT are organochlorine (OC) pesticides. The Ballona Creek Estuary Toxics

258 Los Angeles Regional Water Quality Control Board, [Proposed Amendment to the Water Quality Control Plan – Los Angeles Region to incorporate the Ballona Creek Estuary Toxic Pollutants TMDL](#)

<https://www.waterboards.ca.gov/losangeles/water_issues/programs/tmdl/docs/Ballona%20Toxics/R13-010T_RB_BPA.pdf> [as of May 20, 2021] (Ballona Creek Estuary Toxics TMDL)

does not include a TMDL for PAHs because recent data does not show PAH levels exceeding the numeric targets.²⁵⁹

- Source Analysis

The Ballona Creek Estuary Toxics TMDL identifies urban stormwater as a substantial source of metals and the most prevalent metals in urban stormwater are consistently associated with particulates. As a result, metals have the potential to accumulate in estuarine sediments where they may pose a toxicity risk. A majority of organic constituents in stormwater such as PAHs, phthalates, and OC compounds are also associated with particulates.²⁶⁰

- Waste Load Allocation Translation

The Ballona Creek Estuary Toxics TMDL assigns grouped mass-based waste load allocations per construction area in grams per year per acre (g/yr/ac) for cadmium, chlordane, copper, DDT, lead, PAHs, PCBs, silver, toxicity in sediment, and zinc. The waste load allocations for are shown in Table 46 below.

Table 46 – Ballona Creek Estuary Waste Load Allocations

Pollutant	Waste Load Allocation (g/yr/ac)
Cadmium	0.1
Copper	3
Lead	4
Silver	0.1
Zinc	13
Chlordane	0.00011
DDTs	0.00016
Total PCBs	0.00028

Directly implementing the waste load allocations will result in a unique mass load for each Responsible Discharger dependent on the area of construction site. Requiring Responsible Dischargers to calculate the construction site’s specific mass loading of a pollutant(s) would be impractical, costly, and not aligned with the requirements of this General Permit. However, as mentioned in the source analysis, most metal and toxic pollutant loadings in this watershed are in particulate form and associated with wet-weather flows. Therefore, the following will address this TMDL:

²⁵⁹ Ballona Creek Estuary Toxics TMDL, p. 2.

²⁶⁰ Ballona Creek Estuary Toxics TMDL, p. 3.

- 1) Comply with the site-specific erosion and sediment control, and post-construction requirements in this General Permit.
 - 2) For each phase of the construction project, install erosion controls that will result in predicted erosion rates that are as protective as pre-construction (e.g., undisturbed vegetation for the area) conditions. Calculate the predicted erosion rates by using RUSLE2 modeling as described in Attachment H.
- Compliance Actions and Schedule

Responsible Dischargers shall comply with the requirements of this General Permit. Responsible Dischargers that identify on-site sources of the metals and toxic pollutants, through the required pollutant source assessment, are to implement BMPs specific to preventing or controlling stormwater exposure to the identified metals and toxic pollutants. Furthermore, Responsible Dischargers are to comply with the RUSLE2 modeling requirements in Attachment H, Section I.G.2.

The TMDL's final compliance deadline was January 11, 2015. Since this compliance deadline has passed, the Responsible Dischargers shall comply with the requirements of this General Permit and the RUSLE2 modeling requirements in Attachment H, Section I.G.2, upon the effective date of this General Permit.

iii. Calleguas Creek Metals and Selenium TMDL²⁶¹

The Los Angeles Water Quality Control Board (Los Angeles Water Board) adopted the Calleguas Creek Metals and Selenium TMDL on October 13, 2016, to address the impairment of Calleguas Creek, Mugu Lagoon, and Revolon Slough due to copper, mercury, nickel, and selenium.

- Source Analysis

The significant sources of metals and selenium in the watershed include urban runoff, agricultural runoff, POTW effluent, and groundwater. Open space was also a significant source for mercury. Higher loads were delivered during wet weather for all constituents due to the association between metals and particulate matter. The source analysis indicates that naturally occurring metals and selenium may be contributing sources in soil. The Calleguas Creek Metals and Selenium

261 Los Angeles Regional Water Quality Control Board, [Total Maximum Daily Load for Metals and Selenium in the Calleguas Creek, its Tributaries and Mugu Lagoon](https://www.waterboards.ca.gov/losangeles/water_issues/programs/tmdl/docs/R16-007_RB_BPA.pdf) <https://www.waterboards.ca.gov/losangeles/water_issues/programs/tmdl/docs/R16-007_RB_BPA.pdf> [as of May 20, 2021] Calleguas Creek Metals and Selenium TMDL)

TMDL includes plans for special studies to further assess natural sources of metals in soil.²⁶²

- Waste Load Allocation Translation

- 1) Dry-weather Waste Load Allocations

The Calleguas Creek Metals and Selenium TMDL assigns concentration-based waste load allocations for dry-weather. Non-Stormwater Discharges (NSWDs) are authorized in this General Permit if Order, Section IV.A terms and conditions are met to control the discharge of pollutants from the construction site. Order, Section IV.B prohibits all NSWDs not authorized under Order, Section IV.A; therefore, all unauthorized NSWDs must be either eliminated or have regulatory coverage under a separate NPDES permit. Authorized NSWDs, as defined in this General Permit, are authorized because these discharges do not commingle with stormwater associated with construction activity. The Regional Water Board may impose additional requirements on NSWDs if deemed necessary per site-specific analysis.

- 2) Wet-weather Interim Waste Load Allocations for Copper

The Calleguas Creek Metals and Selenium TMDL assigns an interim concentration-based wet-weather waste load allocation for copper to “Permitted Stormwater Dischargers (PSDs)” to be met at the receiving water. Responsible Dischargers are identified as a PSDs as defined in the Calleguas Creek Metals and Selenium TMDL.²⁶³ The interim wet daily maximum concentration-based waste load allocation will be translated into a numeric action level for Responsible Dischargers until the final waste load allocations apply. The interim waste load allocations were translated into numeric action levels as shown in Table 47 below. The numeric action levels are in mg/L to be consistent with the reporting units in SMARTS.

Table 47 – Calleguas Creek, Conejo Creek, and Revolon Slough Interim Wet-Weather Waste Load Allocations

Water body	Waste Load Allocation for Copper (ug/L)	Total Copper Numeric Action Level (mg/L)
Calleguas and Conejo Creek	204	0.204
Revolon Slough	204	0.204

²⁶² Calleguas Creek Metals and Selenium TMDL, p. 4, p. 13.

²⁶³ Calleguas Creek Metals and Selenium TMDL, p. 19.

3) Wet-weather Final Waste Load Allocations Copper, Nickel, and Selenium

The Calleguas Creek Metals and Selenium TMDL assigns a final mass-based wet-weather waste load allocations for copper, nickel, and selenium in pounds per day to “Permitted Stormwater Dischargers (PSDs)” to be met in the water column of Calleguas Creek or Revolon Slough. The waste load allocation for copper, nickel, and selenium are shown in Table 48 below.

Table 48 – Calleguas Creek, Conejo Creek, and Revolon Slough Interim Wet-Weather Waste Load Allocations

Pollutant	Waste Load Allocation for Calleguas Creek and Conejo Creek (lbs/d)	Waste Load Allocation for Revolon Slough (lbs/d)
Copper*	$(0.00054*Q^2+0.032*Q - 0.17)*WER - 0.06$	$(0.0002*Q^2+0.0005*Q)*WER$
Nickel**	$0.014*Q^2+0.82*Q$	$0.027*Q^2+0.47*Q$
Selenium**	(a)	$0.027*Q^2+0.47*Q$

*The approved site-specific WER of 1.51 for Mugu Lagoon is used to calculate the assigned waste load allocations for discharges to Calleguas and Conejo Creek to ensure the downstream standard is achieved. Permitted stormwater dischargers may apply a WER of up to 3.69 for discharges to upstream reaches, with the exception of Reaches 4 and 5, to calculate the assigned waste load allocations. If a WER of greater than 1.51 is applied, permitted stormwater dischargers shall be required to provide detailed quantitative analysis to demonstrate that the waste load allocations as modified by the WER are protective of downstream reaches. No site specific WER for Revolon Slough was approved so default WER value of 1 is applied. Regardless of the final WERs, total copper loading shall not exceed current loading.

**Current loads do not exceed loading capacity during wet weather. Sum of all loads cannot exceed loads presented in the table. Q: Daily storm volume (cfs). (a) Selenium allocations have not been developed for this reach as it is not on the 303(d) list.

Directly implementing the final copper, nickel, and selenium waste load allocations will result in a unique mass load for each Responsible Discharger dependent on the daily stormwater flows and area of construction site. Requiring Responsible Dischargers to calculate the construction site’s specific mass loading of a pollutant(s) would be impractical, costly, and not aligned with the requirements of this General Permit. However, as mentioned in the source analysis, most metal loadings in this watershed are in particulate form and associated with wet-weather flows. Therefore, the following will address this TMDL:

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- a) Comply with the site-specific erosion and sediment control, and post-construction requirements in this General Permit.
 - b) For each phase of the construction project, install erosion controls that will result in predicted erosion rates that are as protective as pre-construction (e.g., undisturbed vegetation for the area) conditions. Calculate the predicted erosion rates by using RUSLE2 modeling as described in Attachment H.
- 4) Wet-weather Interim Limits and Final Waste Load Allocations for Mercury

The Calleguas Creek Metals and Selenium TMDL assigns mass-based interim and final waste load allocations for mercury pounds per year (lbs/yr) to “Permitted Stormwater Dischargers (PSDs)” to be met at the receiving water. The waste load allocations for mercury are shown in Table 49 below.

Table 49 – Interim Limits and Final Waste Load Allocations for Mercury in Suspended Sediment for Calleguas Creek and Revolon Slough

Flow Range	Calleguas Creek Interim (lb/yr)	Calleguas Creek Final (lb/yr)	Revolon Slough Interim (lb/yr)	Revolon Slough Final (lb/yr)
0-15,000 Million Gallons per Year	3.3	0.4	1.7	0.1
15,000-25,000 Million Gallons per Year	10.5	1.6	4	0.7
Above 25,000 Million Gallons per Year	64.6	9.3	10.2	1.8

Directly implementing the copper and nickel waste load allocations will result in a unique mass load for each Responsible Discharger dependent on the range of stormwater flows and area of construction site. Requiring Responsible Dischargers to calculate the construction site’s specific mass loading of a pollutant(s) would be impractical, costly, and not aligned with the requirements of this General Permit. However, as mentioned in the source analysis, most metal loadings in this watershed are in particulate form and associated with wet-weather flows. Therefore, the following will address this TMDL:

- a) Comply with the site-specific erosion and sediment control, and post-construction requirements in this General Permit.

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b) For each phase of the construction project, install erosion controls that will result in predicted erosion rates that are as protective as pre-construction (e.g., undisturbed vegetation for the area) conditions. Calculate the predicted erosion rates by using RUSLE2 modeling as described in Attachment H.

- Compliance Actions and Schedule

The TMDL's interim compliance deadline was March 27, 2007. Since this compliance deadline has passed, the interim waste load allocations shall be met by the effective date of this General Permit. Responsible Dischargers shall comply with the requirements of this General Permit. Responsible Dischargers shall compare all non-visible sampling and analytical results to the numeric action level for copper. If an exceedance or failure of a BMP is observed, the Responsible Discharger shall evaluate the BMPs being used and identify and implement a strategy in the site's SWPPP to prevent potential exceedances of the waste load allocations in the future. Responsible Dischargers that perform the required pollutant source assessment and implement BMPs specific to preventing or controlling stormwater exposure to copper, nickel, selenium, and mercury sources are expected to meet the assigned waste load allocations.

The TMDL's final compliance deadline was March 27, 2022. Since this compliance deadline has passed, the Responsible Dischargers shall comply with the erosion and sediment control requirements of this General Permit and RUSLE2 modeling requirements in Attachment H, Section I.G.2, upon the effective date of this General Permit.

iv. Calleguas Creek OC Pesticide and PCBs TMDL²⁶⁴

The Los Angeles Regional Water Quality Control Board adopted the Calleguas Creek OC Pesticide and PCBs TMDL on June 9, 2006, to address the impairment of Calleguas Creek Watershed due to organochlorine (OC) pesticides and polychlorinated biphenyls (PCBs). Eleven of fourteen reaches in the watershed are identified as impaired for these toxic pollutants on the 2002 303(d) list.

264 Los Angeles Regional Water Quality Control Board, [Total Maximum Daily Loads \(TMDLs\) for Organochlorine \(OC\) Pesticides, Polychlorinated Biphenyls \(PCBs\) and Siltation in Calleguas Creek, its Tributaries, and Mugu Lagoon](https://www.waterboards.ca.gov/losangeles/water_issues/programs/tmdl/docs/2005-010_RB_BPA.pdf) (July 7, 2005), <https://www.waterboards.ca.gov/losangeles/water_issues/programs/tmdl/docs/2005-010_RB_BPA.pdf> [as of May 20, 2021] (Calleguas Creek OC Pesticides and PCBs TMDL)

- Source Analysis

The largest sources of OC pesticides and PCBs in the watershed were estimated to be agricultural runoff and residues from past uses, respectively. Urban runoff is considered a minor source of OC pesticides and PCBs. Both impairing contaminants are known to bind to sediments and fine particles, which are transported to the watershed through runoff and erosion.

- Waste Load Allocation Translation

The Calleguas Creek OC Pesticide and PCBs TMDL assigns interim and final waste load allocations for pollutants in sediment for stormwater permittees, shown in Table 50 and Table 51 below. Although not specifically identified in the TMDL, waste load allocations were interpreted as applicable to construction stormwater dischargers due to the sediment and erosion intensive activities associated with construction. Therefore, construction stormwater dischargers are considered Responsible Dischargers for the Calleguas Creek OC Pesticide and PCBs TMDL.

Table 50 – Interim Sediment Waste Load Allocations (ng/g) for Stormwater Permittees

Constituent	Mugu Lagoon*	Calleguas Creek	Revolon Slough	Arroyo Las Posas	Arroyo Simi	Conejo Creek
Chlordane	3.3	3.3	0.9	3.3	3.3	3.3
4,4-DDD	2.0	2.0	2.0	2.0	2.0	2.0
4,4-DDE	2.2	1.4	1.4	1.4	1.4	1.4
4,4-DDT	0.3	0.3	0.3	0.3	0.3	0.3
Dieldrin	4.3	0.2	0.1	0.2	0.2	0.2
PCBs	180.0	120.0	130.0	120.0	120.0	120.0
Toxaphene	360.0	0.6	1.0	0.6	0.6	0.6

* Mugu Lagoon subwatershed includes Duck Pond/Agricultural Drain/Mugu/Oxnard Drain #2

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Table 51 – Final Sediment Waste Load Allocations (ng/g) for Stormwater Permittees

Constituent	Mugu Lagoon*	Calleguas Creek	Revolon Slough	Arroyo Las Posas	Arroyo Simi	Conejo Creek
Chlordane	3.3	3.3	0.9	3.3	3.3	3.3
4,4-DDD	2.0	2.0	2.0	2.0	2.0	2.0
4,4-DDE	2.2	1.4	1.4	1.4	1.4	1.4
4,4-DDT	0.3	0.3	0.3	0.3	0.3	0.3
Dieldrin	4.3	0.2	0.1	0.2	0.2	0.2
PCBs	180.0	120.0	130.0	120.0	120.0	120.0
Toxaphene	360.0	0.6	1.0	0.6	0.6	0.6

* Mugu Lagoon subwatershed includes Duck Pond/Agricultural Drain/Mugu/Oxnard Drain #2

Compliance with the sediment-based waste load allocations is measured as an in-stream annual average at the base of each subwatershed where the dischargers are located. Requiring Responsible Dischargers to sample for the pollutant(s) within the receiving waters would be impractical, costly, and not aligned with the requirements of this General Permit. However, as mentioned in the source analysis, OC pesticide and PCB loading are associated with sediment and fine particles transported by runoff. Therefore, the following will address this TMDL:

- 1) Comply with the site-specific erosion and sediment control, and post-construction requirements in this General Permit.
 - 2) For each phase of the construction project, install erosion controls that will result in predicted erosion rates that are as protective as pre-construction (e.g., undisturbed vegetation for the area) conditions. Calculate the predicted erosion rates by using RUSLE2 modeling as described in Attachment H.
- Compliance Actions and Schedule

Responsible Dischargers shall comply with the requirements of this General Permit. Responsible Dischargers that identify on-site sources of organochlorine compounds associated with the impaired water body, through the required pollutant source assessment, are to implement BMPs specific to preventing or controlling stormwater exposure to the organochlorine compounds. Furthermore, Responsible Dischargers are to comply with the RUSLE 2 modeling requirements in Attachment H, Section I.G.2.

The Calleguas Creek OC Pesticide and PCBs TMDL's interim compliance deadline for the TMDLs was March 26, 2007. Since the deadline has already passed, Responsible Dischargers shall comply with

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the interim waste load allocations through the requirements of this General Permit and the RUSLE2 modeling requirements in Attachment H, Section I.G.2, upon the effective date of this General Permit. Compliance with the final waste load allocations shall be achieved by March 26, 2027.

v. Colorado Lagoon Toxics TMDL²⁶⁵

The Los Angeles Regional Water Quality Control Board adopted the Colorado Lagoon Toxics TMDL on October 1, 2009, to address the impairment of Colorado Lagoon due to metals, organochlorine (OC) pesticides (chlordane, DDT, and dieldrin), polyaromatic hydrocarbons (PAHs), polychlorinated biphenyls (PCBs), and sediment toxicity.

- Source and Linkage Analysis

The Colorado Lagoon watershed is divided into five sub-basins that discharge stormwater and urban dry weather runoff to Colorado Lagoon.²⁶⁶ The impairing contaminants in sediment are associated with fine-grained particles that are primarily delivered to the sediments through suspended solids in stormwater and urban runoff.²⁶⁷ Therefore, construction sites covered under this General Permit are considered Responsible Dischargers for the Colorado Lagoon Toxics TMDL.

- Waste Load Allocation Translation

The Colorado Lagoon Toxics TMDL assigns concentration-based waste load allocations for lead, zinc, OC pesticides, PAHs, and PCBs to be met at the construction site's discharge point(s) for discharges into Colorado Lagoon.²⁶⁸ The waste load allocations are shown in Table 52 below.

265 Los Angeles Regional Water Quality Control Board, [Total Maximum Daily Load for Organochlorine \(OC\) Pesticides, Polychlorinated Biphenyls \(PCBs\), Sediment Toxicity, Polycyclic Aromatic Hydrocarbons \(PAHs\), and Metals for Colorado Lagoon](#) (October 1, 2009),

<https://www.waterboards.ca.gov/water_issues/programs/tmdl/docs/coloradolagoontoxicity/signedresolutionr09_005_amendments.pdf> [as of April 29, 2022] (Colorado Lagoon Toxics TMDL)

266 Colorado Lagoon Toxics TMDL, p. 3.

267 Colorado Lagoon Toxics TMDL, p. 4.

268 Colorado Lagoon Toxics TMDL, p. 5, 10.

Table 52 – Colorado Lagoon Waste Load Allocations

Pollutants	Waste Load Allocation Suspended Sediment-Associated Contaminants (ug/dry kg)
Chlordane	0.50
Dieldrin	0.02
Lead	46,700.00
Zinc	150,000.00
PAHs	4,022.00
PCBs	22.70
DDT	1.58

Requiring Responsible Dischargers to sample for the pollutant(s) would be impractical, costly, and not aligned with the requirements of this General Permit. However, as mentioned in the source analysis, most metal loadings in this watershed are in particulate form and associated with wet-weather flows. Therefore, the following will address this TMDL:

- 1) Comply with the site-specific erosion and sediment control, and post-construction requirements in this General Permit.
- 2) For each phase of the construction project, install erosion controls that will result in predicted erosion rates that are as protective as pre-construction (e.g., undisturbed vegetation for the area) conditions. Calculate the predicted erosion rates by using RUSLE2 modeling as described in Attachment H.

- **Compliance Actions and Schedule**

Responsible Dischargers shall comply with the requirements of this General Permit. Responsible Dischargers that identify on-site sources of the toxic pollutants associated with the impaired water body, through the required pollutant source assessment, are to implement BMPs specific to preventing or controlling stormwater exposure to the organochlorine compounds. Furthermore, Responsible Dischargers are to comply with the RUSLE2 modeling requirements in Attachment H, Section I.G.2.

The final compliance deadline for the Colorado Lagoon Toxics TMDL was July 28, 2018. Since the deadline has already passed, Responsible Dischargers shall comply with the waste load allocations through the requirements of this General Permit and the RUSLE2 modeling requirements in Attachment H, Section I.G.2, upon the effective date of this General Permit.

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vi. Los Angeles Area Lakes Waters Toxics TMDL²⁶⁹

The U.S. EPA adopted the Los Angeles Area Lakes Toxics TMDL on March 26, 2012, to address the impairment in three of the nine assessed lakes in the Los Angeles Region due to organochlorine (OC) pesticides (chlordane, dieldrin, DDT) and polychlorinated biphenyls (PCBs). The three identified lakes for OC pesticides and PCBs impairments are Peck Road Park Lake, Echo Park Lake, and Puddingstone Reservoir. Peck Road Park Lake and Echo Park Lake are located in the Los Angeles River watershed. Puddingstone Reservoir is located in the San Gabriel River watershed.

- Source Analysis

The manufacturing and use of OC pesticides and PCBs are currently banned and no additional allowances for new sources of discharges are expected in the Los Angeles Area Lakes Toxics TMDL. Source control BMPs and pollutant removal are the most suitable courses of action to reduce OC pesticides and PCBs. The TMDL identified many historic and current loadings of pollutants into Peck Road Park Lake, Echo Park Lake, and Puddingstone Reservoir including construction sites that would be covered under this General Permit. Therefore, construction stormwater dischargers are considered Responsible Dischargers for the Los Angeles Area Lakes Toxics TMDL.

- Waste Load Allocation Translation

The Los Angeles Area Lakes TMDL assigns concentration-based waste load allocations for OC pesticides and PCBs in the water column to be met at the construction site's discharge location(s) into Peck Road Park Lake, Echo Park Lake, and Puddingstone Reservoir, summarized in Table 53 through Table 55 below.

Table 53 – Peck Road Park Lake Toxics Waste Load Allocation

Pollutant	Waste Load Allocation – Water Column (mg/L)
Chlordane	5.9 X 10 ⁻⁷
Dieldrin	1.4 X 10 ⁻⁷
Total DDTs	5.9 X 10 ⁻⁷
Total PCBs	1.7 X 10 ⁻⁷

269 Los Angeles Regional Water Quality Control Board, [Los Angeles Area Lakes Waters Toxics TMDL](#) (May 2011)

<https://www.waterboards.ca.gov/losangeles/water_issues/programs/tmdl/Established/Lakes/LALakesTMDLsEntireDocument.pdf> [as of April 28, 2022] (Los Angeles and Long Beach Harbor Water TMDL)

Table 54 – Echo Park Lake Toxics Waste Load Allocation

Pollutant	Waste Load Allocation – Water Column (mg/L)
Chlordane	5.9×10^{-7}
Dieldrin	1.4×10^{-7}
Total PCBs	1.7×10^{-7}

Table 55 – Puddingstone Reservoir Toxics Waste Load Allocation

Pollutant	Waste Load Allocation – Water Column (mg/L)
Chlordane	5.7×10^{-7}
Dieldrin	1.4×10^{-7}
Total DDTs	5.9×10^{-7}
Total PCBs	1.7×10^{-7}

The May 2021 draft of the Construction Stormwater General Permit reissuance proposed a translation of the waste load allocations into numeric effluent limitations. However, the translated numeric effluent limitations for chlordane, DDT, dieldrin, and PCBs in the Los Angeles Area Lakes Toxics TMDL were below the respective reporting limits for the constituents and would render determining compliance at the point of discharge infeasible.

Dischargers that discharge to the applicable Los Angeles Area Lakes waterbodies are to conduct a soil screening investigation for chlordane, DDT, dieldrin, and PCBs (as applicable) as part of the pollutant source assessment to determine whether they are Responsible Dischargers per Attachment H, Section I.G.5. Dischargers are considered Responsible Dischargers if the TMDL analytes are measured above their respective reporting limits and will be required to comply with a numeric effluent limitation of 100 mg/L total suspended solids (TSS) as the applicable limitation for each of the applicable TMDL-pollutants identified through the soil screening investigation.

State Water Board staff reviewed literature²⁷⁰ and concluded that measurements of total suspended solids at the point of discharge,

270 Nasrabadi T, Ruegner H, Schwientek M, Bennett J, Fazel Valipour S, Grathwohl P (2018) “Bulk metal concentrations versus total suspended solids in rivers: Time-invariant & catchment-specific relationships.”;
 Washington Department of Ecology (2004) “A Total Maximum Daily Load Evaluation for Chlorinated Pesticides and PCBs in the Walla Walla River.”;
 Angela Gorgoglione, Fabián A. Bombardelli, Bruno J. L. Pitton, Lorence R. Oki, Darren L. Haver and Thomas M. Young (2018) “Role of Sediments in Insecticide Runoff from Urban Surfaces: Analysis and Modeling.”

following a non-visible pollutant monitoring trigger, are the most reasonable way to assess presence of chlordane, DDT, dieldrin, and PCBs, as these organic pollutants are readily sorbed to sediment.

The measurement of total suspended solids at or above of 100 mg/L is an appropriate indicator of the presence of chlordane, DDT, dieldrin, and PCBs in runoff, if the pre-project soil analysis (described in Attachment H, Section I.G.5) demonstrated these pollutants are present in the soil. There is a strong positive correlation between total suspended solids and chlordane, DDT, dieldrin, and PCBs, indicating that concentrations of pollutants increase and decline proportionally with the TSS concentrations. If the constituents were measured in the soil at or above the reporting limit, a small fraction will be in the TSS sample as well.

- Compliance Actions and Schedule

Responsible Dischargers shall comply with the requirements of this General Permit. Responsible Dischargers that identify on-site sources of toxic pollutants associated with the impaired water bodies, through the required pollutant source assessment, are to implement BMPs specific to preventing or controlling stormwater exposure to the metals. Furthermore, the Responsible Discharger shall compare all non-visible sampling and analytical results to the TSS numeric effluent limitation to address toxic pollutants associated with the impairment of the water body. Exceedances of the TSS numeric effluent limitation equates to an exceedance of each applicable TMDL-specific pollutant identified in the soil screening investigation.

The Los Angeles Regional Water Quality Control Board has not adopted an Implementation Plan or a compliance schedule for the toxic pollutants addressed by the Los Angeles Area Lakes Toxics TMDL. Therefore, Responsible Dischargers are required to achieve compliance with the TSS numeric effluent limitation by the effective date of this General Permit.

vii. Los Angeles and Long Beach Harbor Waters TMDL²⁷¹

The Los Angeles Regional Water Quality Control Board adopted the Los Angeles and Long Beach Harbor Waters TMDL on May 5, 2011, to address

271 Los Angeles Regional Water Quality Control Board, [Total Maximum Daily Load for Toxic Pollutants in Dominguez Channel and Greater Los Angeles and Long Beach Harbor Waters](#) (May 2011)

<https://www.waterboards.ca.gov/losangeles/water_issues/programs/tmdl/docs/R11-008_RB_BPA.pdf> [as of May 20, 2021] (Los Angeles and Long Beach Harbor Waters TMDL)

the impairment and affected benthic communities of the Dominguez Channel, Greater Los Angeles, and Long Beach Harbor Waters due to cadmium, certain polyaromatic hydrocarbon (PAH) compounds, chlordane, chromium, copper, DDT, dieldrin, lead, mercury, polychlorinated biphenyls (PCBs), toxaphene, toxicity, and zinc.

- Source Analysis

Chromium, copper, lead, mercury, PAHs, and zinc are currently deposited into the watershed via urban runoff and then washed into storm drains and channels that discharge to the Dominguez Channel and Greater Harbor Waters. Organochlorine (OC) pesticides (chlordane, DDT, dieldrin) and PCBs are legacy pollutants and remain present in the environment. Urban runoff and rainfall mobilize OC pesticides, PAHs, and PCBs bound to fine-grained particles, which are then washed into storm drains and channels that discharge to the Dominguez Channel and Greater Harbor Waters. Runoff from construction sites covered under this General Permit has the potential to transport these toxic pollutants into the waters. Therefore, construction stormwater dischargers are considered Responsible Dischargers for the Los Angeles and Long Beach Harbor Waters Toxics TMDL.

- Waste Load Allocation Translation

- 1) Dominguez Channel and Torrance Lateral Freshwater Wet Weather Interim Waste Load Allocations

This TMDL assigns interim concentration-based waste load allocations for copper, lead, and zinc to Responsible Dischargers to be met at the construction site's discharge location(s) for discharges into the Dominguez Channel or Torrance Lateral. The interim concentration-based waste load allocations will be translated to numeric action levels as an interim target for Responsible Dischargers until the final waste load allocations apply. The compliance deadline of the interim waste load allocations is upon effective date of the TMDL and therefore, apply at that time. The interim numeric action levels are shown in Table 56 below.

Table 56 – Dominguez Channel and Torrance Lateral Interim Waste Load Allocation Translation

Pollutant	Waste Load Allocation (ug/L)	Interim Numeric Action Level (mg/L)
Total Copper	207.51	0.20751
Total Lead	122.88	0.12288
Total Zinc	898.87	0.89887

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2) Dominguez Channel and Torrance Lateral Wet-Weather Final Waste Load Allocations

This TMDL assigns wet-weather final concentration-based waste load allocations for copper, lead, and zinc to Responsible Dischargers to be met at the construction site’s discharge location(s) for discharges into the Dominguez Channel (above Vermont Avenue).

Exxon Mobil Torrance Refinery and “all other dischargers” are assigned concentration-based waste load allocations of copper, lead, and zinc equal to the sediment targets to be met at the construction site’s discharge location(s) for discharges into the Dominguez Channel and Torrance Lateral, shown in Table 57 below.

Responsible Dischargers are assumed to be included in the “all other dischargers” definition. The concentration-based waste load allocations are translated into numeric effluent limitations. However, the numeric effluent limitations are not immediately effective because the compliance deadline for attaining the waste load allocation for dischargers into Dominguez Channel and Torrance Lateral is beyond this General Permit’s term.

Table 57 – Dominguez Channel and Torrance Lateral Final Waste Load Allocation

Pollutant	Waste Load Allocation* (mg/L)
Total Copper	0.0097
Total Lead	0.0427
Total Zinc	0.0697

*Hardness used = 50 mg/L. Recalculated concentration-based allocations using ambient hardness at the time of sampling are considered consistent with the assumptions and requirements of these waste load allocations. In addition to the waste load allocations above, samples collected during flow conditions less than the 90th percentile of annual flow rates must demonstrate that the acute and chronic hardness dependent water quality criteria provided in the CTR are achieved.

The May 2021 draft of the Construction Stormwater General Permit reissuance proposed a translation for the final total copper, lead, and zinc waste load allocations into numeric effluent limitations as the waste load allocations were concentration-based and assigned at the point of discharge. However, this General Permit incorporates a soil screening investigation and a total suspended solids numeric effluent limitation to assess compliance with the final waste load allocations for total copper, lead, and zinc.

Starting at the effective date of the final waste load allocations, March 23, 2032, dischargers that discharge to the Dominguez Channel and Torrance Lateral are to conduct a soil screening investigation for

copper, lead, and zinc as part of the pollutant source assessment to determine whether they are Responsible Dischargers per Attachment H Section I.G.5. Dischargers are considered Responsible Dischargers if the TMDL analytes are measured above the analytical reporting limit and will be required to comply with a numeric effluent limitation of 100 mg/L total suspended solids (TSS) as the applicable limitation for each of the applicable TMDL-pollutants identified through the soil screening investigation, instead of the numeric effluent limitations for total copper, lead, and zinc.

State Water Board staff reviewed literature²⁷² and concluded that measurements of TSS at the point of discharge, following a non-visible pollutant monitoring trigger, are the most reasonable way to assess the presence of copper, lead, and zinc, as these metals are readily sorbed to sediment, which is the most common pollutant discharged from construction sites and can be managed effectively with BMPs.

Staff determined the measurement of TSS at or above 100 mg/L is an appropriate indicator of the presence of copper, lead, and zinc in runoff, if the pre-project soil monitoring (described in Attachment H, Section I.G.5) demonstrated these pollutants are present in the soil. There is a strong positive correlation between TSS and metals, indicating that concentrations of pollutants increase and decline proportionally with the TSS concentrations. If the constituents were measured in the soil at or above the analytical reporting limit, a small fraction will be in the TSS sample as well.

3) Dominguez Channel Estuary and Greater Los Angeles and Long Beach Harbor Waters Interim Sediment Waste Load Allocations

This TMDL assigns concentration-based interim sediment waste load allocations for copper, lead, zinc, DDT, PAHs, and PCBs to Responsible Dischargers for discharges into the Dominguez Channel Estuary and Greater Harbor Waters, shown in Table 58 below.

272 Nasrabadi T, Ruegner H, Schwientek M, Bennett J, Fazel Vaipour S, Grathwohl P (2018) "Bulk metal concentrations versus total suspended solids in rivers: Time-invariant & catchment-specific relationships."

Table 58 – Dominguez Channel Estuary and Greater Harbor Waters Interim Sediment Waste Load Allocations in mg/kg sediment

Water Body	Copper	Lead	Zinc	DDT	PAHs	PCBs
Dominguez Channel Estuary	220.0	510.0	789.0	1.727	31.60	1.490
Long Beach Inner Harbor	142.3	50.4	240.6	0.070	4.58	0.060
Los Angeles Inner Harbor	154.1	145.5	362.0	0.341	90.30	2.107
Long Beach Outer Harbor (inside breakwater)	67.3	*46.7	150	0.075	*4.022	0.248
Los Angeles Outer Harbor (inside breakwater)	104.1	*46.7	150	0.097	*4.022	0.310
Los Angeles River Estuary	53.0	*46.7	183.5	0.254	4.36	0.683
San Pedro Bay Near/Offshore Zones	76.9	66.6	263.1	0.057	*4.022	0.193
Los Angeles Harbor – Cabrillo Marina	367.6	72.6	281.8	0.186	36.12	0.199
Los Angeles Harbor – Consolidated Slip	1470.0	1100.0	17050	1.724	386.00	1.920
Los Angeles Harbor – Inner Cabrillo Beach	129.7	*46.7	163.1	0.145	*4.022	0.033
Fish Harbor	558.6	116.5	430.5	40.5	2102.7	36.6

*Values are also the final allocation

Directly implementing the final waste load allocations would be impractical, costly, and not aligned with the monitoring requirements in this General Permit. As mentioned above, this TMDL associates bed toxicity with discharges of metals, OC pesticides, PAHs, and PCBs bound to sediment particulates. Therefore, the following will address this TMDL:

- a) Comply with the site-specific erosion and sediment control, and post-construction requirements in this General Permit.
 - b) For each phase of the construction project, install erosion controls that will result in predicted erosion rates that are as protective as pre-construction (e.g., undisturbed vegetation for the area) conditions. Calculate the predicted erosion rates by using RUSLE2 modeling as described in Attachment H.
- 4) Dominguez Channel Estuary and Greater Harbor Waters Final Water-Column Waste Load Allocations

This TMDL assigns concentration-based final waste load allocations for the metals and organic compounds identified in Table 57 and Table 58 below. The waste load allocations are to be met in the water column for discharges to Dominguez Channel Estuary and the Greater Harbor Waters. Greater Harbor Waters include Inner and

Outer Harbor, Main Channel, Consolidated Slip, Southwest Slip, Fish Harbor, Cabrillo Marina, Inner Cabrillo Beach, Los Angeles River Estuary, and San Pedro Bay. The concentration-based waste load allocations are translated to numeric action levels because the waste load allocations are assigned to be met in the receiving waters and not at the point of discharge. The assigned waste load allocations of copper, lead, and zinc are based on the Criteria Chronic Concentration, and are inappropriate to assign to stormwater discharges. Therefore, the California Toxics Rule (CTR) Criterion Maximum (acute) Concentration is applied to Responsible Dischargers. The units are converted from ug/L to mg/L to be consistent with the reporting units in SMARTS. The numeric action levels assigned to Responsible Dischargers are shown in Table 59 and Table 60 below.

Table 59 – Dominguez Channel Estuary Final Water Column Waste Load Allocation Translations

Pollutant	Waste Load Allocation (ug/L)	Dissolved Saltwater Criterion Maximum Concentration (ug/L)	Total Saltwater Criterion Maximum Concentration (ug/L)	Numeric Action Level (mg/L)
4,4-DDT	0.00059			5.9 X10 ⁻⁷
Chlordane	0.00059			5.9 X10 ⁻⁷
Dieldrin	0.00014			1.4 X10 ⁻⁷
Total Copper	3.73	4.8	5.8**	0.0058
Total Lead	8.53	210	221**	0.221
PAHs	0.049			4.9 X10 ⁻⁵
Total PCBs	0.00017			1.7 X10 ⁻⁷
Total Zinc	85.6	90	95**	0.095

* CTR human health criteria were not established for total PAHs. Therefore, the CTR criterion for individual PAHs of 0.049 µg/L is applied individually to benzo(a)anthracene, benzo(a)pyrene, and chrysene. The CTR criterion for Pyrene of 11,000 µg/L is assigned as an individual waste load allocation to Pyrene. Other PAH compounds in the CTR shall be screened as part of the TMDL monitoring.

**Values were rounded to match Criterion significant figures.

Table 60 – Greater Harbor Final Water Column Waste Load Allocation Translations

Pollutant	Waste Load Allocation (ug/L)	Dissolved Saltwater Criterion Maximum Concentration (ug/L)	Total Saltwater Criterion Maximum Concentration (ug/L)	Numeric Action Level (mg/L)
4,4-DDT	0.00059			5.9 X10 ⁻⁷
Total Copper	3.73	4.8	5.8**	0.0058

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Pollutant	Waste Load Allocation (ug/L)	Dissolved Saltwater Criterion Maximum Concentration (ug/L)	Total Saltwater Criterion Maximum Concentration (ug/L)	Numeric Action Level (mg/L)
Total Lead	8.53	210	221**	0.221
Total PCBs	0.00017			1.7 X10 ⁻⁷
Total Zinc	85.6	90	95**	0.095

**Values were rounded to match Criterion significant figures.

5) Dominguez Chanel Estuary, Consolidated Slip, and Fish Harbor Final Sediment Waste Load Allocations

This TMDL assigns concentration-based final sediment waste load allocations for cadmium, chromium, and mercury to be met at the construction site's discharge point(s) for discharges into Consolidated Slip and Fish Harbor, cadmium discharges into Dominguez Channel Estuary and Consolidated Slip, and chromium discharges into Consolidated Slip.

Table 61 – Dominguez Channel Estuary, Consolidated Slip and Fish Harbor Final Sediment Waste Load Allocations

Pollutant	Waste Load Allocation (mg/kg sediment)
Cadmium*	1.2
Chromium**	81
Mercury***	0.15

* Applies to Dominguez Channel Estuary and Consolidated Slip

** Applies to Consolidated Slip

*** Applies to Consolidated Slip and Fish Harbor

Directly implementing the final waste load allocations would be impractical, costly, and not aligned with the monitoring requirements in this General Permit. As mentioned above, this TMDL associates bed toxicity with discharges of metals bound to sediment particulates. Therefore, the following will address this TMDL:

- a) Comply with the site-specific erosion and sediment control, and post-construction requirements in this General Permit.
- b) For each phase of the construction project, install erosion controls that will result in predicted erosion rates that are as protective as pre-construction (e.g., undisturbed vegetation for the area) conditions. Calculate the predicted erosion rates by using RUSLE2 modeling as described in Attachment H.

- Compliance Actions and Schedule

Responsible Dischargers shall comply with the requirements of this General Permit. Responsible Dischargers that discharge into the

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Dominguez Channel or the Torrance Lateral, and identify on-site sources of copper, lead, and zinc through the required pollutant source assessment, shall compare all non-visible sampling and analytical results to the applicable interim numeric action levels for the metals. Responsible Dischargers that discharge into the Dominguez Channel Estuary or the Greater Harbor waters, and that identify on-site sources of the metals and toxic pollutants listed in Table 60 and Table 61 are to implement BMPs specific to preventing or controlling stormwater contact with those metals and toxic pollutants. Furthermore, Responsible Dischargers are to comply with the RUSLE2 modeling requirements in Attachment H, Section I.G.2, in order to address applicable interim sediment-based waste load allocations.

If an exceedance or failure of a BMP is observed, the Responsible Discharger shall evaluate the BMPs being used and identify and implement a strategy in the site's SWPPP to prevent potential exceedances of the interim numeric action levels and TSS numeric effluent limitations in the future. Responsible Dischargers that perform the required pollutant source assessment and implement BMPs specific to preventing or controlling stormwater exposure to the metals and toxic pollutant sources are expected to meet the assigned numeric action levels and TSS numeric effluent limitations.

The effective date of the TMDL, March 23, 2012, is the interim compliance deadline. Since this compliance deadline has passed, the requirements to meet the interim numeric action levels shall be met by the effective date of this General Permit. Responsible Dischargers are to comply with the final numeric action levels and TSS numeric effluent limitations by March 23, 2032, the final compliance deadline for the Los Angeles and Long Beach Harbor. Future reissuances of this General Permit may incorporate additional or revised compliance requirements or interim targets to progress towards the required final compliance when a final numeric action level or TSS numeric effluent limitation applies.

viii. Los Angeles River Metals TMDL²⁷³

The Los Angeles Regional Water Quality Control Board adopted the Los Angeles River Metals TMDL on April 9, 2015, to address the impairment of

273 Los Angeles Regional Water Quality Control Board, [Amendment to the Water Quality Control Plan for the Los Angeles Region to Revise the Los Angeles River and Tributaries Metals TMDL](https://www.waterboards.ca.gov/losangeles/water_issues/programs/tmdl/docs/R15-004_BPA_CH_7.pdf) (April 2015)

<https://www.waterboards.ca.gov/losangeles/water_issues/programs/tmdl/docs/R15-004_BPA_CH_7.pdf> [as of May 20, 2021] (Los Angeles River Metals TMDL)

Los Angeles River and its tributaries due to cadmium, copper, lead, selenium, and zinc.

- Source Analysis

Dry weather loading from storm drains contributes a large percentage of the loading because of low flows but high concentration of dissolved metals. During wet weather most metals loadings are in the particulate form where stormwater flows contribute a large percentage of cadmium, copper, lead, and zinc loading. Studies are underway to evaluate whether selenium levels represent a “natural condition” for this watershed.²⁷⁴

- Waste Load Allocation Translation

- 1) Dry-weather Waste Load Allocations

The Los Angeles River Metals TMDL assigns concentration-based waste load allocations for dry-weather. Non-Stormwater Discharges (NSWDs) are only authorized in this General Permit if the terms and conditions in Order, Section IV.A are met to control the discharge of pollutants from the construction site. Order, Section IV.B prohibits all NSWDs not authorized under Order, Section IV.A; therefore, all unauthorized NSWDs must be either eliminated or have regulatory coverage under a separate NPDES permit. Authorized NSWDs, as defined in this General Permit, are authorized because these discharges do not commingle with stormwater associated with construction activity. The Regional Water Board may impose additional requirements on NSWDs if deemed necessary per site-specific analysis.

- 2) Wet-weather Waste Load Allocations

The Los Angeles River Metals TMDL assigns a mass-based waste load allocation per construction area in grams per day per acre (g/d/ac) for cadmium, copper, lead, and zinc at the construction site’s discharge point(s) for discharges into the Los Angeles River or tributaries (Los Angeles River Watershed).²⁷⁵ In addition, daily storm volume flows are required to calculate the waste load allocation for each metal. The waste load allocations are shown in Table 62 below.

Directly implementing the copper, lead, and zinc waste load allocations would result in a unique mass load for each Responsible Discharger depended on the daily stormwater flows and the

²⁷⁴ Los Angeles River Metals TMDL, p. 4.

²⁷⁵ Los Angeles River Metals TMDL, p. 13.

construction site's acreage. Requiring Responsible Dischargers to calculate the site-specific mass load of a pollutant would be impractical, costly, and not aligned with the monitoring requirements in this General Permit.

The Los Angeles River Metals TMDL Staff Report allows for compliance to be assessed based on concentration. Additionally, the TMDL Staff Report states, "the wet-weather mass-based waste load allocations for the general construction and industrial stormwater permittees (Table 6-12) will be incorporated into watershed specific general permits. Concentration-based permit conditions may be set to achieve the mass-based waste load allocations. These concentration-based conditions would be equal to the concentration-based waste load allocations assigned to the other NPDES permits."

This TMDL states "each general construction stormwater permit holder will be subject to site-specific BMPs and monitoring requirements to demonstrate compliance with the final waste load allocations."²⁷⁶ Therefore, it is consistent with the requirements and assumptions of the waste load allocation to apply the Los Angeles River Metals TMDL Numeric Targets as concentration-based numeric action levels (permit conditions).

The numeric action level iterative process in this General Permit requires dischargers to implement and evaluate performance of site-specific BMPs to demonstrate compliance with applicable waste load allocations. The units are converted from ug/L to mg/L to be consistent with the reporting units in SMARTS. The translated numeric action levels are shown in Table 62 below and a WER of 3.97 is used for copper.

Table 62 – Los Angeles River Waste Load Allocations Translation for Total Recoverable Metals

Pollutant	Waste Load Allocation (g/d/ac)	Numeric Target (ug/L)	Numeric Action Level (mg/L)
Cadmium*	WER x (7.6×10^{-12}) x daily volume (L) – (4.8×10^{-6})	WER x 3.1	0.0031
Copper**	WER x (4.2×10^{-11}) x daily volume (L) – (2.6×10^{-5})	WER x 17	0.06749
Lead*	WER x (4.2×10^{-11}) x daily volume (L) – (8.7×10^{-5})	WER x 94	0.094
Zinc*	WER x (3.9×10^{-10}) x daily volume (L) – (2.2×10^{-4})	WER x 159	0.159

* WER(s) have a default value of 1.0 unless site-specific WER(s) are approved.

**The WER for this constituent is 3.97.

- Compliance Actions and Schedule

Responsible Dischargers shall comply with the requirements of this General Permit. Responsible Dischargers that discharge into the Los Angeles River or its tributaries, and that identify on-site sources of cadmium, copper, lead, and/or zinc through the required pollutant source assessment, shall compare all non-visible sampling and analytical results to the applicable numeric action levels for the identified metals.

Responsible Dischargers shall install, operate, and maintain site-specific BMPs to address identified on-site sources of cadmium, copper, lead, and/or zinc.

If an exceedance or failure of a BMP is observed, the Responsible Discharger shall evaluate the BMPs being used and identify and implement a strategy in the site's SWPPP to prevent potential exceedances of the numeric action levels in the future. Responsible Dischargers that perform the required pollutant source assessment and implement BMPs specific to preventing or controlling stormwater exposure to the sources of metals are expected to meet the numeric action levels.

The final compliance deadline for the Los Angeles River Metals TMDL was January 11, 2016. Since this compliance deadline has passed, the numeric action levels are applicable upon the effective date of this General Permit.

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ix. Los Cerritos Channel Metals TMDL²⁷⁷

The U.S. EPA adopted the Los Cerritos Metals TMDL on March 17, 2010, to address the impairment of Los Cerritos Channel due to copper, lead, and zinc.

- Source Analysis

Sources of metals from construction sites include sediment-bound metals, construction materials, and equipment used on construction sites. Additionally, in highly urbanized Los Cerritos Channel freshwater watershed, re-development of former industrial sites has a higher potential to discharge sediments laden with metals. During wet-weather, runoff from construction sites has the potential to contribute metals loadings to the Channel. Building materials and construction waste exposed to stormwater can leach and contribute metals to waterways.²⁷⁸ Therefore, construction sites covered under this General Permit are considered Responsible Dischargers for the Los Cerritos Channel Metals TMDL.

- Waste Load Allocation Translation

- 1) Dry-weather Waste Load Allocation

The Los Cerritos Channel Metals TMDL assigns a concentration-based waste load allocation for dry-weather. Non-Stormwater Discharges (NSWDs) are authorized in this General Permit if Order, Section IV.A terms and conditions are met to control the discharge of pollutants from the construction site. Order, Section IV.B prohibits all NSWDs not authorized under Order, Section IV.A; therefore, all unauthorized NSWDs must be either eliminated or have regulatory coverage under a separate NPDES permit. Authorized NSWDs, as defined in this General Permit, are authorized because these discharges do not commingle with stormwater associated with construction activity. The Regional Water Board may impose additional requirements on NSWDs if deemed necessary per site-specific analysis.

277 U.S. Environmental Protection Agency Region IX, [Los Cerritos Channel Total Maximum Daily Loads for Metals](#) (March 2010)
<https://www.waterboards.ca.gov/losangeles/water_issues/programs/tmdl/Established/Los%20Cerritos%20Channel%20Metals%20TMDL/03-18-10LosCerritosChannel-metalsTMDLs.pdf> [as of April 28, 2022]

278 Los Cerritos Channel Metals TMDL, p. 20.

2) Wet-weather Waste Load Allocations

The Los Cerritos Channel Metals TMDL assigns a mass-based waste load allocation per construction area in grams per day per acre (g/day/ac) for copper, lead, and zinc for discharges into the Los Cerritos Channel. In addition, daily storm volume flows are required to calculate the waste load allocation for each metal. The mass-based waste load allocations are shown in Table 63 below.

Table 63 – Los Cerritos Mass-based Waste Load Allocations

Pollutant	Waste Load Allocation (g/day/ac)
Copper	$0.497 \times 10^{-3} \times \text{daily volume(L)}$
Lead	$2.835 \times 10^{-3} \times \text{daily volume(L)}$
Zinc	$4.860 \times 10^{-3} \times \text{daily volume(L)}$

Directly implementing the copper, lead, and zinc mass-based waste load allocations would result in a unique mass load for each Responsible Discharger, dependent on the daily stormwater flows and the construction site’s acreage. Requiring Responsible Dischargers to calculate the site-specific mass loading of a pollutant(s) is impractical, costly, and not aligned with the monitoring requirements of this this General Permit. The Los Cerritos Channel TMDL Implementation Plan²⁷⁹ requires incorporation of the waste load allocations in this General Permit as wet-weather permit limitations expressed as event mean concentrations.

The term permit limitation in the TMDL implementation plan is defined as “a water-quality based effluent limitation or a receiving water limitation...permittees may demonstrate compliance with wet-weather waste load allocations in any one of three ways. First, general industrial and construction storm water permittees may be deemed in compliance with permit limitations if they demonstrate that there are no exceedances of the permit limitations at their discharge points or outfalls. Second, general industrial and construction storm water permittees may be deemed in compliance with permit limitations if they demonstrate that there are no exceedances of the permit limitations in the receiving water at, or downstream of, the

279 Los Angeles Regional Water Quality Control Board, [Amendment to the Water Quality Control Plan – Los Angeles Region to Incorporate the Implementation Plan for the Total Maximum Daily Loads for Metals in the Los Cerritos Channel](https://www.waterboards.ca.gov/losangeles/board_decisions/basin_plan_amendments/technical_documents/99_New/Los%20Cerritos%20Metals%20implementation%20plan%20and%20schedule%20BPA_rev%20053013.pdf)
 <https://www.waterboards.ca.gov/losangeles/board_decisions/basin_plan_amendments/technical_documents/99_New/Los%20Cerritos%20Metals%20implementation%20plan%20and%20schedule%20BPA_rev%20053013.pdf> [as of April 28, 2022] (Los Cerritos Channel Metals TMDL Implementation Plan)

permittee's outfalls. Third, if permittees provide a quantitative demonstration that control measures and best management practices (BMPs) will achieve wet-weather waste load allocations consistent with the schedule in Table 7-20.2, then compliance may be demonstrated by implementation of those control measures and BMPs, subject to Executive Officer approval.”²⁸⁰ The assigned mass-based waste load allocations require site-specific calculations that are incompatible with the monitoring and reporting requirements in this General Permit. Therefore, it is consistent with the requirements and assumptions of the waste load allocations to implement the Los Cerritos Channel Metals TMDL Numeric Targets as concentration-based numeric action levels to align the mass-based waste load allocations to the requirements in this General Permit. The TMDL implementation plan provided Responsible Dischargers the above-stated three options for demonstrating waste load allocation compliance. The option implemented in this General Order is to implement the TMDL-specific numeric action levels at the point of discharge for the Responsible Discharger’s construction site. The assigned concentration based numeric action levels are shown in Table 64 below. The units are converted from ug/L to mg/L to be consistent with the reporting units in SMARTS.

Table 64 – Los Cerritos Channel Waste Load Allocations (Concentration-based, Total Recoverable)

Pollutant	Numeric Targets (ug/L)	Numeric Action Levels (mg/L)
Copper	9.8	0.0098
Lead	55.8	0.0558
Zinc	95.6	0.0956

- Compliance Actions and Schedule

Responsible Dischargers shall comply with the requirements of this General Permit. Responsible Dischargers that discharge into the Los Cerritos Channel and that identify on-site sources of copper, lead, and zinc through the required pollutant source assessment, shall compare all non-visible sampling and analytical results to the applicable numeric action levels for the identified metals.

If an exceedance or failure of a BMP is observed, the Responsible Discharger shall evaluate the BMPs being used and identify and implement a strategy in the site’s SWPPP to prevent potential exceedances of the numeric action levels in the future. Responsible

Dischargers that perform the required pollutant source assessment and implement BMPs specific to preventing or controlling stormwater exposure to the metals' sources are expected to meet the assigned numeric action levels.

The TMDL's final compliance deadline was September 30, 2017. Since this compliance deadline has passed, the numeric action levels are applicable upon the effective date of this General Permit.

x. Machado Lake Toxics TMDL²⁸¹

The Los Angeles Regional Water Quality Control Board adopted the Machado Lake Toxics TMDL on September 2, 2010, to address the impairment of Machado Lake due to chemical group organochlorine (OC) pesticides (chlordane, DDT, dieldrin) and polychlorinated biphenyls (PCBs).

- Source Analysis

The point sources of OC pesticides and PCBs into Machado Lake are stormwater and urban runoff discharges from the municipal separate storm sewer system (MS4), the California Department of Transportation, and general construction and industrial dischargers. Therefore, construction sites covered under this General Permit are considered Responsible Dischargers for the Machado Lake Toxics TMDL.

OC pesticides are no longer legally sold or used, but remain ubiquitous in the environment, bound to fine-grained particles. The chemicals are transported to new locations when these particles become waterborne. The more recent small discharges of OC pesticides and PCBs to Machado Lake most likely come from the erosion of pollutant-laden sediment further up in the watershed. Urban runoff and rainfall higher in the watershed mobilize the particles, which are then washed into storm drains and channels that discharge to the lake. Stormwater and urban runoff discharges to Machado Lake occur through the Wilmington Drain, Project 77, and Project 510 subdrainage systems. The estimated contributions of OC pesticides and PCBs from point sources is much smaller than the estimated contribution from internal lake sediments. However, a waste load allocation is assigned to ongoing point source discharges to the lake.

281 Los Angeles Regional Water Quality Control Board, [Machado Lake Pesticides and PCBs TMDL](https://www.waterboards.ca.gov/losangeles/water_issues/programs/tmdl/docs/R10-008_RB_BPA.pdf) (September 2, 2010),

<https://www.waterboards.ca.gov/losangeles/water_issues/programs/tmdl/docs/R10-008_RB_BPA.pdf> [as of May 20, 2021] (Machado Lake Toxics TMDL)

- Waste Load Allocation Translation

The Machado Lake Toxics TMDL assigns a suspended sediment concentration-based waste load allocations for OC pesticides and PCBs to be met at the construction site’s discharge location(s) for discharges into Machado Lake, shown in Table 65 below.

Table 65 – Machado Lake Toxics Waste Load Allocations

Pollutant	Waste Load Allocation of Suspended Sediment-Associated Contaminants (ug/kg dry weight)
Chlordane	3.24
DDD (all congeners)	4.88
DDE (all congeners)	3.16
DDT (all congeners)	4.16
Dieldrin	1.9
Total DDTs	5.28
Total PCBs	59.8

Requiring Responsible Dischargers to directly implement the waste load allocation and sample for the pollutant(s) would be impractical, costly, and not aligned with the requirements of this General Permit. However, as mentioned in the source analysis, most toxic pollutants loadings in this watershed are in particulate form and associated with wet-weather flows. Therefore, the following will address this TMDL:

- 1) Comply with the site-specific erosion and sediment control, and post-construction requirements in this General Permit.
- 2) For each phase of the construction project, install erosion controls that will result in predicted erosion rates that are as protective as pre-construction (e.g., undisturbed vegetation for the area) conditions. Calculate the predicted erosion rates by using RUSLE2 modeling as described in Attachment H.

- Compliance Actions and Schedule

Responsible Dischargers shall comply with the requirements of this General Permit. Responsible Dischargers that identify on-site sources of the toxic pollutants associated with the impaired water body, through the required pollutant source assessment, are to implement BMPs specific to preventing or controlling stormwater exposure to the toxic pollutants. Furthermore, Responsible Dischargers are to comply with the RUSLE2 modeling requirements in Attachment H, Section I.G.2.

The Machado Lake Toxics TMDL’s final compliance deadline was September 30, 2019. Since this compliance deadline has passed,

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compliance with the waste load allocations shall be met upon the effective date of this General Permit.

xi. Marina del Rey Toxics TMDL²⁸²

The Los Angeles Regional Water Quality Control Board adopted the Marina del Rey Toxics TMDL on February 6, 2014, to address the impairment of Marina del Rey Harbor due to chlordane, copper, DDT, dieldrin, fish consumption advisory, lead, polychlorinated biphenyls (PCBs), sediment toxicity, and zinc. During the development of this TMDL, review of available data indicated that dieldrin is no longer a cause of impairment, and that there is a dissolved copper impairment in the water column and sediment.

- Source Analysis

Urban stormwater has been recognized as a substantial source of metals. Numerous researchers have documented that the most prevalent metals in urban stormwater (i.e., copper, lead, and zinc) are consistently associated with suspended solids. Because metals are typically associated with fine particles in stormwater runoff, they have the potential to accumulate in marine sediments where they may pose a toxicity risk. A majority of organic constituents in stormwater are also associated with particulates. Once the particles accumulate in the sediments in the harbor, the sediments themselves can become a source through re-suspension and are thus assigned load allocations. Therefore, construction sites covered under this General Permit are considered Responsible Dischargers for the Marina del Rey Toxics TMDL.

In addition to stormwater runoff, copper-based anti-fouling paints are recognized as substantial sources of dissolved copper in the water column and sediments. Site-specific modeling indicated that 100 percent of copper loading came from copper-based anti-fouling hull paint and hull cleaning activities. Direct deposition of airborne particles to the water surface may be a minor source responsible for contributing metals and organic pollutants to the Marina del Rey Harbor.²⁸³

282 Los Angeles Regional Water Quality Control Board, [Amendment to the Water Quality Control Plan – Los Angeles Region to incorporate the Marina del Rey Harbor Toxic Pollutants TMDL](#) (February 6, 2014),

<https://www.waterboards.ca.gov/losangeles/water_issues/programs/tmdl/docs/R14-004_RB_BPA.pdf> [as of May 20, 2021] (Marina del Rey Harbor Toxics TMDL)

283 Marina del Rey Harbor Toxics TMDL, p. 3-4.

- Waste Load Allocation Translation

The Marina del Rey Toxics TMDL assigns a mass-based waste load allocation per construction area in grams per day per acre (g/day/ac) or milligrams per day per acre (mg/day/ac) for chlordane, copper, total DDTs, Dichlorodiphenyldichloroethylene (p,p'-DDE), lead, total PCBs, and zinc for discharges into the Marina del Rey Harbor. The mass-based waste load allocations are shown in Table 66 and Table 67 below.

Table 66 – Marina del Rey Toxics Metals Waste Load Allocations

Pollutant	Waste Load Allocation (g/yr/ac)
Copper	1.9
Lead	2.6
Zinc	8.5

Table 67 – Marina del Rey Toxics OC Pesticides Waste Load Allocations

Pollutant	Waste Load Allocation (mg/yr/ac)
Chlordane	0.03
Total PCBs	1.3
Total DDTs	0.09
p,p'-DDE	0.12

Requiring Responsible Dischargers to directly implement the waste load allocation and sample for the pollutant(s) would be impractical, costly, and not aligned with the requirements of this General Permit. However, as mentioned in the source analysis, most toxic pollutants loadings in this watershed are in particulate form and associated with wet-weather flows. Therefore, the following will address this TMDL:

- 1) Comply with the site-specific erosion and sediment control, and post-construction requirements in this General Permit.
- 2) For each phase of the construction project, install erosion controls that will result in predicted erosion rates that are as protective as pre-construction (e.g., undisturbed vegetation for the area) conditions. Calculate the predicted erosion rates by using RUSLE2 modeling as described in Attachment H.

100 percent of the copper loadings into the Marina del Rey Harbor comes from the leaching of antifouling hull paint and from hull cleaning operations. Therefore, the copper numeric target will not be assigned to Responsible Dischargers and compliance with this waste load allocation shall be through compliance with this General Permit.

EXHIBIT "C" (Stormwater Pollution Prevention Plan)

- Compliance Actions and Schedule

Responsible Dischargers shall comply with the requirements of this General Permit. Responsible Dischargers that identify on-site sources of the metals and toxic pollutants associated with the impaired water body, through the required pollutant source assessment, are to implement BMPs specific to preventing or controlling stormwater exposure to the metals and toxic pollutants. Furthermore, Responsible Dischargers are to comply with the RUSLE2 modeling requirements in Attachment H, Section I.G.2.

The Marina del Rey Toxics TMDL's final compliance deadline was March 22, 2016. Since this compliance deadline has passed, the waste load allocations shall be met upon the effective date of this General Permit.

xii. Oxnard Drain No. 3 Toxics TMDL²⁸⁴

The U.S. EPA adopted the Oxnard Drain No. 3 Toxics TMDL on October 6, 2011, to address the impairment of the Oxnard Drain No. 3 due to bifenthrin, chlorpyrifos, organochlorine (OC) pesticides (chlordane, DDT, dieldrin, and toxaphene), polychlorinated biphenyls, and sediment toxicity.

- Source Analysis

The Oxnard Drain No. 3 Toxics TMDL identifies historic and current loadings of toxic pollutants, including construction sites that would be covered under this General Permit. During wet weather, discharges from construction sites have the potential to contribute toxic pollutant loadings. However, dry weather discharges have less potential to contribute to toxic pollutant loadings as non-stormwater discharges authorized by this General Permit are only authorized when they do not cause or contribute to a violation of any water quality standard. Therefore, construction sites covered under this General Permit are considered Responsible Dischargers for the Oxnard Drain No. 3 Toxics TMDL.

- Waste Load Allocation Translation

The Oxnard Drain No. 3 Toxics TMDL assigns a concentration-based waste load allocation to construction stormwater discharges for 4,4'-

284 United States EPA Region IX, [Total Maximum Daily Loads for Pesticides, PCBs, and Sediment Toxicity in Oxnard Drain No.3](https://www.waterboards.ca.gov/losangeles/water_issues/programs/tmdl/Established/Oxnard%20Drain%20No.%203%20Pesticides%20PCBs%20and%20Sediment%20Toxicity%20TMDL/oxnard-drain-3-tmdl-10-2011.pdf) (October 6, 2011), <https://www.waterboards.ca.gov/losangeles/water_issues/programs/tmdl/Established/Oxnard%20Drain%20No.%203%20Pesticides%20PCBs%20and%20Sediment%20Toxicity%20TMDL/oxnard-drain-3-tmdl-10-2011.pdf> [as of April 28, 2022] (Oxnard Drain No. 3 Toxics TMDL)

DDD, 4,4'-DDE, 4,4'-DDT, bifenthrin, chlorpyrifos, dieldrin, total chlordane, total PCBs, and toxaphene expressed as water, bed sediment and suspended sediment concentrations in ug/kg to be met at the construction site's discharge location(s) for discharges into the Oxnard Drain No. 3. OC pesticides and PCBs have an affinity for organic matter and will partition from water to organic substances such as sediment, benthic organisms, and fish, so the sediment allocations are applied, shown in Table 68 below.

Table 68 – Oxnard Drain No. 3 Waste Load Allocations

Pollutant	Waste Load Allocation of Suspended Sediment-Associated Contaminants (ug/kg dry weight)
4,4'-DDD	2.0
4,4'-DDE	2.2
4,4'-DDT	0.3
Bifenthrin	-
Chlordane, Total	3.3
Chlorpyrifos	-
Dieldrin	4.3
PCBs, Total	180
Sediment Toxicity	-
Toxaphene	360

Requiring Responsible Dischargers to directly implement the waste load allocation and sample for the pollutant(s) would be impractical, costly, and not aligned with the requirements of this General Permit. However, as mentioned in the source analysis, most toxic pollutants loadings in this watershed are in particulate form and associated with wet-weather flows. Therefore, the following will address this TMDL:

- 1) Comply with the site-specific erosion and sediment control, and post-construction requirements in this General Permit.
 - 2) For each phase of the construction project, install erosion controls that will result in predicted erosion rates that are as protective as pre-construction (e.g., undisturbed vegetation for the area) conditions. Calculate the predicted erosion rates by using RUSLE2 modeling as described in Attachment H.
- Compliance Actions and Schedule

Responsible Dischargers shall comply with the requirements of this General Permit. Responsible Dischargers that identify on-site sources of the toxic pollutants associated with the impaired water body, through the required pollutant source assessment, are to implement BMPs specific to preventing or controlling stormwater exposure to the toxic pollutants.

EXHIBIT "C" (Stormwater Pollution Prevention Plan)

Furthermore, Responsible Dischargers are to comply with the RUSLE2 modeling requirements in Attachment H, Section I.G.2.

The Los Angeles Regional Water Quality Control Board has not adopted an Implementation Plan or a compliance schedule for the toxic pollutants addressed by the Oxnard Drain No. 3 Toxics TMDL. Therefore, Responsible Dischargers are required to achieve compliance with the waste load allocations upon the effective date of this General Permit.

xiii. San Gabriel River Metals and Selenium TMDL²⁸⁵

The U.S. EPA adopted the San Gabriel River Metals TMDL on March 26, 2007, to address the impairment of San Gabriel River, estuary, and tributaries due to copper, lead, selenium, and zinc. A TMDL was not developed for the elevated levels of selenium in Reach 6 during dry weather conditions because the sources of selenium appear to be related to natural levels of selenium in the soils.

- Source Analysis

Sources of metals from construction sites include sediment-bound metals, construction materials, and equipment used on construction sites. Building materials and construction waste exposed to stormwater can leach and contribute metals to waterways. During dry weather, the potential contribution of metals loading from Responsible Dischargers is low.²⁸⁶

- Waste Load Allocation Translation

- 1) Dry-weather Waste Load Allocation

The San Gabriel River Metals TMDL assigns concentration-based and mass-based waste load allocations for dry-weather discharges of copper and selenium. Non-Stormwater Discharges (NSWDs) are authorized in this General Permit if Order, Section IV.A terms and conditions are met to control the discharge of pollutants from the construction site. Order, Section IV.B prohibits all NSWDs not authorized under Order, Section IV.A; therefore, all unauthorized NSWDs must be either eliminated or have regulatory coverage under a separate NPDES permit. Authorized NSWDs, as defined in this

285 U.S. Environmental Protection Agency Region IX, [Total Maximum Daily Loads for Metals and Selenium San Gabriel River and Impaired Tributaries](https://www.waterboards.ca.gov/losangeles/water_issues/programs/tmdl/Established/San%20Gabriel%20River%20Metals%20TMDL/final_sangabriel_metalstmdl_3-27-07.pdf) (March 26, 2007) <https://www.waterboards.ca.gov/losangeles/water_issues/programs/tmdl/Established/San%20Gabriel%20River%20Metals%20TMDL/final_sangabriel_metalstmdl_3-27-07.pdf> [as of May 20, 2021] (San Gabriel River Metals TMDL)

286 San Gabriel River Metals TMDL, p. 22.

General Permit, are authorized because these discharges do not commingle with stormwater associated with construction activity. The Regional Water Board may impose additional requirements on NSWDS if deemed necessary per site-specific analysis.

2) Wet-weather Waste Load Allocations

The San Gabriel River Metals TMDL assigns a mass-based waste load allocation per construction area in kilograms per day (kg/d) for lead for discharges into the San Gabriel River Reach 2 watershed (all upstream reaches and tributaries) and Coyote Creek or its tributaries. The waste load allocations are shown in Table 69 and Table 70 below.

Table 69 – San Gabriel River Reach 2 Watershed Waste Load Allocation

Pollutant	Waste Load Allocation (kg/d)
Lead	0.8

Table 70 – Coyote Creek Watershed Waste Load Allocations

Pollutant	Waste Load Allocation (kg/d)
Copper	0.513
Lead	2.07
Zinc	3.0

The San Gabriel River Metals TMDL Implementation Plan²⁸⁷ requires incorporation of the waste load allocations in this General Permit as permit limitations expressed as event mean concentrations. The term permit limitation is defined in the TMDL compliance plan as “a water-quality based effluent limitation or a receiving water limitation...permittees may demonstrate compliance with wet-weather waste load allocations in any one of three ways. First, general industrial and construction storm water permittees may be deemed in compliance with permit limitations if they demonstrate that there are no exceedances of the permit limitations at their discharge points or outfalls. Second, general industrial and construction storm water permittees may be deemed in compliance with permit limitations if they demonstrate that there are no exceedances of the permit

287 Los Angeles Regional Water Quality Control Board, [Amendment to the Water Quality Control Plan – Los Angeles Region to Incorporate the Implementation Plan for the Total Maximum Daily Loads for Metals and Selenium in the San Gabriel River and Impaired Tributaries](https://www.waterboards.ca.gov/losangeles/water_issues/programs/tmdl/docs/R13-004_RB_BPA.pdf) (June 6, 2013) <https://www.waterboards.ca.gov/losangeles/water_issues/programs/tmdl/docs/R13-004_RB_BPA.pdf> [as of May 20, 2021] (San Gabriel River Metals TMDL Implementation Plan)

limitations in the receiving water at, or downstream of, the permittee's outfalls. Third, if permittees provide a quantitative demonstration that control measures and best management practices (BMPs) will achieve wet-weather waste load allocations consistent with the schedule in Table 7-20.2, then compliance may be demonstrated by implementation of those control measures and BMPs, subject to Executive Officer approval.”²⁸⁸

The assigned mass-based waste load allocations require site-specific calculations that are incompatible with the monitoring and reporting requirements in this General Permit. Therefore, it is consistent with the requirements and assumptions of the waste load allocations to implement the San Gabriel River Metals and Selenium TMDL Numeric Targets as concentration-based numeric action levels to align the mass-based waste load allocations to the requirements in this General Permit. The TMDL implementation plan provided Responsible Dischargers the three above-stated options for demonstrating waste load allocation compliance and the appropriate option is to implement the TMDL-specific numeric action levels at the point of discharge for the Responsible Discharger’s construction site. The assigned concentration-based numeric action levels are shown in Table 71 and Table 72 below. The units are converted from ug/L to mg/L to be consistent with the reporting units in SMARTS.

Table 71 – San Gabriel River Reach 2 Watershed Waste Load Allocation Translation (concentration-based, total recoverable)

Pollutant	Numeric Targets (ug/L)	Numeric Action Levels (mg/L)
Lead	166	0.166

Table 72 – Coyote Creek Watershed Waste Load Allocations (concentration-based, total recoverable)

Pollutant	Numeric Targets (ug/L)	Numeric Action Levels (mg/L)
Copper	27	0.027
Lead	106	0.106
Zinc	158	0.158

- Compliance Actions and Schedule

Responsible Dischargers shall comply with the requirements of this General Permit. Responsible Dischargers that discharge into the San Gabriel River and that identify on-site sources of copper, lead, and zinc through the required pollutant source assessment, shall compare all

non-visible sampling and analytical results to the applicable numeric action levels for the identified metals.

If an exceedance or failure of a BMP is observed, the Responsible Discharger shall evaluate the BMPs being used and identify and implement a strategy in the site's SWPPP to prevent potential exceedances of the numeric action levels in the future. Responsible Dischargers that perform the required pollutant source assessment and implement BMPs specific to preventing or controlling stormwater exposure to the metals sources are expected to meet the numeric action levels.

The San Gabriel River Metals TMDL's final compliance deadline was September 30, 2017. Since this compliance deadline has passed, the numeric action levels are applicable upon the effective date of this General Permit.

xiv. Santa Monica Bay Toxics TMDL²⁸⁹

The U.S. EPA adopted the Santa Monica Bay Toxics TMDL on March 26, 2012, to address the impairment for Santa Monica Bay due to DDTs and polychlorinated biphenyls (PCBs). Santa Monica Bay, as defined in this TMDL, is Point Dume to Point Vicente and the Palos Verdes shelf from Point Vicente to Point Fermin.

- Source Analysis

DDTs are organochlorine insecticides widely used in the past on agricultural crops and to control disease-carrying insects. The United States banned the use of DDTs in 1972, except for public health emergencies involving insect diseases and control of body lice. Although use of DDTs is limited, it can persist in the environment, adhering strongly to soil particles. PCBs are mixtures of up to 209 individual chlorinated compounds (known as congeners). In 1976, the manufacturing of PCBs was prohibited because of evidence that they build up in the environment and can cause harmful health effects. Similar to DDTs, PCBs adhere to soil and can be transported into watersheds via erosion and stormwater runoff. Studies within the watershed indicated that concentrations of DDTs and PCBs in stormwater may exceed human health criteria. Therefore, construction sites covered

289 U.S. Environmental Protection Agency Region IX, [Santa Monica Bay Total Maximum Daily Loads for DDTs and PCBs](#) (March 26, 2012), <https://www.waterboards.ca.gov/losangeles/water_issues/programs/tmdl/Established/SantaMonica/FinalSantaMonicaBayDDTPCBsTMDL.pdf> [as of May 20, 2021] (Santa Monica Bay Toxics TMDL)

under this General Permit are considered Responsible Dischargers for the Santa Monica Bay Toxics TMDL.

- Waste Load Allocation Translation

The Santa Monica Bay Toxics TMDL assigns mass-based waste load allocations of 0.16 g/yr for DDT and 0.82 g/yr for PCBs to be met at the construction site's discharge location(s) for discharges into Santa Monica Bay. The waste load allocations are based on the aggregate area represented by individual permittees covered under this General Permit, which is roughly 0.56 percent of the watershed's total area. Table 73 shows the waste load allocation below.

Table 73 – Santa Monica Bay Toxics Waste Load Allocations

Pollutant	Waste Load Allocation (g/yr)
DDTs	0.16
PCBs	0.82

Permittees covered under this General Permit are not expected to perform individual sampling. Requiring Responsible Dischargers to directly implement the waste load allocation and sample for the pollutant(s) would be impractical, costly, and not aligned with the requirements of this General Permit. However, as mentioned in the source analysis, most toxic pollutants loadings in this watershed are in particulate form and associated with wet-weather flows. Therefore, the following will address this TMDL:

- 1) Comply with the site-specific erosion and sediment control, and post-construction requirements in this General Permit.
- 2) For each phase of the construction project, install erosion controls that will result in predicted erosion rates that are as protective as pre-construction (e.g., undisturbed vegetation for the area) conditions. Calculate the predicted erosion rates by using RUSLE2 modeling as described in Attachment H.

- Compliance Actions and Schedule

Responsible Dischargers shall comply with the requirements of this General Permit. Responsible Dischargers that identify on-site sources of the toxic pollutants associated with the impaired water body, through the required pollutant source assessment, are to implement BMPs specific to preventing or controlling stormwater exposure to the toxic pollutants. Furthermore, Responsible Dischargers are to comply with the RUSLE 2 modeling requirements in Attachment H, Section I.G.2.

EXHIBIT "C" (Stormwater Pollution Prevention Plan)

The Los Angeles Regional Water Quality Control Board has not adopted an Implementation Plan or a compliance schedule for the toxic pollutants addressed by the Santa Monica Bay Toxics TMDL. Therefore, Responsible Dischargers are required to achieve compliance with the waste load allocations upon the effective date of this General Permit.

xv. San Diego Creek and Newport Bay Toxics TMDL ^{290,291}

The U.S. EPA adopted the San Diego Creek and Newport Bay Toxics TMDL on June 14, 2002, to address the impairments of San Diego Creek and Newport Bay due to cadmium, chlordane, chlorpyrifos, chromium, copper, DDT, diazinon, dieldrin, lead, mercury, polychlorinated biphenyls (PCBs), selenium, toxaphene, and zinc. However, the Santa Ana Regional Water Quality Control Board adopted a separate Revised Organochlorine Compounds (chlordane, DDT, dieldrin, PCBs, and toxaphene) TMDL on July 15, 2011, which revises the loading capacities in the U.S. EPA TMDL based on an updated impairment assessment. For the purpose of this General Permit and factsheet, both TMDLs will be addressed as a single San Diego Creek and Newport Bay Toxics TMDL.

- Source Analysis

The San Diego Creek and Newport Bay Toxics TMDL provides source analyses specific to the pollutant categories: metals, organochlorine compounds, chromium, and mercury. These pollutants are known to adsorb or adhere to sediment which are transported through the watershed via soil erosion and runoff. Surface runoff from natural background and man-made contributions are estimated to be the largest source of metals within San Diego Creek and its tributaries. The largest source of dissolved metals (except copper) to Upper and Lower Newport Bay are thought to be freshwater-borne loads from San Diego Creek. Likewise, the main source of continual loadings of organochlorine pollutants to the Newport Bay watershed is also attributed to erosion of

290 United States EPA, [Total Maximum Daily Loads for Toxic Pollutants San Diego Creek and Newport Bay, California](https://www.waterboards.ca.gov/santaana/water_issues/programs/tmdl/docs/sd_crk_nb_toxics_tmdl/summary0602.pdf) (June 14, 2002), <https://www.waterboards.ca.gov/santaana/water_issues/programs/tmdl/docs/sd_crk_nb_toxics_tmdl/summary0602.pdf> [as of May 20, 2021] (San Diego Creek and Newport Bay Toxics TMDL)

291 Santa Ana Regional Water Quality Control Board, [Revised Organochlorine Compounds TMDLs for San Diego Creek, Upper and Lower Newport Bay](https://www.waterboards.ca.gov/rwqcb8/water_issues/programs/tmdl/docs/oc/2011-0037/FINAL/R8-2011-0037_Attachment2_Final_BPA.PDF) (July 15, 2015),

<https://www.waterboards.ca.gov/rwqcb8/water_issues/programs/tmdl/docs/oc/2011-0037/FINAL/R8-2011-0037_Attachment2_Final_BPA.PDF> [as of May 20, 2021] (San Diego Creek and Newport Bay Toxics TMDL)

surface soils or in-stream sediments, primarily from San Diego Creek. Construction activities have the potential to exacerbate erosion within the watershed, therefore construction sites covered under this General Permit are considered Responsible Dischargers.

Chlorpyrifos, chromium, diazinon, dieldrin, mercury, and selenium are not translated for this General Permit as construction stormwater discharges are not identified as sources of these pollutants.

- Waste Load Allocation Translation

The San Diego Creek and Newport Bay Toxics TMDL assigns waste load allocations for various metals (cadmium, copper, lead, and zinc) and organochlorine compounds (chlordane, DDT, PCBs, and toxaphene) to Responsible Dischargers to be met at the site's discharge location(s) for dischargers into Newport Bay or San Diego Creek and its tributaries. The following list details the water bodies and their associated pollutants with assigned waste load allocations:

- 1) San Diego Creek: cadmium, copper, lead, zinc, DDT, and toxaphene

The San Diego Creek and Newport Bay Toxics TMDL assigns concentration-based waste load allocations for cadmium, copper, lead, and zinc to the category "Other NPDES permittees" which includes Responsible Dischargers in addition to seven other NPDES permits. The TMDL does not specifically identify construction stormwater dischargers as a major source of metals to the impaired waterbodies or divide the waste load allocations between permitted dischargers. Furthermore, the TMDL includes an option for the Water Boards to conduct a permit-specific analysis to divide the waste load allocations; however, conducting the analysis on a discharge flow, volume, and timing basis is not aligned with the framework of this General Permit.

The waste load allocations are assigned to Responsible Dischargers to be met at the construction site's discharge location(s) for discharges into San Diego Creek and its tributaries including the Santa Ana-Delhi Channel, Big Canyon Channel, East Costa Mesa Channel, and other tributaries into San Diego Creek (San Diego Creek Watershed). Therefore, these waste load allocations are translated as concentration-based numeric action levels applied at the point(s) of discharge from the Responsible Discharger's construction site. The waste load allocations are hardness dependent, meaning the receiving water body hardness must be known to calculate the waste load allocations.

EXHIBIT "C" (Stormwater Pollution Prevention Plan)

Receiving water body hardness is dependent on receiving water body flow. The U.S. EPA calculated the hardness-dependent criteria for cadmium, copper, lead, and zinc as shown in Table 5-2 of the San Diego Toxics TMDL with the following CTR equation:

$$\text{CMC} = \text{WER} \times (\text{Acute Conversion Factor}) \times (\exp\{m_A[\ln(\text{hardness})] + b_A\})$$

Where CMC stands for criterion maximum concentration, WER is the water effect ratio, and m_A and b_A are constants, specific to each metal. Hardness is defined as the concentration of calcium carbonate (CaCO_3) in the water column and has the units of milligram per liter (mg/L). Freshwater aquatic life criteria for certain metals are expressed as a function of hardness because hardness and/or water quality characteristics that are usually correlated with hardness can reduce or increase the toxicity of some metals. The site-specific hardness is used to calculate the metal numeric targets.

Only one hardness value is selected to be representative of the receiving water body instead of requiring Responsible Dischargers to sample for receiving water body hardness in concurrence with taking a discharge sample to calculate the metal criteria. This is consistent with the approach taken in many hardness-dependent TMDLs of assigning a hardness value based on existing data. The U.S. EPA and the Santa Ana Regional Water Quality Control Board staff evaluated daily flow records of the San Diego Creek for 19 years. The TMDL developed multiple receiving water hardness values based on flow and did not assign one hardness value to be representative of the San Diego Creek water body. A hardness of 197mg/L was calculated as the average hardness for large flows and is selected as the typical hardness value associated with a precipitation event flow at San Diego Creek. Table 5-2 of the San Diego Toxics TMDL shows how the California Toxics Rule (CTR) equation was used to calculate the acute concentration criteria at a hardness of 197 mg/L.

EXHIBIT "C" (Stormwater Pollution Prevention Plan)

Table 74 – San Diego Creek Watershed Waste Load Allocation Translation

Parameter	CTR Equation	Total Criteria with 197 hardness in mg/L	Total freshwater acute concentration Numeric Action Level mg/L*
Cadmium	$(\exp(1.128 \cdot \ln(\text{hardness}) - 3.6867))$	0.0097	0.0097
Copper	$(\exp(0.9422 \cdot \ln(\text{hardness}) - 1.7))$	0.027	0.027
Lead	$(\exp(1.273 \cdot \ln(\text{hardness}) - 1.460))$	0.194	0.194
Zinc	$(\exp(0.8473 \cdot \ln(\text{hardness}) + 0.884))$	0.21	0.21

*Values are rounded to reflect the significant figures of each respective pollutant

An average hardness of San Diego Creek was selected to calculate the criteria for translating each pollutant into a numeric action level in the San Diego Toxics TMDL because it is not feasible or practical to require Responsible Dischargers to collect the ambient hardness of the receiving water body in concurrence with each monitoring sample.

The Revised Organochlorine Compounds TMDL assigns mass-based waste load allocations for total DDT and toxaphene on an annual basis to Responsible Dischargers in the San Diego Creek watershed, shown in Table 76 below. Requiring Responsible Dischargers to calculate the construction site’s specific mass loading of a pollutant(s) would be impractical, costly, and not aligned with the requirements of this General Permit. However, as mentioned in the source analysis, most organochlorine compound loadings in this watershed are in the form of fine sediment transported through erosion. The TMDL’s implementation plan intends to use source control to reduce the loading of organochlorine compounds into the watershed, which is aligned with the requirements of this General Permit. Therefore, the following will address this TMDL:

- a) Comply with the site-specific erosion and sediment controls, and post-construction requirements in this General Permit.
- b) For each phase of the construction project, install erosion controls that will result in predicted erosion rates that are as protective as pre-construction (e.g., undisturbed vegetation for the area) conditions. Calculate the predicted erosion rates by using RUSLE2 modeling as described in Attachment H.

EXHIBIT "C" (Stormwater Pollution Prevention Plan)

- 2) Upper Newport Bay: cadmium, copper, lead, zinc, chlordane, DDT, and PCBs

Mass-based waste load allocations for dissolved cadmium, copper, lead, and zinc are assigned to be met in the receiving water of Upper Newport Bay. Concentration-based waste load allocations for cadmium, copper, lead, and zinc in Upper Newport Bay are assigned to Other NPDES Dischargers, which includes construction stormwater dischargers. However, the TMDL does not specifically identify construction stormwater dischargers as a major source of metals to the impaired waterbodies or divide the waste load allocations between permitted dischargers. The TMDL includes an option for the Water Boards to conduct a permit-specific analysis to divide the waste load allocations; however, conducting the analysis on a discharge flow, volume, and timing basis is not aligned with the framework of this General Permit. Therefore, these waste load allocations are translated as concentration-based numeric action levels applied to the point(s) of discharge from the Responsible Discharger's construction site. The concentration-based waste load allocations are translated into total concentrations using the CTR conversion factor for saltwater acute criteria. The numeric action levels are shown in Table 75 below.

The Revised Organochlorine Compounds TMDL assigns mass-based waste load allocations for chlordane, DDT, and PCBs on an annual basis to Responsible Dischargers in Upper Newport Bay, shown in Table 76 below. Requiring Responsible Dischargers to calculate the construction site's specific mass loading of a pollutant(s) would be impractical, costly, and not aligned with the requirements of this General Permit. However, as mentioned in the source analysis, most organochlorine compound loadings in this watershed are in the form of fine sediment transported through erosion. The TMDL's implementation plan intends to use source control to reduce the loading of organochlorine compounds into the watershed, which is aligned with the requirements of this General Permit. Therefore, the following will address this TMDL:

- a) Comply with the site-specific erosion and sediment controls, and post-construction requirements in this General Permit.
- b) For each phase of the construction project, install erosion controls that will result in predicted erosion rates that are as protective as pre-construction (e.g., undisturbed vegetation for the area) conditions. Calculate the predicted erosion rates by using RUSLE2 modeling as described in Attachment H.

EXHIBIT "C" (Stormwater Pollution Prevention Plan)

3) Lower Newport Bay: copper, lead, zinc, chlordane, DDT, and PCBs

Mass-based waste load allocations for dissolved copper, lead, and zinc are assigned to be met in the receiving water of Lower Newport Bay. Concentration-based waste load allocations for copper, lead, and zinc in Lower Newport Bay are assigned to Other NPDES Dischargers, which includes construction stormwater dischargers. However, the TMDL does not specifically identify construction stormwater dischargers as a major source of metals to the impaired waterbodies or divide the waste load allocations between permitted dischargers. The TMDL includes an option for the Water Boards to conduct a permit-specific analysis to divide the waste load allocations; however, conducting the analysis on a discharge flow, volume, and timing basis is not aligned with the framework of this General Permit. Therefore, these waste load allocations are translated as concentration-based numeric action levels applied to the point(s) of discharge from the Responsible Discharger's construction site. The concentration-based waste load allocations are translated into total concentrations using the CTR conversion factor for saltwater acute criteria. The numeric action levels are shown in Table 75 below.

The Revised Organochlorine Compounds TMDL assigns mass-based waste load allocations for chlordane, DDT, and PCBs on an annual basis to Responsible Dischargers in Lower Newport Bay, shown in Table 76 below. Requiring Responsible Dischargers to calculate the construction site's specific mass loading of a pollutant(s) would be impractical, costly, and not aligned with the requirements of this General Permit. However, as mentioned in the source analysis, most organochlorine compound loadings in this watershed are in the form of fine sediment transported through erosion. The TMDL's implementation plan intends to use source control to reduce the loading of organochlorine compounds into the watershed, which is aligned with the requirements of this General Permit. Therefore, the following will address this TMDL:

- a) Comply with the site-specific erosion and sediment controls, and post-construction requirements in this General Permit.
- b) For each phase of the construction project, install erosion controls that will result in predicted erosion rates that are as protective as pre-construction (e.g., undisturbed vegetation for the area) conditions. Calculate the predicted erosion rates by using RUSLE2 modeling as described in Attachment H.

EXHIBIT "C" (Stormwater Pollution Prevention Plan)

- 4) Rhine Channel Area of Lower Newport Bay: copper, lead, and zinc
- Mass-based waste load allocations for dissolved, copper, lead, and zinc are assigned to be met in the receiving water of the Rhine Channel. Concentration-based waste load allocations for copper, lead, and zinc in Lower Newport Bay are assigned to Other NPDES Dischargers, which includes construction stormwater dischargers. However, the TMDL does not specifically identify construction stormwater dischargers as a major source of metals to the impaired waterbodies or divide the waste load allocations between permitted dischargers. The TMDL includes an option for the Water Boards to conduct a permit-specific analysis to divide the waste load allocations; however, conducting the analysis on a discharge flow, volume, and timing basis is not aligned with the framework of this General Permit. Therefore, these waste load allocations are translated as concentration-based numeric action levels applied to the point(s) of discharge from the Responsible Discharger's construction site. The concentration-based waste load allocations are translated into total concentrations using the CTR conversion factor for saltwater acute criteria. The numeric action levels are shown in Table 75 below.

Table 75 – Upper Newport Bay, Lower Newport Bay and Bay Segments, and Rhine Channel Metals Waste Load Allocation Translation

Parameter	Dissolved saltwater acute TMDLs and allocations (ug/L)	CTR Conversion Factor for saltwater acute criteria	Total saltwater acute concentration Numeric Action Level (mg/L)
Cadmium*	42	0.994	0.042**
Copper	4.8	0.83	0.00578**
Lead	210	0.951	0.221**
Zinc	90	0.946	0.095**

*Applies to Upper Newport Bay only

**Values are rounded to reflect the significant figures of each respective pollutant

Table 76 – San Diego Creek, Upper Newport Bay and Lower Newport Bay Organochlorine Compounds Waste Load Allocations

Parameter	Total DDT (g/yr)	Chlordane (g/yr)	Total PCBs (g/yr)	Toxaphene (g/yr)
San Diego Creek	99.8			1.5
Upper Newport Bay	40.3	23.4	23.2	
Lower Newport Bay	14.9	8.6	60.7	

EXHIBIT "C" (Stormwater Pollution Prevention Plan)

- Compliance Actions and Schedule

- 1) Metals

Responsible Dischargers shall comply with the requirements of this General Permit. Responsible Dischargers that discharge into San Diego Creek, Upper Newport Bay, Lower Newport Bay, or the Rhine Channel and that identify on-site sources of cadmium, copper, lead, and zinc through the required pollutant source assessment, shall compare all non-visible sampling and analytical results to the applicable numeric action levels for the identified metals.

If an exceedance or failure of a BMP is observed, the Responsible Discharger shall evaluate the BMPs being used and identify and implement a strategy in the site's SWPPP to prevent potential exceedances of the numeric action levels in the future. Responsible Dischargers that perform the required pollutant source assessment and implement BMPs specific to preventing or controlling stormwater exposure to the metals' sources are expected to meet the numeric action levels.

The Santa Ana Regional Water Quality Control Board has not adopted an Implementation Plan or a compliance schedule for the metals addressed by the San Diego Creek and Newport Bay Toxics TMDL. Therefore, Responsible Dischargers are required to achieve compliance with the translated numeric action levels by the effective date of this General Permit.

- 2) Organochlorine Compounds

Responsible Dischargers shall comply with the requirements of this General Permit. Responsible Dischargers that identify on-site sources of organochlorine compounds associated with the impaired water body, through the required pollutant source assessment, are to implement BMPs specific to preventing or controlling stormwater exposure to the organochlorine compounds. Furthermore, Responsible Dischargers are to comply with the RUSLE2 modeling requirements in Attachment H, Section I.G.2.

The Revised Organochlorine Compounds TMDL's final compliance deadline for the TMDLs is December 31, 2020. Therefore, Responsible Dischargers shall comply with the requirements of this General Permit and the RUSLE2 modeling requirements in Attachment H, Section I.G.2, upon the effective date of this General Permit.

EXHIBIT "C" (Stormwater Pollution Prevention Plan)

xvi. Chollas Creek Metals TMDL²⁹²

The San Diego Regional Water Quality Control Board adopted the Chollas Creek Metals TMDL on June 13, 2007, to address the impairment of Chollas Creek due to dissolved copper, lead, and zinc.

- Source Analysis

The major urban runoff contributors of copper, lead, and zinc into Chollas Creek include freeways, commercial, and industrial land uses.²⁹³ Construction erosion is a potential source of metals in Chollas Creek.²⁹⁴ Sediment is assumed to not reside in Chollas Creek long enough to allow metal concentrations to build to high enough levels that the sediment becomes a source to the creek.²⁹⁵ However, construction sites covered under this General Permit are identified as Responsible Dischargers for the Chollas Creek Metals TMDL.

- Waste Load Allocation Translation

The Chollas Creek Metals TMDL assigns waste load allocations for dissolved copper, lead, and zinc to Responsible Dischargers to be met at the construction discharge location(s).

The waste load allocations for dissolved copper, lead, and zinc are concentration-based and set equal to 90 percent of the numeric targets, which is the CTR acute criteria, shown in Table 77 below.

292 San Diego Regional Water Quality Control Board, [A Resolution Adopting an Amendment to the Water Quality Control Plan for the San Diego Basin \(9\) to Incorporate Total Maximum Daily Loads for Dissolved Copper, Lead, and Zinc in Chollas Creek, Tributary to San Diego Bay, and to Revise the Toxic Pollutants Section of Chapter 3 to Reference the California Toxics Rule](https://www.waterboards.ca.gov/sandiego/water_issues/programs/tmdls/docs/chollas_creekmetals/update011509/R9-2007-0043_Signed.pdf) (June 2007)
<https://www.waterboards.ca.gov/sandiego/water_issues/programs/tmdls/docs/chollas_creekmetals/update011509/R9-2007-0043_Signed.pdf> [as of May 20, 2021] (Chollas Creek Metals TMDL)

293 Chollas Creek Metals TMDL, p. 3.

294 San Diego Regional Water Quality Control Board, [Total Maximum Daily Loads for Dissolved Copper, Lead, and Zinc in Chollas Creek, Tributary to San Diego Bay](https://www.waterboards.ca.gov/sandiego/water_issues/programs/tmdls/docs/chollas_creekmetals/update011509/Technical_Report.pdf) (May 2007)
<https://www.waterboards.ca.gov/sandiego/water_issues/programs/tmdls/docs/chollas_creekmetals/update011509/Technical_Report.pdf> [as of May 20, 2021] (Chollas Creek Metals TMDL Technical Report)

295 Chollas Creek Metals TMDL Technical Report, p. 49-50.

Table 77 – Chollas Creek Metals Waste Load Allocations

Pollutant	90 Percent of Dissolved Metal Concentration Numeric Targets (ug/L)
Dissolved Copper	$(0.90) \times (0.96) \times \exp(0.9422 \times \ln[\text{hardness}] - 1.700) \times \text{WER}$
Dissolved Lead	$(0.90) \times [1.46203 - 0.145712 \times \ln(\text{hardness})] \times \exp(1.273 \times \ln[\text{hardness}] - 1.460) \times \text{WER}$
Dissolved Zinc	$(0.90) \times (0.978) \times \exp(0.8473 \times \ln[\text{hardness}] + 0.884) \times \text{WER}$

The CTR acute criteria for dissolved copper, lead, and zinc are calculated using water effect ratios (WER), which represents the correlation between the concentrations present in the water column and the concentrations that are biologically available and toxic to aquatic life. The San Diego Regional Water Board adopted Resolution R9-2017-0015 which established site-specific WERs for dissolved copper (6.998) and zinc (1.711) in Chollas Creek. In the absence of a site-specific WER, such as for lead, a default value of 1.0 is used.

The CTR acute criteria calculation also requires receiving water body hardness, which results in a floating target that would differ at each sample because the receiving water body hardness is dependent on receiving water body flow. Hardness is defined as the concentration of calcium carbonate (CaCO₃) in the water column and has the units of milligram per liter (mg/L). Freshwater aquatic life criteria for certain metals are expressed as a function of hardness because hardness and/or water quality characteristics that are usually correlated with hardness can reduce or increase the toxicities of some metals.

Known site-specific hardness data is used to calculate the waste load allocation instead of requiring Responsible Dischargers to calculate their metal limit by sampling the receiving water body hardness in concurrence with taking a discharge sample. This is consistent with the approach taken in many hardness dependent TMDLs of assigning a hardness value based on existing data. Hardness data for Chollas Creek was obtained by Regional Board TMDL staff from California Integrated Water Quality System (CIWQS). Data analysis was conducted on hardness results from wet-weather sampling events from the Chollas Creek TMDL watershed with sample dates ranging from 1994 to 2017. All results obtained were marked as part of the Chollas Creek TMDL project, however not all stations had specific location information. Statistics run on the data set produced a hardness geometric mean of 94.07 mg/L. Table 78 below shows how the CTR equation was used to calculate the acute concentration criteria at a hardness of 94.07 mg/L.

EXHIBIT "C" (Stormwater Pollution Prevention Plan)

Table 78 – Chollas Creek Dissolved Metals Waste Load Allocation Translation

Pollutant	CTR equation	Total Criteria (ug/L) using hardness of 94.07 mg/L	90 Percent of Total Criteria as the Waste Load Allocation (ug/L)	Translated Numeric Effluent Limitations (mg/L)*
Copper	$6.998 \times (\exp(0.9422 \times \ln[\text{hardness}] - 1.7))$	92.4823777	83.23413993	0.083
Lead	$1 \times (\exp(1.273 \times \ln[\text{hardness}] - 1.460))$	75.5324136	67.97917227	0.068
Zinc	$1.711 \times (\exp(0.8473 \times \ln[\text{hardness}] + 0.884))$	194.6576544	175.181889	0.175

*Values are rounded to reflect the significant figures of each respective pollutant

A geometric mean hardness of Chollas Creek was selected to calculate the criteria for translating each pollutant into a numeric effluent limitation in the Chollas Creek Metals TMDL because it is not feasible or practical to require Responsible Dischargers to collect the ambient hardness of the receiving water body in concurrence with each monitoring sample. Therefore, Responsible Dischargers are assigned numeric effluent limitations for dissolved copper, lead, and zinc for discharges to Chollas Creek to be met at the construction site’s discharge location(s).

- **Compliance Actions and Schedule**

Responsible Dischargers shall comply with the requirements of this General Permit. Responsible Dischargers that discharge into Chollas Creek and that identify on-site sources of copper, lead, and zinc through the required pollutant source assessment, shall compare all non-visible sampling and analytical results to the applicable numeric effluent limitations for the identified metals.

If an exceedance or failure of a BMP is observed, the Responsible Discharger shall evaluate the BMPs being used and identify and implement a strategy in the site’s SWPPP to prevent potential exceedances of the numeric effluent limitations in the future.

Responsible Dischargers that perform the required pollutant source assessment and implement BMPs specific to preventing or controlling stormwater exposure to the metals’ sources are expected to meet the numeric effluent limitations.

The Chollas Creek Metals TMDL’s final compliance deadline is October 22, 2028. As an interim target, Responsible Dischargers shall apply the translated numeric effluent limitation values as numeric action levels up until the compliance date of October 22, 2028. Future reissuances of this General Permit may incorporate additional or revised compliance

requirements or interim targets to progress towards the required final compliance when a numeric effluent limitation applies.

EXHIBIT "C" (Stormwater Pollution Prevention Plan)

ATTACHMENT A

ACRONYMS AND TERMS

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES)
 GENERAL PERMIT FOR STORMWATER DISCHARGES ASSOCIATED
 WITH CONSTRUCTION AND LAND DISTURBANCE ACTIVITIES
 (GENERAL PERMIT)

Acronym or Term	Definition
ASBS	Areas of Special Biological Significance
ASTM	American Society of Testing and Materials; Standard Test Method for Particle-Size Analysis of Soils
ATS	Active Treatment System
BAT	Best Available Technology Economically Achievable
BCT	Best Conventional Pollutant Control Technology
BMP	Best Management Practice
BOD	Biochemical Oxygen Demand
CBPELSG	California Board of Professional Engineers, Land Surveyors and Geologists
CCR	California Code of Regulations
CEQA	California Environmental Quality Act
CFR	Code of Federal Regulations
CGP	NPDES General Permit for Stormwater Discharges Associated with Construction and Land Disturbance Activities
CIWQS	California Integrated Water Quality System
COI	Change of Information
CPESC	Certified Professional in Erosion and Sediment Control
CPSWQ	Certified Professional in Storm Water Quality
CSMP	Construction Site Monitoring Program
CTR	California Toxics Rule
CWA	Clean Water Act
CWC	California Water Code
DAR	Duly Authorized Representative
DDD	Dichlorodiphenyldichloroethane
DDE	Dichlorodiphenyldichloroethylene
DDT	Dichlorodiphenyltrichloroethane
DWQ	Division of Water Quality
ELAP	Environmental Laboratory Accreditation Program
ELG	Effluent Limitation Guidelines
JTU	Jackson Turbidity Units
LID	Low Impact Development
LOEC	Lowest Observed Effect Concentration
LRP	Legally Responsible Person

EXHIBIT "C" (Stormwater Pollution Prevention Plan)

LUP	Linear Underground and Overhead Projects
MATC	Maximum Allowable Threshold Concentration
MDL	Method Detection Limit
MRP	Monitoring and Reporting Program
MS4	Municipal Separate Storm Sewer System
NAL	Numeric Action Level
NEL	Numeric Effluent Limitation
NEPA	National Environmental Policy Act
NOAA	National Oceanic and Atmospheric Administration
NOEC	No Observed Effect Concentration
NOI	Notice of Intent
NONA	Notice of Non-Applicability
NOT	Notice of Termination
NPDES	National Pollutant Discharge Elimination System
NRCS	Natural Resources Conservation Service
NTR	National Toxics Rule
NTU	Nephelometric Turbidity Units
O&M	Operation and Maintenance
OC	Organochlorine
PAH	Polycyclic Aromatic Hydrocarbon
PCB	Polychlorinated Biphenyl
POTW	Publicly Owned Treatment Works
PRD	Permit Registration Document
Previous Permit	State Water Board Order 2009-009-DWQ, as amended by Orders 2010-0014-DWQ and 2012-0006-DWQ
QA/QC	Quality Assurance and Quality Control
QAPrP	Quality Assurance Program Plan
QSD	Qualified SWPPP Developer
QSP	Qualified SWPPP Practitioner
Regional Water Board	Regional Water Quality Control Board
RUSLE	Revised Universal Soil Loss Equation
RUSLE2	Revised Universal Soil Loss Equation 2
SMARTS	Stormwater Multiple Application and Report Tracking System
State Water Board	State Water Resources Control Board
SWAMP	Surface Water Ambient Monitoring Program
SWMM	Storm Water Management Model
SWPPP	Storm Water Pollution Prevention Plan
TDS	Total Dissolved Solids
TMDL	Total Maximum Daily Load
TSS	Total Suspended Solids
USC	United States Code
U.S. EPA	United States Environmental Protection Agency
USGS	United States Geological Survey

EXHIBIT "C" (Stormwater Pollution Prevention Plan)

Water Boards	Collectively, the State Water Resources Control Board and the Regional Water Quality Control Boards
WDID	Waste Discharge Identification Number
WLA	Waste Load Allocation
WER	Water Effect Ratio
WET	Whole Effluent Toxicity
WQO	Water Quality Objective
WQS	Water Quality Standard

EXHIBIT "C" (Stormwater Pollution Prevention Plan)

ATTACHMENT B

GLOSSARY

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES) GENERAL PERMIT FOR STORMWATER DISCHARGES ASSOCIATED WITH CONSTRUCTION AND LAND DISTURBANCE ACTIVITIES (GENERAL PERMIT)

70 Percent Final Cover

For final construction site stabilization, 70 percent final cover is the permanent vegetative cover that is evenly established over 70 percent of all disturbed and exposed areas of soil (non-paved or non-built). In areas that naturally have low vegetative coverage (e.g., deserts), 70 percent of natural conditions is acceptable.

Active Areas of Construction

Active areas of construction are all areas subject to land surface disturbance activities related to the project including, but not limited to, project staging areas, immediate access areas and storage areas. All previously active areas of construction are considered active areas (unless temporarily defined as inactive areas) until final stabilization is complete.

Active Treatment System

An active treatment system is a treatment technology that employs chemical coagulation, chemical flocculation, or electrocoagulation to reduce turbidity caused by fine suspended sediment, and/or to control pH levels. An active treatment system relies on enclosed computerized systems with pumps, filters, and real-time controls.

Acute Toxicity

Acute toxicity in water is caused by chemical stimuli that rapidly induce a negative effect on aquatic life; in aquatic toxicity tests, acute toxicity is demonstrated by an effect observed within 96 hours or less.

Aerial Deposition

Aerial deposition is the deposition of airborne particulates from construction activities or nearby activities that settle onto surfaces. Such particulates can include, but are not limited to, metals, nutrients, organics, sediment, and trash.

Ancillary Facility

An ancillary facility is a support area required for construction activities of the linear underground and overhead project permitted area. The ancillary facility may be located adjacent to or within the linear underground and overhead project alignment (i.e., transmission/distribution right-of-way) or may be regionally located away from the linear underground and overhead project alignment. Ancillary areas include, but are not limited to, new access roads, helicopter landing zones, laydown yards, staging areas, substations, valve stations, etc.

EXHIBIT "C" (Stormwater Pollution Prevention Plan)

Best Available Technology Economically Achievable (BAT)

As defined by U.S. EPA, BAT is a technology-based standard established by the Clean Water Act (CWA) § 304(b)(2) as the most appropriate means available on a national basis for controlling the direct discharge of toxic and nonconventional pollutants to navigable waters. The BAT effluent limitations guidelines, in general, represent the best existing performance of treatment technologies that are economically achievable within an industrial point source category or subcategory.

Best Conventional Pollutant Control Technology (BCT)

As defined by U.S. EPA, BCT is a technology-based standard established by the Clean Water Act (CWA) § 304(b)(4) for the discharge from existing industrial point sources of conventional pollutants including biochemical oxygen demand (BOD), total suspended sediment (TSS), fecal coliform, pH, and oil and grease.¹

Best Management Practices (BMPs)

BMPs are management practices and structural controls used to prevent or reduce the discharge of pollutants from runoff, spillage or leaks, sludge or waste disposal, or drainage from raw material storage to waters of the United States. BMPs include scheduling of activities, prohibitions of practices, operation and maintenance procedures, treatment, and vegetated infiltration basins amongst other practices.

Best Professional Judgment

Best professional judgement is a method used by permit writers to develop technology-based NPDES permit conditions on a case-by-case basis using all reasonably available and relevant data to establish technology-based limits or to determine other appropriate means to control its discharge (U.S. EPA NPDES Permit Writer's Manual 2010).

Chain of Custody Form

The Chain of Custody form is used to track sample handling as samples progress from sample collection to the analytical laboratory. The Chain of Custody form is then used to track the resulting analytical data from the laboratory to the client. Chain of Custody forms can be obtained from an analytical laboratory upon request.

Coagulation

Coagulation is the clumping of particles in a discharge to settle out impurities, often induced by chemicals such as lime, alum, and iron salts.

Common Plan of Development or Sale

A common plan of development or sale is a contiguous area where multiple separate and distinct construction activities may be taking place at different times on different schedules under one common plan. The "common plan" of development or sale is broadly defined as any announcement or piece of documentation (including a sign, public notice or hearing, sales pitch, advertisement, drawing, permit application, zoning request, computer design, etc.) or physical demarcation (including boundary signs, lot

¹ U.S. EPA. [Learn about Effluent Guidelines](https://www.epa.gov/eg/learn-about-effluent-guidelines#BCT). Web. <<https://www.epa.gov/eg/learn-about-effluent-guidelines#BCT>> [as of October 19, 2020]

stakes, surveyor markings, etc.) indicating construction activities may occur on a specific plot. However, broad planning documents, such as land use master plans, conceptual master plans, or broad-based California Environmental Quality Act (CEQA) or National Environmental Policy Act (NEPA) documents that identify potential projects for an agency or facility are not considered common plans of development. For construction projects within a larger common plan of development or sale located at least one-quarter mile apart and the area between the projects is not being disturbed, each individual project may be regulated as a separate construction project if land for interconnecting road, pipeline, or utilities that is part of the same common plan is not concurrently being disturbed.

Construction Site Monitoring Program

Construction site monitoring program is a description of methods and procedures for monitoring discharges at a construction site.

Conveyance System

Conveyance system is a sewer, ditch, pipe, hose, swale, or any engineered feature that is designed to convey water or any combination of such components.

Debris

Debris is litter, rubble, discarded refuse, or remains of destroyed inorganic anthropogenic waste.

Demolition and Pre-Development Site Preparation

Demolition and pre-development site preparation is a construction stage including demolition of existing structures that expose soil, rough grading and/or disking, clearing and grubbing operations, or any soil disturbance prior to mass grading.

Detected Not Quantifiable

Detected not quantifiable is a sample result that is between the method detection limit and the minimum level or reporting limit.

Detention

Detention is the temporary storage of stormwater to improve quality or reduce the volumetric flow rate of discharge or both.

Dewatering

Dewatering is the process of removing excess water in an excavation or impoundment by pumping or other mechanical means.

Discharge Location

Discharge location is a common outlet from a construction site drainage area where stormwater, authorized non-stormwater, or dewatering discharge leaves the site or project boundary, or enters any on-site waters of the United States (e.g., a creek running through a site).

EXHIBIT "C" (Stormwater Pollution Prevention Plan)

Discharger

The discharger is a person as defined in Water Code, § 13050(c), which includes companies and governmental bodies, subject to this General Permit. The discharger is responsible for compliance with this Permit, including work done by QSDs, QSPs, and QSP delegates. The following persons may serve as the discharger:

1. A person, company, agency, or other entity that possesses a real property interest (including, but not limited to, fee simple ownership, easement, leasehold, or other rights of way) in the land upon which the construction or land disturbance activities will occur for the regulated site.
2. For linear underground and overhead projects, the utility company, municipality, or other public or private company or agency that owns or operates the linear underground or overhead project.
3. For land controlled by an estate or similar entity, the person who has day-to-day control over the land (including, but not limited to, a bankruptcy trustee, receiver, or conservator).
4. For pollution investigation and remediation projects, any potentially responsible party that has received permission to conduct the project from the holder of a real property interest in the land.
5. For U.S. Army Corps of Engineers projects, the U.S. Army Corps of Engineers may provide written authorization to its bonded contractor to serve as the discharger, provided the U.S. Army Corps of Engineers is also responsible for compliance with the General Permit, as authorized by the Clean Water Act or the Federal Facilities Compliance Act.
6. For projects on public lands, a public agency with a real property interest in the land may provide written authorization via an encroachment permit to another public agency to serve as the discharger, provided that both public agencies remain responsible for compliance with this General Permit.

A contractor is qualified to be a discharger if the contractor satisfies one of the requirements above.

Dose Rate

In applied chemistry, dose rate is dose of a chemical per time unit (e.g., mg/day), sometimes also called dosage or injection rate.

Drainage Area

Drainage area is the area of land that drains water, sediment, pollutants, and dissolved materials to a common outlet or discharge location.

Duly Authorized Representative (DAR)

A Duly Authorized Representative is a named individual or position that has responsibility for the overall operation of the regulated construction project or activities

including, but not limited to, a superintendent, project manager, or other positions of equivalent or higher responsibility. Additionally, an individual or position that has overall responsibility for environmental matters for the owner or company may be designated as a Duly Authorized Representative. The Legally Responsible Person designates the Duly Authorized Representative through SMARTS, authorizing the Duly Authorized Representative to sign, certify, and electronically submit Permit Registration Documents, Notices of Termination, and any other supporting documents, reports, or information required by this General Permit, the State or Regional Water Boards, or U.S. EPA. A Duly Authorized Representative cannot be a contractor, consultant, or other third party.

Effective Date

An effective date is a date set by the State Water Resources Control Board (State Water Board) during the adoption of an Order, for the date that at least one or more of the Order provisions take effect and the previous Order is rescinded.

Effluent

Effluent is any discharge either to the receiving water or beyond the property boundary controlled by the discharger.

Effluent Limitation

An effluent limitation is any numeric or narrative restriction imposed on quantities, discharge rates, and concentrations of pollutants which are discharged from point sources into waters of the United States, the waters of the contiguous zone, or the ocean.

Erosion

Erosion is the process, by which soil particles are detached and transported by the actions of wind, water, or gravity.

Erosion Control BMPs

Erosion control BMPs is vegetation, such as grasses and wildflowers, and other materials, such as straw, fiber, stabilizing emulsion, protective blankets, rolled erosion control product, etc., placed to stabilize areas of disturbed soils, reduce loss of soil due to the action of water or wind, and prevent water pollution.

Field Measurements

Field measurements are results of testing procedures performed in the field with portable field-testing kits or meters.

Final Stabilization

Final stabilization is established when all soil disturbing activities at each individual parcel within the construction site have been completed, and the establishment of a permanent vegetative cover, or equivalent permanent stabilization measures (such as riprap, gabions, or geotextiles) to prevent erosion in a manner consistent with the requirements in this General Permit.

EXHIBIT "C" (Stormwater Pollution Prevention Plan)

First Order Stream

A first order stream is a stream with no tributaries.

Flocculants

Flocculants are substances which promote the clumping of particles.

Forecasted Precipitation Event

Forecasted precipitation event is any weather pattern that is forecasted to have a 50 percent or greater chance of producing 0.5 inches of precipitation in a 24-hour period in the project area. The discharger shall obtain precipitation forecast information from the [National Weather Service Forecast Office](https://forecast.weather.gov) (e.g., by entering the zip code of the project's location at <https://forecast.weather.gov>). Precipitation events end when there are two sequential 24-hour periods with less than 0.25 inches of precipitation forecast for each period.

Full Capture System

A full capture system is a treatment control, or series of treatment controls, including but not limited to, a multi-benefit project or a low impact development control that traps all particles that are 5mm or greater, and has a design treatment capacity that is either:

1. Of not less than the peak flow rate, Q, resulting from a one-year, one-hour, storm in the subdrainage area; or
2. Appropriately sized to, and designed to, carry at least the same flows as the corresponding storm drain.

Full Capture System Equivalency

Full capture system equivalency is the trash load that would be reduced if full capture systems were installed, operated, and maintained for all storm drains that capture runoff from the relevant areas of land (e.g., facilities or sites regulated by NPDES permits for discharges of stormwater associated with industrial activity, including construction activity). The full capture system equivalency is a trash load reduction target that the permittee quantifies by using an approach, and technically acceptable and defensible assumptions and methods for applying the approach, subject to the approval of the permitting authority.

Good Housekeeping BMPs

Good housekeeping BMPs are designed to reduce or eliminate the addition of pollutants to construction site runoff through analysis of pollutant sources, implementation of proper handling/disposal practices, employee education, and other actions.

Grading and Land Development Phase

Grading and land development phase includes reconfiguring the topography and slope, including: alluvium removals; canyon cleanouts; rock undercuts; keyway excavations; landform grading; and stockpiling of select material for capping operations.

EXHIBIT "C" (Stormwater Pollution Prevention Plan)

Groundwater

Groundwater is water that exists underground in saturated zones beneath the land surface.

Hydraulically Downgradient

Hydraulically downgradient is the direction of stream flow towards a lower elevation.

Hydromodification

Hydromodification is the alteration of the hydrologic characteristics of coastal and non-coastal waters, which in turn could cause degradation of water resources.

Hydromodification can cause excessive erosion and/or sedimentation rates, causing excessive turbidity, channel aggradation and/or degradation.

Inactive Project

Inactive project is where all construction activities (including passive treatment technology, active treatment systems, and/or active equipment), are fully stabilized and will be suspended for 30 days or more.

Infeasible

Infeasible means that the discharger has demonstrated that the specific requirement is not technologically possible, or not economically practicable and achievable in light of best industry practices.

K Factor

The K factor is the soil erodibility factor used in the Revised Universal Soil Loss Equation (RUSLE). The K factor represents the combination of detachability of the soil, runoff potential of the soil, and the transportability of the sediment eroded from the soil.

Legally Responsible Person

The Legally Responsible Person is a representative of a permittee and signatory that is legally designated to sign, certify, and electronically submit any documents required by the General Permit, the State or Regional Water Board, or U.S. EPA. An LRP must be one of the following:

1. For a corporation or limited liability company: a responsible corporate officer. For the purpose of this section, a responsible corporate officer means: (a) a president, secretary, treasurer, or vice-president of the corporation in charge of a principal business function, or any other person who performs similar policy or decision-making functions for the corporation or limited liability company; or (b) the manager of the facility if authority to sign documents has been assigned or delegated to the manager in accordance with corporate procedures;
2. For a partnership or sole proprietorship: a general partner or the proprietor, respectively;
3. For a municipality, state, federal, or other public agency: a principal executive officer, ranking elected official, city manager, council president, or any other authorized

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public employee with managerial responsibility over the construction or land disturbance project (including, but not limited to, project manager, project superintendent, or resident engineer);

4. For an individual: the individual; or
5. For any type of entity not listed above (e.g., trusts, estates, receivers): an authorized person with managerial authority over the construction or land disturbance project.

Maximum Allowable Threshold Concentration

Maximum allowable threshold concentration is the allowable concentration of residual, or dissolved, coagulant/flocculant in effluent. The MATC shall be coagulant/flocculant-specific, and based on toxicity testing conducted by an independent, third-party laboratory. Typically, the MATC is equal to the geometric mean of the NOEC (No Observed Effect Concentration) and LOEC (Lowest Observed Effect Concentration) Acute and Chronic toxicity results for most sensitive species determined for the specific coagulant. The most sensitive species test shall be used to determine the MATC.

Method Detection Limit

Method detection limit is the minimum concentration of a substance that can be measured and reported with 99 percent confidence that the analyte concentration is greater than zero.

Minimum Level or Reporting Limit

Minimum level or reporting limit is the lowest level at which the entire analytical system must give a recognizable signal and acceptable calibration point for the analyte. It is equivalent to the concentration of the lowest calibration standard in a method, assuming that all method-specified sample weights, volumes, and cleanup procedures have been employed.

Multi-Benefit Project

Multi-benefit project is a treatment control project designed to achieve the benefits set forth in California Water Code § 10562, subdivision (d). Examples include projects designed to: infiltrate, recharge, or store stormwater for beneficial reuse; develop or enhance habitat and open space through stormwater and non-stormwater management; and/or reduce stormwater and non-stormwater runoff volume.

Natural Channel Evolution

Natural channel evolution is the physical trend in channel adjustments following a disturbance that causes the river to have more energy and degrade or aggrade more sediment. Channels have been observed to pass through 5 to 9 evolution types. Once a channel passes through the suite of evolution stages, the channel will rest in a new state of equilibrium.

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Non-Detect

Non-detect is a sample result represented by “ND” in which the concentration of the subject pollutant analyte is less than the method detection limit, and therefore not detectable by the laboratory method and/or equipment used.

Non-Stormwater Discharges

Non-stormwater discharges are discharges that do not originate from precipitation events. They can include, but are not limited to, discharges of process water, air conditioner condensate, non-contact cooling water, vehicle wash water, sanitary wastes, concrete washout water, paint wash water, irrigation water, dust control over-wetting, or pipe testing water.

Non-Stormwater Pollution Controls

Non-stormwater pollution controls are the general site and materials management measures that directly or indirectly aid in minimizing the non-stormwater originated discharge of sediment and other construction related pollutants from the construction site.

Non-Structural Controls

Non-structural controls are best management practices that do not involve a structured or engineered solution. Non-structural controls include measures including education, site planning, and stormwater management regulations.

Non-Visible Pollutants

Non-visible pollutants associated with a specific site or activity that can have a negative impact on water quality but cannot be seen through observation (e.g., chlorine).

Numeric Action Level

A numeric action level (e.g., a pH range, turbidity value, or concentration) is a level that triggers a required evaluation of the effectiveness of best management practices implemented on the subject construction site, and the required implementation of additional corrective actions necessary to reduce the subject pollutant below the numeric action level. The numeric action level compliance location applies to each sample location and/or corresponding discharge location.

Numeric Action Level Exceedance

Non-TMDL numeric action level exceedance: A numeric action level exceedance occurs when the field reading for the one sample taken during each day of a qualifying precipitation event at each sample and/or discharge location, exceeds an applicable numeric action level. A numeric action level exceedance is not a violation of this General Permit. A discharger failing to report and failing to modify implementation of its best management practices to prevent further numeric action level exceedance(s), is a violation of this General Permit.

TMDL-related numeric action level exceedance: A TMDL-related numeric action level exceedance occurs on the second, and each subsequent, analytical result for samples taken from any and all discharge location(s) within the same drainage area, during the

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same reporting year and taken in accordance with Attachment D or E Section III.D.3, that is above the concentration set forth in an applicable numeric action level. A numeric action level exceedance is not a violation of this General Permit; however, it is a violation when the discharger fails to report and respond to the numeric action level exceedance(s).

Numeric Effluent Limitation

Numeric effluent limitation is a technology-based or water quality-based limit (e.g., pH range, turbidity value, or concentration) established for discharges covered under this General Permit. The numeric effluent limitation compliance location(s) applies to each sample and/or discharge location at the point of discharge from an active treatment system if applicable.

Numeric Effluent Limitation Exceedance

Active treatment system numeric effluent limitation exceedance: An active treatment system numeric effluent limitation exceedance occurs when the analytical result for the samples taken during operation of an active treatment system exceeds an applicable numeric effluent limitation. A numeric effluent limitation exceedance is a violation of this General Permit and subject to mandatory minimum penalties.

TMDL-related numeric effluent limitation exceedance: A TMDL-related numeric effluent limitation exceedance occurs on the second, and each subsequent, analytical result for samples taken from any and all discharge location(s) within the same drainage area, during the same reporting year and taken in accordance with Attachment D or E Section III.D.3, that is above the concentration set forth in an applicable numeric effluent limitation. Each numeric effluent limitation exceedance after the first instance is a violation of this General Permit and subject to mandatory minimum penalties.

Passive Treatment

Passive treatment is the application of natural or synthetic chemicals and products to reduce turbidity in discharges through coagulation and flocculation. Passive treatment does not rely on computerized, enclosed systems with pumps, filters, and real-time controls. Passive treatment may include pumps where they are necessary to move water around the construction site.² Passive treatment products are available in a variety of forms and may be land-applied for soil stabilization (e.g., bonded fiber matrixes, hydromulches) or water-applied for sediment removal (e.g., liquid treatment chemicals, powders, slow-releasing solid blocks/socks).

Permanent Control Measures

Permanent control measures are the erosion prevention materials designed to provide long-term protection to underlying soils. This may include, but is not limited to buildings, paving a uniform (evenly distributed, without large bare areas) perennial vegetative cover, riprap, gabions, or biodegradable rolled erosion control products (RECP).

² [U.S. EPA. 2017 Construction General Permit](https://www.epa.gov/npdes/epas-2017-construction-general-permit-cgp-and-related-documents). Web. January 11, 2017.

<<https://www.epa.gov/npdes/epas-2017-construction-general-permit-cgp-and-related-documents>> [as of October 19, 2020]

pH

pH is the unit universally used to express the intensity of the acid or alkaline condition of a water sample. The pH of natural waters tends to range between 6 and 9, with neutral being 7. Extremes of pH can have deleterious effects on aquatic systems.

Post-Construction BMPs

Post-construction BMPs are structural and non-structural controls which detain, retain, infiltrate, and/or filter out pollutants discharged to receiving waters after a construction project is completed. Low impact development features are considered a type of post-construction BMP.

Precipitation Event

Precipitation event is any weather pattern that results in precipitation (rain, snow, sleet, or hail).

Programmatic Permitting

Programmatic permitting is an approach for linear underground and overhead project dischargers to obtain General Permit coverage for multiple non-contiguous sites with similar scope and construction activities, that are located within one Regional Water Board boundary and have the same Legally Responsible Person.

Project

Project is the area that includes sites where land is disturbed and also includes the areas of activities that do not disturb land.

Property Boundary

Property boundary or the area enclosed by the property lines. Property boundary includes project area and sites.

Qualified SWPPP Developer (QSD)

Qualified SWPPP developer is a qualified stormwater professional authorized by the discharger to develop and revise SWPPPs.

Qualified SWPPP Practitioner (QSP)

Qualified SWPPP practitioner is a qualified stormwater professional authorized by the discharger to conduct non-stormwater and stormwater visual observations, sampling, and implementation of all elements of the SWPPP.

Qualifying Precipitation Event

Qualifying precipitation event is any weather pattern that is forecast to have a 50 percent or greater Probability of Precipitation (PoP) and a Quantitative Precipitation Forecast (QPF) of 0.5 inches or more within a 24-hour period. The event begins with the 24-hour period when 0.5 inches has been forecast and continues on subsequent 24-hour periods when 0.25 inches of precipitation or more is forecast.

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R Factor

R factor is the erosivity factor used in the Revised Universal Soil Loss Equation (RUSLE). The R factor represents the erosivity of the climate at a particular location. An average annual value of R is determined from historical weather records using erosivity values determined for individual storms. The erosivity of an individual storm is computed as the product of the storm's total energy, which is closely related to storm amount, and the storm's maximum 30-minute intensity.

Regional Water Quality Control Board (Regional Water Board)

A Regional Water Board is a semi-autonomous board comprised of board members appointed by the Governor and confirmed by the state Senate. California has nine Regional Water Boards with jurisdictions based on watersheds. A Regional Water Board may delegate its authority to the executive officer to the board, or other designated staff.

Remaining Sub-Sampled Material

Remaining sub-sampled material is the material (for example: organic material, gravel, etc.) that remains after the organisms to be identified have been removed from the subsample for identification. (Generally, no macroinvertebrates are present in the remaining subsampled material, but the sample needs to be checked and verified using a complete Quality Assurance (QA) plan).

Reporting Period

A reporting period is a specified period of time in which pertinent report information is applicable. For example, a standard reporting period in this Order is July 1 through June 30 of each year.

Responsible Discharger

Responsible dischargers are dischargers who:

1. Discharge stormwater and authorized non-stormwater directly, or through a municipal separate sewer system (MS4) or other conveyance, to impaired water bodies or watersheds identified in a U.S. EPA-approved TMDL with a waste load allocation assigned to construction stormwater sources; and
2. Have identified, through the site-specific pollutant source assessment, that one or more pollutants specific to the TMDL are present on-site with the potential to enter construction stormwater discharges.

Revised Universal Soil Loss Equation (RUSLE)

Revised universal soil loss equation is the empirical model that calculates average annual soil loss as a function of rainfall and runoff erosivity, soil erodibility, topography, erosion controls, and sediment controls.

Revised Universal Soil Loss Equation 2 (RUSLE2)

Revised universal soil loss equation 2 is the updated Windows®-based empirical model that calculates average annual soil loss as a function of rainfall and runoff erosivity, soil

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erodibility, topography, erosion controls, and sediment controls. This includes subsequent equivalent versions of this model.

Routine Maintenance

Routine maintenance are activities intended to maintain the original line and grade, hydraulic capacity, and/or original purpose of a facility. The Order further defines routine maintenance (Section II.B.1) for road and highway projects as the replacement of the structural section, but not when the activity exposes the underlying soil or erodible subgrade. The road surface and base are not part of the subgrade. As such, those portions of a project that remove the paved road surface and base down to the erodible subgrade and/or underlying soil would not be considered routine maintenance.

Runoff Control BMPs

Runoff control BMPs are designed to control the peak volume and flow rate, or prevent scour due to concentrated flows.

Run-on

Run-on are discharges that originate offsite and flow onto the property of a separate project site.

Sampling Location

Sampling location for traditional construction projects: An identified discharge location where samples of stormwater, non-stormwater, or dewatering discharges are obtained to determine compliance with requirements in this General Permit.

Sampling location for linear underground and overhead projects: An identified discharge location, representative of the project's construction activities, where samples of stormwater, non-stormwater, or dewatering discharges are obtained to determine compliance with requirements in this General Permit.

Secondary Containment

Secondary containment is a device or control measure in addition to the primary containment that is used to stop a discharge of pollutants or hazardous material from leaving a specified area.

Sediment

Sediment is solid particulate matter, both mineral and organic, that is in suspension, is being transported, or has been moved from its site of origin by air, water, gravity, or ice and has come to rest on the earth's surface either above or below sea level.

Sediment Control BMPs

Sediment control BMPs are practices and controls that trap soil particles after erosion by rain, flowing water, or wind. They include those practices that intercept and slow or detain the flow of stormwater to allow sediment to settle and be trapped (e.g., silt fence, sediment basin, fiber rolls, etc.).

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Sedimentation

Sedimentation is the process of deposition of suspended matter carried by water, wastewater, or other liquids, by gravity. It is usually accomplished by reducing the velocity of the liquid below the point at which it can transport the suspended material.

Sensitive Watershed

Sensitive watershed is a watershed draining into a receiving water body listed on the State Water Board's approved CWA 303(d) list for sedimentation/siltation, turbidity, or a water body designated with beneficial uses of cold, spawn, and migratory.

Settleable Solids

Settleable solids is a solid material that can be settled within a water column during a specified time frame. It is typically tested by placing a water sample into an Imhoff settling cone and then allowing the solids to settle by gravity for a given length of time. Results are reported either as a volume of milliliter per liter (mL/L) or as a concentration (milligrams per liter (mg/L)).

Sheet Flow

Sheet flow is overland flow of water that occurs in areas where there are no defined channels where the water spreads out over a large area at a uniform depth.

Site

A site is the area disturbed where the construction activity is physically located or conducted, including staging, storage, and access areas.

Site Operating Hours

Site operating hours are the time periods when the site is staffed to conduct any function related to the construction activity.

Soil Amendment

A soil amendment is any material that is added to the soil to change its chemical properties, engineering properties, or erosion resistance that could become mobilized by stormwater.

Source

Source is any construction activity, material, or area that causes or contributes to pollutants in stormwater.

Stormwater

Stormwater is rain, snowmelt, or any other liquid or solid precipitation that may result in runoff, and drainage from a site.

Streets and Utilities Phase

Streets and utilities phase is the construction stage including excavation and street paving, lot grading, curbs, gutters and sidewalks, public utilities, public water facilities including fire hydrants, public sanitary sewer systems, storm sewer system, and/or other drainage improvements.

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Structural Controls

Structural controls are any structural facility or fabrication designed and constructed to mitigate the adverse impacts of stormwater and urban runoff pollution.

Surface Runoff

Surface runoff is the portion of stormwater that does not infiltrate into the ground or evaporate, but instead flows overland onto adjacent land or watercourses or is routed to stormwater conveyance systems.

Topsoil

Topsoil is the uppermost part of the soil profile, which is the most favorable material for plant growth. It is typically rich in organic matter.

Total Maximum Daily Load (TMDL)

A TMDL is the sum of the maximum amount of a pollutant that a waterbody can receive per day and still meet state water quality standards. It is the sum of the individual Waste Load Allocations (WLAs) for point sources, the load allocations for nonpoint and natural background sources, and the margin of safety.

Total Suspended Solids (TSS)

The measure of total suspended solids is the measure of the suspended solids in a water sample which includes inorganic substances, such as soil particles and organic substances, such as algae, aquatic plant/animal waste, particles related to industrial/sewage waste, etc. The TSS test measures the concentration of suspended solids in water by measuring the dry weight of a solid material contained in a known volume of a sub-sample of a collected water sample. Results are reported in mg/L.

Toxicity

Toxicity is the adverse response(s) of organisms to chemicals or physical agents ranging from mortality to physiological responses such as impaired reproduction or growth anomalies.

Trash

Trash is all improperly discarded solid material from any production, manufacturing, or processing operation including, but not limited to, products, product packaging, or containers constructed of plastic, steel, aluminum, glass, paper, or other synthetic or natural materials.

Tributary

Tributary is a smaller river or stream that flows into a larger river or stream.

Turbidity

Turbidity is the optical condition and cloudiness of water caused by suspended or dissolved particles or colloids. Turbidity is quantified by the degree to which light traveling through a water column is scattered by the suspended organic and inorganic particles it contains. The turbidity test is reported in Nephelometric Turbidity Units (NTU) or Jackson Turbidity Units (JTU) with a calibrated turbidity meter.

Vertical Construction Phase

Vertical construction phase is the build out of structures from foundations to roofing, including rough landscaping.

Waste Load Allocation (WLA)

Waste load allocation is the portion of a receiving water's loading capacity that is allocated to one of its existing or future point sources of pollution.

Water Effect Ratio (WER)

Water effect ratio is a factor that can be used per U.S. EPA water quality criteria (WQC) regulations, to customize national aquatic life criteria to reflect site-specific water column conditions. The WER is used to derive site-specific criteria that maintain the level of protection of aquatic life intended by the "Guidelines for deriving numerical national WQC" (U.S. EPA 1985).

Waters of the United States

Waters of the United States is defined by the federal Environmental Protection Agency in 40 Code of Federal Regulations § 122.2.

Water Quality Objectives (WQO)

Water quality objectives are defined in the California Water Code as limits or levels of water quality constituents or characteristics, which are established for the reasonable protection of beneficial uses of water or the prevention of nuisance within a specific area.

Water Quality Standards

Water quality standards consists of beneficial uses, water quality objectives to protect those uses, an antidegradation policy, and policies for implementation. Water quality standards are established in Regional Water Quality Control Plans (Basin Plans) and statewide Water Quality Control Plans. U.S. EPA has also adopted water quality criteria (the same as objectives) for California in the National Toxics Rule and California Toxics Rule.

EXHIBIT "C" (Stormwater Pollution Prevention Plan)

ATTACHMENT C

CONTACTS

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES)
GENERAL PERMIT FOR STORMWATER DISCHARGES ASSOCIATED
WITH CONSTRUCTION AND LAND DISTURBANCE ACTIVITIES
(GENERAL PERMIT)

State Water Resources Control Board

www.waterboards.ca.gov

P.O. Box 1977

Sacramento, CA 95812-1977

stormwater@waterboards.ca.gov

Division of Financial Assistance: (916) 341-5700

Division of Water Quality: (916) 341-5455

Office of Enforcement: (916) 341-5272

Office of Public Affairs: (916) 341-5254

Office of Legislative Affairs: (916) 341-5251

Office of the Ombudsman: (916) 341-5254



STATE WATER RESOURCES CONTROL BOARD
REGIONAL WATER QUALITY CONTROL BOARDS

EXHIBIT "C" (Stormwater Pollution Prevention Plan)

ATTACHMENT C

Regional Water Quality Control Board Stormwater Program Contacts

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CENTRAL COAST REGION (3)

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(805) 549-3147

CENTRAL VALLEY REGION (5S)

r5s_stormwater@waterboards.ca.gov
11020 Sun Center Drive, Suite 200
Rancho Cordova, CA 95670-6114
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FRESNO BRANCH OFFICE (5F)

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SANTA ANA REGION (8)

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3737 Main Street, Suite 500
Riverside, CA 92501-3348
(951) 782-4130

SAN FRANCISCO BAY REGION (2)

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1515 Clay Street, Suite 1400
Oakland, CA 94612
(510) 622-2402

LOS ANGELES REGION (4)

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Los Angeles, CA 90013
(213) 576-6600

REDDING BRANCH OFFICE (5R)

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LAHONTAN REGION (6SLT)

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South Lake Tahoe, CA 96150
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Palm Desert, CA 92260
(760) 346-7491

SAN DIEGO REGION (9)

r9_stormwater@waterboards.ca.gov
2375 Northside Drive, Suite 100
San Diego, CA 92108-2700
(619) 516-1990

STORMWATER STAFF DIRECTORY

https://www.waterboards.ca.gov/water_issue_s/programs/stormwater/contact.html



STATE WATER RESOURCES CONTROL BOARD
REGIONAL WATER QUALITY CONTROL BOARDS

EXHIBIT "C" (Stormwater Pollution Prevention Plan)

ATTACHMENT D

TRADITIONAL CONSTRUCTION RISK LEVEL REQUIREMENTS

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES)
GENERAL PERMIT FOR STORMWATER DISCHARGES
ASSOCIATED WITH CONSTRUCTION AND LAND DISTURBANCE ACTIVITIES
(GENERAL PERMIT)

I. GENERAL REQUIREMENTS

Risk Level 1, 2, and 3 dischargers shall implement the following minimum best management practices (BMPs) to reduce or prevent pollutants in construction stormwater discharges, monitoring requirements, and reporting requirements. If a requirement in this attachment does not specify a specific Risk Level, then the requirement applies to Risk Level 1, 2, and 3 dischargers.

II. MINIMUM BEST MANAGEMENT PRACTICES

II.A. Good Site Management "Housekeeping"

II.A.1. Dischargers shall implement good site management (i.e., "housekeeping") measures for construction materials that could potentially be a threat to water quality if discharged or exposed to stormwater. At a minimum, dischargers shall implement the following good housekeeping measures:

- a. Identify and protect the products used and/or expected to be used and the end products that are produced and/or expected to be produced from exposure to stormwater. Products do not include materials and equipment that are designed to be outdoors and exposed to environmental conditions (e.g., poles, equipment pads, cabinets, conductors, insulators, bricks, roofing, and siding);
- b. Apply BMPs to erodible stockpiled construction materials (e.g., soil, spoils, fly-ash, stucco, hydrated lime) to prevent erosion and pollutant transport;
- c. Store chemicals in watertight containers with secondary containment to prevent any spillage or leakage or store in a completely enclosed storage area;
- d. Minimize exposure of construction materials to precipitation. Construction materials do not include materials and equipment that are designed to be outdoors and exposed to environmental conditions (e.g., poles, equipment pads, cabinets, conductors, insulators, bricks);
- e. Implement BMPs to control the off-site tracking of sediment and loose construction and landscape materials; and
- f. Implement BMPs to control the discharge of plastic materials and limit the use of plastic materials when more sustainable, environmentally friendly alternatives exist. Dischargers shall consider the use of plastic materials resistant to solar degradation where plastic materials are deemed necessary.

- II.A.2. Dischargers shall implement good housekeeping measures for waste management, which, at a minimum, shall consist of the following:
- a. Minimize the discharge of pollutants from equipment and vehicle washing, wheel wash water, masonry wash waters, and other wash waters. Wash waters shall be captured and treated prior to discharge, or disposed of at a permitted facility that can accept that waste, to mitigate impacts to water quality;
 - b. Provide containment (e.g., secondary containment) of sanitation facilities (e.g., portable toilets) to prevent discharges of pollutants to the stormwater drainage system or receiving water;
 - c. Clean or replace sanitation facilities and inspect them regularly for leaks and spills;
 - d. Keep debris or trash in waste containers if it is subject to transport from the site by wind or runoff;
 - e. Cover waste disposal containers at the end of every business day and during a precipitation event;
 - f. Prevent discharges from waste disposal containers to the stormwater drainage system or receiving water (e.g., containers with solid bottoms and regular maintenance);
 - g. Contain and securely protect stockpiled waste material from wind and precipitation unless actively being used; and
 - h. Secure and contain concrete washout areas and other washout areas that may contain additional pollutants to minimize discharge into the underlying soil and onto surrounding areas. Washout areas shall be covered prior to and during a precipitation event.
- II.A.3. Dischargers shall implement good housekeeping for vehicle/equipment storage and maintenance, which shall consist of the following:
- a. Contain fuel, grease, and oil to prevent them from leaking into ground, storm drains, or surface waters;
 - b. Place all equipment or vehicles, which are to be fueled, maintained, and/or stored in a designated area with BMPs installed; and
 - c. Clean leaks immediately and dispose of leaked materials properly in accordance with the law.
- II.A.4. Dischargers shall implement good housekeeping for landscape materials, which shall consist of the following:
- a. Contain and protect stockpiled materials such as mulches and topsoil, or other erodible landscape materials, from wind and precipitation unless being actively used;
 - b. Contain packaged landscape materials (e.g., fertilizers) when they are not being actively used;

- c. Discontinue the application of any erodible landscape material at least 2 days before a forecasted precipitation event as defined in Attachment B or during periods of precipitation; and
 - d. Apply erodible landscape material at quantities and rates in accordance with manufacturer recommendations or based on written specifications by knowledgeable and experienced field personnel;
- II.A.5. Dischargers shall implement good housekeeping measures on the construction site to control the aerial deposition of site materials and from site operations. Such particulates can include, but are not limited to, metals, nutrients, organics, sediment, other particulates, and trash.
- II.A.6. Dischargers shall document all housekeeping BMPs in the SWPPP that correspond to the nature and phase of the construction activities. Construction phases at traditional land development projects include demolition and pre-development site preparation phase, grading and land development phase, streets and utilities phase, vertical construction phase, and final landscaping and site stabilization phase.

II.B. Non-Stormwater Management

- II.B.1. Dischargers shall implement the following measures to control all non-stormwater discharges during construction:
- a. Wash vehicles in such a manner as to prevent non-stormwater discharges to surface waters or municipal separate sewer system drainage systems;
 - b. Clean streets in such a manner as to prevent unauthorized non-stormwater discharges from reaching surface water or municipal separate sewer system drainage systems; and
 - c. Eliminate any non-stormwater discharges not authorized in Section IV.A of this General Permit's Order.

II.C. Preserve Existing Topsoil

- II.C.1. Dischargers shall preserve existing topsoil, unless infeasible, through the following practices:
- a. Stockpiling existing topsoil, or transferring topsoil to other locations, to deploy and reestablish vegetation prior to termination of coverage; and
 - b. Stabilizing disturbed topsoil during construction.

Preserving existing topsoil is not required where the intended function of a specific area of the site dictates that the topsoil be disturbed or removed.¹

¹ Examples may include the removal of topsoil containing invasive seedbanks, lack of space to stockpile topsoil, and sites that are designed to be highly impervious after construction with little to no vegetation intended to remain.

II.D. Erosion Control

- II.D.1. Dischargers shall implement the following practices to eliminate or minimize site erosion. Erosion control BMPs (except for sprayed products) shall be available on-site or at a nearby location (e.g., common lay-down yard), year-round with trained persons able to deploy the product under the direction of the Qualified SWPPP Practitioner:
- a. Implement effective wind erosion control;
 - b. Preserve existing vegetation;
 - c. Minimize the amount of soil exposed during construction activity;
 - d. Minimize the disturbance of steep slopes;
 - e. Schedule earthwork to minimize the amount of disturbed area when feasible;
 - f. Immediately initiate stabilization for disturbed areas whenever earth disturbing activities have permanently ceased on any portion of the site, or temporarily ceased on any portion of the site and will not resume for a period exceeding 14 calendar days;²
 - g. Minimize soil compaction in areas other than where the intended function of a specific area dictates that it be compacted;
 - h. Reestablish vegetation or non-vegetative erosion controls as soon as practicable;
 - i. If feasible, divert up gradient run-on water from contacting areas of exposed soils disturbed by construction activities or convey run-on through the site in a manner that prevents erosion from areas of construction and does not compromise the effectiveness of erosion, sediment, and perimeter controls;
 - j. Run-on water flowing onto a site from off-site areas may be separated from a site's stormwater discharge to eliminate commingled contribution. Run-on diversion shall occur prior to entering an area affected by construction activity. Run-on flow diversion shall be conveyed through or around the construction activity in plastic pipe or an engineered conveyance channel in a manner that will not cause erosion due to flow diversion. Run-on combined with a site's stormwater discharge is considered a stormwater discharge.
 - k. Limit the use of plastic materials when more sustainable, environmentally friendly alternatives exist. Where plastic materials are deemed necessary, the

² In arid, semiarid, and drought-stricken areas where initiating vegetative stabilization measures immediately is infeasible, alternative stabilization measures shall be employed as specified by the Regional Water Board. Stabilization shall be completed within a period of time determined by the Regional Water Board. In limited circumstances stabilization may not be required if the intended function of a specific area of the site necessitates that it remains disturbed.

discharger shall consider the use of plastic materials resistant to solar degradation;

- I. Control stormwater and non-stormwater discharges to minimize downstream channel and bank erosion; and
 - m. Control peak flowrates and total volume of stormwater and authorized non-stormwater discharges to minimize channel and streambank erosion and scour in the immediate vicinity of discharge points.
- II.D.2. Dischargers that stabilize soil using bonded-fiber matrices, hydromulches, spray tackifiers, or other land-applied products shall:
- a. Apply the product according to the manufacturer's instructions and guidance; and
 - b. Apply the product according to the manufacturer's guidance to allow for ample cure time and to prevent treatment chemicals from being transported by runoff.

II.E. Sediment Controls

- II.E.1. Dischargers shall implement the following site sediment controls:
- a. Establish and maintain effective perimeter controls;
 - b. Stabilize all construction entrances and exits to sufficiently control erosion and sediment discharges from the site; and
 - c. Design, install, and maintain effective sediment controls to minimize the discharge of pollutants utilizing site-specific BMPs.

At a minimum, design sediment basins and impoundments according to the method provided in the California Stormwater Quality Association Construction BMP Handbook³ and utilize outlet structures that withdraw water from the surface. Dischargers utilizing sediment basins shall complete installation prior to other land disturbance activities.

II.F. Additional Risk Level 2 and 3 Requirements:

- II.F.1. Risk Level 2 and 3 dischargers shall implement the following additional erosion and sediment control BMPs for areas under active⁴ construction:

3 California Stormwater Quality Association (CASQA), [Construction BMP Handbook](https://www.casqa.org/sites/default/files/casqa-handbook-construction/master_hanbook_file_2015_sec.pdf) (January 2015), <https://www.casqa.org/sites/default/files/casqa-handbook-construction/master_hanbook_file_2015_sec.pdf> [as of May 20, 2021] (CASQA Construction BMP Handbook)

4 Active areas of construction are areas undergoing land surface disturbance and associated site areas. This includes construction activity during the preliminary phase, mass grading phase, streets and utilities phase, and the vertical construction phase.

- a. Design and construct cut and fill slopes in a manner to ensure slope stability and to minimize erosion including, but not limited to, these practices:
 - i. Reduce continuous slope length using terracing and diversions;
 - ii. Reduce slope steepness; and
 - iii. Roughen slope surfaces with large cobble or track walking.
- b. Install linear sediment controls along the toe of the slope, face of the slope, and at the grade breaks of exposed slopes according to sheet flow lengths as shown in Table 1 until the slope has reached Notice of Termination conditions for erosion protection. When infeasible to comply with Table 1 due to site-specific geology or topography, the QSD shall include in the SWPPP a justification for the use of an alternative method to protect slopes from erosion and sediment loss.

Table 1 - Critical Slope and Sheet Flow Length Combinations for Linear Sediment Reduction Barrier

Slope Ratio (Vertical to Horizontal)	Sheet flow length not to exceed
≤ 1:20	Per QSD's specification.
> 1:20 to ≤ 1:4	35 feet
> 1:4 to ≤ 1:3	20 feet
> 1:3 to ≤ 1:2	15 feet
> 1:2	10 feet

- II.F.2. Limit construction activity traffic to and from the project to entrances and exits that employ effective controls to prevent off-site tracking of sediment.
- II.F.3. Maintain and protect all storm drain inlets, perimeter controls, and BMPs at entrances and exits (e.g., tire wash off locations).
- II.F.4. Remove any excess sediment or other construction activity-related materials that are deposited on the impervious roads by vacuuming or sweeping prior to any precipitation event.
- II.F.5. Implement additional site-specific sediment controls upon written request by the Regional Water Boards when the implementation of the other requirements in this Section are determined to inadequately protect the site's receiving water(s).

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II.G. Surface Water Buffer⁵

- II.G.1. Dischargers shall provide and maintain natural buffers and/or equivalent erosion and sediment controls when a water of the U.S. is located within 50 feet of the site's earth disturbances, unless infeasible.
- II.G.2. Dischargers shall comply with one of the following alternatives for any discharges to waters of the U.S. located within 50 feet of a site's earth disturbances:
- a. Provide and maintain a 50-foot undisturbed natural buffer from the edge of the disturbed area to the top of bank;
 - b. Provide and maintain an undisturbed natural buffer that is less than 50 feet and is supplemented by erosion and sediment controls that achieve, in combination, the sediment load reduction equivalent to a 50-foot undisturbed natural buffer. The equivalent sediment load may be calculated using RUSLE2 or another method approved by the Regional Water Board; or
 - c. Implement erosion and sediment controls to achieve the sediment load reduction equivalent to a 50-foot undisturbed natural buffer when infeasible to provide and maintain an undisturbed natural buffer of any size. The equivalent sediment load may be calculated using RUSLE2 or another method approved by the Regional Water Board.

II.H. Pesticide Application

Dischargers shall only apply pesticides that have been authorized for use through California Department of Pesticide Regulation. The application of pesticides shall follow manufacturer's guidance.

II.I. Demolition of Existing Structure

Dischargers shall prevent exposing demolition materials to precipitation. Demolition materials should be covered with an impermeable barrier such as, but not limited to, plastic sheeting prior to precipitation to prevent known contaminants from being mobilized. Dischargers unable to cover demolished material that were not previously investigated or found to be absent of applicable pollutants in reportable quantities shall sample for any non-visible pollutants that may be in stormwater

⁵ The surface water buffer requirements apply to work above the top-of-bank or high-water level of waters of the United States. Work within a channel or streambed (water body-dependent construction), Clean Water Act § 404 projects with a § 401 certification, and projects where no natural surface buffer exists (e.g., concrete channelization) are exempt from the requirements. All types of in-channel work may be regulated under § 401 (Clean Water Act - Regional Boards), § 404 (Clean Water Act - Army Corps of Engineers), or §1602 (California Fish and Game Code).

discharges such as, but not limited to, asbestos, leaded paint, or Poly Chlorinated Biphenyls (PCBs)⁶.

II.J. Maintenance and Repair

- II.J.1. Dischargers shall begin maintaining, repairing, and/or implementing design changes (reviewing alternatives that have not been used yet) to BMPs within 72 hours of identification of failures or other shortcomings and complete the changes as soon as possible, prior to the next forecasted precipitation event.
- II.J.2. Dischargers shall have a Qualified SWPPP Practitioner (QSP) verify all BMP maintenance and repairs were appropriately implemented during the next visual inspection following completion. The QSP may delegate BMP maintenance and repair verification to an appropriately trained delegate.

III. MONITORING REQUIREMENTS

III.A. General Requirements

The monitoring requirements of this Section are issued pursuant to Water Code § 13383 and specifies monitoring requirements for dischargers subject to this Order.

All dischargers shall implement the Construction Site Monitoring Program in compliance with this Section at the time of the commencement of construction activity and shall continue implementation until the project is complete and the project site is stabilized as defined in Section III.H in the Order.

III.B. Monitoring Exceptions

- III.B.1. Dischargers shall conduct visual inspections and collect samples to meet the requirements of this Attachment. Dischargers are not required to physically conduct visual inspections or collect samples under the following conditions:
 - a. During dangerous weather conditions such as electrical storms, flooding, and high winds above 40 miles per hour;
 - b. Outside of scheduled site operating hours; or
 - c. When the site is not accessible to personnel.
- III.B.2. For inactive projects, dischargers may reduce the visual inspection frequency and suspend sampling per Section III.G of the Order. Dischargers shall provide an explanation with supporting information for all missed visual inspections or sampling required by this Attachment, to be included in the Annual Report.

6 PCBs were used between January 1, 1950 and January 1, 1980 and should be considered to be potentially present in structures built during that timeframe.

"Structure", in this instance, shall have been constructed with floor space (such as a building).

III.C. Visual Inspection Requirements

III.C.1. Dischargers shall perform visual inspections, based on their Risk Level, in accordance with Table 2 below. The purpose of visual inspections is, to identify and record BMPs that need maintenance to operate effectively, that have failed, or that could fail to operate as intended. Except as specified in Section III.C.3 below, inspectors shall be the Qualified SWPPP Developer, Qualified SWPPP Practitioner, or be trained by the Qualified SWPPP Practitioner.

Table 2 – Visual Inspection Schedule⁷

Risk Level	Weekly	Pre-Qualifying Precipitation Event	During Qualifying Precipitation Event	Post-Qualifying Precipitation Event
1	X	X	X	X
2	X	X	X	X
3	X	X	X	X

III.C.2. Dischargers shall conduct weekly visual inspections to ensure that BMPs are properly installed and maintained. A pre-, during, or post-qualifying precipitation event inspection also satisfies the weekly visual inspection requirement.

III.C.3. Dischargers shall have a QSP conduct a pre-Qualifying Precipitation Event inspection within 72 hours prior to any weather pattern that is forecasted to have a 50 percent or greater chance of 0.5 inches or more in a 24-hour period. Precipitation forecast information shall be obtained from the [National Weather Service Forecast Office](https://www.weather.gov/) (e.g., by entering the zip code of the project’s location at <https://www.weather.gov/>) and shall be included as part of the inspection checklist weather information. If extended forecast precipitation data (greater than three days) is available from the National Weather Service, the pre-precipitation event inspection may be done up to 120 hours in advance. The pre-Qualifying Precipitation Event inspection shall include an inspection of the following:

- a. All stormwater drainage areas to identify leaks, spills, or uncontrolled pollutant sources and when necessary, implement appropriate corrective actions to control pollutant sources.
- b. All BMPs to identify whether they have been properly implemented in accordance with the SWPPP, and when necessary, implement appropriate corrective actions to control pollutant sources.
- c. All stormwater storage and containment areas to detect leaks and check for available capacity to prevent overflow.

III.C.4. Dischargers shall conduct visual inspections at least once every 24-hour period during Qualifying Precipitation Events. Qualifying Precipitation Events are

⁷ This table is limited to routine weekly inspections and Qualifying Precipitation Event related inspections. Other visual inspections may be required under this Permit and are described in the applicable sections.

extended for each subsequent 24-hour period forecast to have at least 0.25 inches of precipitation.

- III.C.5. Dischargers shall conduct post-Qualifying Precipitation Event visual inspections within 96 hours after each Qualifying Precipitation Event if 0.5 inches or more precipitation is measured during the duration of the Qualifying Precipitation Event using the onsite rain gauge. The inspection is to:
- a. Identify if BMPs were adequately designed, implemented, and effective;
 - b. Identify BMPs that require repair or replacement due to damage; and
 - c. Identify additional BMPs that need to be implemented and revise the SWPPP accordingly.
- III.C.6. Dischargers shall conduct visual inspections during scheduled site operating hours.
- III.C.7. For each required inspection, dischargers shall develop and complete an inspection checklist that, at a minimum includes:
- a. Inspection type (weekly, pre-precipitation, daily precipitation, or post-precipitation event);
 - b. Inspection date and time the inspection was conducted;
 - c. Weather information, including the presence or absence of precipitation, an estimate of the beginning of the Qualifying Precipitation Event, duration of the event, date of the end of the Qualifying Precipitation Event, and the amount of precipitation in inches;
 - d. Site information, including stage of construction, activities completed since last inspection, and approximate area of the site exposed;
 - e. A description of any BMPs evaluated and any deficiencies noted, including those that may have resulted in the release of non-visible pollutants;
 - f. A list of BMPs inspected, including erosion controls, sediment controls, chemical and waste controls, and non-stormwater controls;
 - g. Report of the presence of any floating and suspended materials, odors, discolorations, visible sheens, and any sources of pollutants in discharges and contained stormwater;
 - h. Any corrective actions required, including any necessary changes to the SWPPP and the associated implementation dates;
 - i. Photographs of areas of concern and the QSP's description of the problem, if any; and
 - j. Inspector's name, title, and certification, if any.

III.D. Water Quality Monitoring Requirements

Dischargers shall collect samples of discharges, based on their Risk Level in accordance with Table 3 and the requirements below, to monitor water quality and

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assess compliance with the requirements of this General Permit. Samplers shall be the QSD, QSP, or be trained by the QSP.

Table 3 – Sample Collection Schedule

Risk Level	Stormwater Discharge Sample Collection (as applicable)	Receiving Water Sample Collection (as applicable)	Non-Visible Sample Collection (as applicable)
1	Not Applicable	Not Applicable	X
2	X	Not Applicable	X
3	X	X (Post-exceedance)	X

III.D.1. Risk Level 2 and 3 Stormwater Discharge Monitoring Requirements

- III.D.1.a. Risk Level 2 and 3 dischargers shall collect stormwater grab samples, from all discharge locations incorporating runoff from project construction sites⁸, during discharge and within site operating hours. The grab samples shall be representative of the discharge flow and characteristics.
- III.D.1.b. Risk Level 2 and 3 dischargers shall obtain one sample from each discharge location per 24-hour period of each Qualifying Precipitation Event, during active discharge.
- III.D.1.c. Risk Level 2 and 3 dischargers shall collect samples of stored or contained stormwater during discharge from the impoundment, in accordance with Attachment J.
- III.D.1.d. Risk Level 2 and 3 dischargers shall analyze all samples for:
 - i. pH and turbidity (refer to Order, Section IV.C.3.c and d); and
 - ii. Any additional parameter required by the Regional Water Board.
- III.D.1.e. Risk Level 2 and 3 dischargers may sample run-on from surrounding areas if there is reason to believe run-on may contribute to exceedance of numeric action levels and/or numeric effluent limitations.

III.D.2. Risk Level 3 Receiving Water Monitoring Requirements

- III.D.2.a. Risk Level 3 dischargers who discharge directly into receiving waters are also required to monitor that receiving water if sampling results from the discharge monitoring location meets either of the following conditions:
 - i. pH value falls outside of the range of 6.0 and 9.0 pH units; or
 - ii. Turbidity exceeds 500 NTU.

⁸ The Glossary definition of ‘site’ applies here, i.e., *The area where the construction activity is physically located or conducted, including staging, storage, and access areas.*

- III.D.2.b. Receiving water monitoring does not apply if run-on from a forest fire or any other natural disaster caused the stormwater results to fall outside the pH range or exceed the turbidity value.
- III.D.2.c. Risk Level 3 dischargers required to conduct receiving water monitoring shall collect samples as follows:
 - i. Collect, at minimum, one upstream receiving water sample from an accessible and safe location that is:
 - 1. Representative of the receiving water;
 - 2. As close as possible to the discharge location; and
 - 3. Upstream from the discharge location.
 - ii. Collect, at minimum, one downstream receiving water sample from an accessible and safe location that is:
 - 1. Representative of the receiving water;
 - 2. As close as possible to the discharge location; and
 - 3. Downstream from the discharge location.
- III.D.2.d. Risk Level 3 dischargers shall analyze the samples for the parameter that triggered this monitoring (either pH or turbidity, or both).
- III.D.2.e. Risk Level 3 dischargers shall collect the samples once every 24-hour period of the Qualifying Precipitation Event.
- III.D.2.f. Risk Level 3 dischargers shall specify the specific locations where samples were collected, date and time of sample collection, as well as constituents analyzed.
- III.D.2.g. The Regional Water Board delegate may require, in writing, that the Risk Level 3 discharger continue to sample the receiving water for the parameter that required this monitoring (pH and/or turbidity) after the Qualifying Precipitation Event ends.

III.D.3. Non-Visible Pollutant Monitoring Requirements

- III.D.3.a. Dischargers shall implement sampling and analysis requirements to monitor non-visible pollutants when there is:
 - i. Evidence of pollutant releases that are not visually detectable in stormwater discharges; and
 - ii. Releases of substances which could cause or contribute to an exceedance of water quality objectives in the receiving waters.
- III.D.3.b. Dischargers are required to conduct sampling and analysis for non-visible pollutants identified in the SWPPP or otherwise known to be on site, only when the pollutants may be discharged due to failure to implement BMPs, a container spill or leak, or a BMP breach, failure, or malfunction.

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- III.D.3.c. Dischargers shall collect at least one sample, within 8 hours, from each discharge location hydraulically down-gradient from the observed triggering event or condition.
- III.D.3.d. Dischargers shall continue to collect at least one sample per applicable discharge location for each 24-hour period that there is discharge, until the necessary corrective actions are completed to control further discharge of the pollutant.
- III.D.3.e. Dischargers are not required to sample if one of the conditions described in Section III.D.3.b above (e.g., breach or spill) occurs and, prior to discharge, the material containing the pollutant is fully remediated or removed; and BMPs to control the pollutant are implemented, maintained, or replaced as necessary.
- III.D.3.f. Dischargers shall analyze samples in the field or submit them to a laboratory as specified in Section III.F of this Attachment for analysis of all non-visible pollutants suspected to be present in the discharge, including applicable TMDL-specific pollutants listed in Table H-2 in Attachment H.

III.E. Sample Collection and Handling Instructions

III.E.1. Dischargers shall:

- a. Identify applicable parameters that require laboratory analysis for each stormwater discharge location (pH and turbidity are typically analyzed with field meters).
- b. Request the laboratory provide the appropriate number of sample containers, types of containers, sample container labels, blank Chain of Custody forms, and sample preservation instructions.
- c. Use the appropriate sample shipping method to the laboratory. The laboratory should receive samples within 48 hours of the physical sampling (unless otherwise required by the laboratory to meet all method hold times). The options are to either deliver the samples to the laboratory, arrange to have the laboratory pick them up, or ship them overnight to the laboratory.
- d. Use only the sample containers provided/specified by the laboratory to collect and store samples. Use of any other type of containers could cause sample contamination.
- e. Prevent sample contamination by not touching or putting anything into the sample containers before collecting stormwater samples.
- f. Not overfill sample containers. Overfilling can change the analytical results.
- g. Secure each sample container cap without stripping the cap threads.
- h. Label each sample container. The label shall identify the date and time of sample collection, the person taking the sample, and the sample collection location or discharge point. The label should also identify any sample containers that have been preserved.

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- i. Carefully pack the sample container into an ice chest or refrigerator to prevent breakage and maintain temperature during shipment; frozen ice packs or ice is placed into the shipping container to keep the sample close to 4° C (39° F) until arriving at the laboratory (do not freeze samples).
- j. Complete a Chain of Custody form with each set of samples. The Chain of Custody form shall include the discharger's name, address, and phone number, identification of each sample container and sample collection point, person collecting the samples, the date and time each sample container was filled, the analysis that is required for each sample container, and both the signatures of the persons relinquishing and receiving the sample containers.

III.E.2. The Discharger shall designate and train personnel for the collection, maintenance, and shipment of samples in accordance with the above sample protocols and laboratory-specific practices.

III.E.3. Dischargers shall perform all sampling and preservation protocols in accordance with the 40 Code of Federal Regulations Part 136 and the current edition of "Standard Methods for the Examination of Water and Wastewater" (American Public Health Association).⁹

III.E.4. Dischargers may refer to the Surface Water Ambient Monitoring Program's (SWAMP) Quality Assurance Program Plan (QAPrP) for more information on sampling collection and analysis.¹⁰

III.F. Analytical Methods Requirements

III.F.1. Dischargers shall refer to Table 4 for applicable test methods, detection limits, and reporting units.

⁹ Unless other test procedures have been specified in this General Permit or by the Water Boards.

¹⁰ Additional information regarding the [SWAMP QAPrP](https://www.waterboards.ca.gov/water_issues/programs/swamp/quality_assurance.html#qaprp) can be found at: https://www.waterboards.ca.gov/water_issues/programs/swamp/quality_assurance.html#qaprp. [as of October 20, 2020]

Table 4 - Test Methods, Detection Limits and Reporting Units

Parameter	Test Method	Discharger Type	Method Detection Limit	Reporting Units
pH	Field test with calibrated portable instrument using U.S. EPA approved procedures	Risk Level 2 and 3	0.2	pH units
Turbidity	U.S. EPA 0180.1 and/or field test with calibrated portable instrument	Risk Level 2 and 3	1	NTU
Non-Visible Pollutant Parameter(s)	U.S. EPA-approved test method for the specific pollutant parameter	All Risk Levels	Dependent on the test method	Dependent on the test method

- III.F.2. All monitoring instruments and equipment shall be calibrated and maintained in accordance with manufacturers' specifications to ensure accurate measurements. Additionally, records of calibration shall be retained for at least three years and made available upon request.
- III.F.3. Risk Level 2 and 3 dischargers shall perform pH analysis on-site with a calibrated pH meter using a U.S. EPA acceptable test method.
- III.F.4. Risk Level 2 and 3 dischargers shall perform turbidity analysis using a calibrated turbidity meter (turbidimeter), either on-site or at a State Water Board Environmental Laboratory Accreditation Program (ELAP)-accredited laboratory. Acceptable test methods include Standard Method 2130 B or U.S. EPA Method 180.1.
- III.F.5. All analyses of laboratory-analyzed parameters shall be sent to and conducted at a laboratory recognized by the State Water Board Environmental Laboratory Accreditation Program (ELAP), with the exception of field analysis conducted by the discharger for turbidity and pH.
- III.F.6. All dischargers shall assign a value of zero (0) for all non-visible pollutant analytical results less than the minimum level (reporting limit), as reported by the laboratory, used in calculations required by this permit (e.g., numeric action level and numeric effluent limitation exceedance determinations), so long as a sufficiently sensitive test method was used as evidenced by the reported method detection limit and minimum level.

III.G. Exceedance Response Requirements¹¹

- III.G.1. Dischargers are subject to the applicable numeric action levels and/or numeric effluent limitations based on their Risk Level as shown in Table 5 below.

¹¹ Terms including, but not limited to, numeric action level, numeric effluent limitation, and exceedances are defined in Attachment B of this General Permit.

Table 5 - Numeric Action Levels and Numeric Effluent Limitations

Parameter	Discharger Type	Numeric Action Level	Numeric Effluent Limitation
pH	Risk Level 2 and 3	Lower = 6.5 Upper = 8.5	Not Applicable
Turbidity	Risk Level 2 and 3	250 NTU	Not Applicable
TMDL-related Pollutant	Responsible Dischargers with a project of any Risk Level	Refer to Table H-2 in Attachment H	Refer to Table H-2 in Attachment H

- III.G.2. For pH and turbidity, the discharger shall use the field meter readings obtained from each discharge location per day of discharge to determine if there has been an exceedance of the numeric action levels.
- III.G.3. Whenever analytical results indicate that the discharge is below the lower pH value, above the upper pH value, exceeds the turbidity value, or exceeds an applicable TMDL-related numeric action level or numeric effluent limitation, dischargers shall determine the source(s) of the pollutant and immediately implement corrective actions to:
 - a. Meet Best Available Technology Economically Achievable and Best Conventional Pollutant Control Technology requirements in 40 Code of Federal Regulations §§ 450.21 through 450.23¹²; and
 - b. Reduce or prevent pollutants in stormwater and authorized non-stormwater discharges from causing further exceedances.
- III.G.4. Dischargers shall iterate corrective actions until the discharge is in compliance with the applicable numeric action level(s).
- III.G.5. The source evaluation shall be kept with the SWPPP and specifically address what corrective actions were taken or will be taken and provide a schedule for their completion.

IV. REPORTING REQUIREMENTS

IV.A. Visual Inspections

Dischargers shall keep all completed inspection checklists and related documentation with the SWPPP on-site or electronically.

12 United States Environmental Protection Agency, [Construction and Development Effluent Limitation Guidelines §§ 450.21 through 450.23](https://www.ecfr.gov/current/title-40/chapter-I/subchapter-N/part-450/subpart-B?toc=1), <<https://www.ecfr.gov/current/title-40/chapter-I/subchapter-N/part-450/subpart-B?toc=1>> [as of June 28, 2022].

IV.B. Water Quality Monitoring

IV.B.1. Risk Level 2 and 3 Stormwater Discharge Monitoring Reporting

- IV.B.1.a. Risk Level 2 and 3 dischargers shall electronically submit through SMARTS all field sampling results within 30 days of the completion of the precipitation event or within 10 days if the field sampling results demonstrate the exceedance of the pH, and/or turbidity numeric action levels.
- IV.B.1.b. Risk Level 2 and 3 dischargers that exceeded the pH and/or turbidity numeric action levels shall prepare a Numeric Action Level Exceedance Report when requested, in writing, from a Regional Water Board delegate and shall submit and certify each Numeric Action Level Exceedance Report through SMARTS within 30 days of receiving the written request, in accordance with Section IV of this General Permit's Order.
- IV.B.1.c. The Numeric Action Level Exceedance Report shall include:
 - i. The analytical method(s), method reporting unit(s), and method detection limit(s) for each parameter;
 - ii. The date, place, time of sampling, visual inspections, and/or measurements, including precipitation; and
 - iii. An assessment of the existing BMPs associated with the sample that exceeded the numeric action level, a description of each corrective action taken including photographs, and date of implementation.
- IV.B.1.d. Risk Level 2 and 3 dischargers that prepared a Numeric Action Level Exceedance Report shall retain a copy of the report for a minimum of three years after the date the exceedance report is certified and submitted.

IV.B.2. Risk Level 3 Receiving Water Monitoring Reporting

- IV.B.2.a. Risk Level 3 dischargers shall electronically submit all receiving water sample results through SMARTS within 10 days of a precipitation event.

IV.B.3. Non-Visible Pollutant Monitoring Reporting

- IV.B.3.a. All dischargers that conducted non-visible pollutant monitoring shall electronically submit through SMARTS all field and/or analytical sampling results within 30 days after obtaining the analytical result or within 10 days after if the analytical results demonstrate the exceedance of an applicable TMDL-related numeric action level or numeric effluent limitation or Basin Plan parameter.
- IV.B.3.b. All dischargers that exceeded an applicable TMDL-related numeric action level shall prepare a Numeric Action Level Exceedance Report when requested, in writing, from a Regional Water Board delegate and shall submit and certify each Numeric Action Level Exceedance Report through SMARTS within 30 days of receiving the written request, in accordance with Section IV of this General Permit's Order.

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- IV.B.3.c. The Numeric Action Level Exceedance Report shall include:
- i. The analytical method(s), method reporting unit(s), and method detection limit(s) for each parameter;
 - ii. The date, place, time of sampling, visual inspections, and/or measurements, including precipitation; and
 - iii. An assessment of the existing BMPs associated with the sample that exceeded the numeric action level, a description of each corrective action taken including photographs, and date of implementation.
- IV.B.3.d. All dischargers that prepared a Numeric Action Level Exceedance Report shall retain a copy of the report for a minimum of three years after the date the exceedance report is certified and submitted.
- IV.B.3.e. All dischargers that exceed an applicable TMDL-related numeric effluent limitation shall comply with the water quality-based corrective action requirements in Section VI.Q of the Order.

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ATTACHMENT D.1

RISK DETERMINATION WORKSHEET

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES) GENERAL PERMIT FOR STORMWATER DISCHARGES ASSOCIATED WITH CONSTRUCTION AND LAND DISTURBANCE ACTIVITIES (GENERAL PERMIT)

The Risk Determination Worksheet in this Attachment serves as guidance for construction stormwater dischargers and may be used to manually calculate the site-specific risk of a construction project. Dischargers are required to submit risk information using the Stormwater Multiple Application and Report Tracking System (SMARTS) as part of filing a Notice of Intent for coverage under the Construction Stormwater General Permit.

Dischargers may use SMARTS to auto-populate values for the soil erodibility factor (K factor), length-slope factor (LS factor), and the receiving water risk (the risk sediment poses to receiving waters) based on the provided latitude and longitude coordinates for the project. SMARTS relies on the same data as the GIS map method, which dischargers can use to confirm the auto-populated values. Dischargers may alternatively use the individual method, a site-specific analysis, to determine the K factor, LS factor, and receiving water risk where GIS data may not accurately reflect the site's characteristics.

Dischargers may use a combination of the GIS map method or individual method to calculate the K factor, LS factor, sediment risk, and receiving water risk in steps 1 and 2, depending on which method is judged to be the most accurate for the site.

SMARTS will automatically determine the combined Risk Level based on the entered information.

Instructions:

Step 1 – Determine sediment risk via one of the following options:

- [GIS Map Method - EPA Rainfall Erosivity Calculator & GIS Map](#)
- [Individual Method - EPA Rainfall Erosivity Calculator & Individual Data](#)

Step 2 – Determine receiving water risk via one of the following options:

- [GIS Map Method - GIS Map of Sediment-Sensitive Watersheds](#)
- [Individual Method - Provided Sediment Impaired Water Bodies](#)

Step 3 – Determine combined Risk Level

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Step 1 – Sediment Risk Worksheet

The Construction Stormwater General Permit requires dischargers to calculate sediment risk by multiplying the rainfall erosivity (R), soil erodibility (K), and length-slope (LS) factors. Determine the values for each of the factors and use the table below to assess the site-specific sediment risk for the construction project.

a. Rainfall Erosivity (R) Factor

Analyses of data indicated that when factors other than rainfall are held constant, soil loss is directly proportional to a rainfall factor composed of total storm kinetic energy (E) times the maximum 30-minute intensity (I30) (Wischmeier and Smith, 1958). The numerical value of R is the average annual sum of EI30 for storm events during a rainfall record of at least 22 years. "Isoerodent" maps were developed based on R values calculated for more than 1000 locations in the Western U.S.

A [guide for the U.S. EPA Rainfall Erosivity Factor Calculator](https://www.waterboards.ca.gov/water_issues/programs/stormwater/smarts/construction/docs/rfactor_guide.pdf)

(https://www.waterboards.ca.gov/water_issues/programs/stormwater/smarts/construction/docs/rfactor_guide.pdf) is available to dischargers to assist with calculating the site-specific R factor.

R Factor Value = _____

b. Soil Erodibility (K) Factor

The soil erodibility (K) factor represents: (1) susceptibility of soil or surface material to erosion, (2) transportability of the sediment, and (3) the amount and rate of runoff given a particular rainfall input, as measured under a standard condition. Fine-textured soils that are high in clay have low K values (about 0.05 to 0.15) because the particles are resistant to detachment. Coarse-textured soils, such as sandy soils, also have low K values (about 0.05 to 0.2) because of high infiltration resulting in low runoff even though these particles are easily detached. Medium-textured soils, such as a silt loam, have moderate K values (about 0.25 to 0.45) because they are moderately susceptible to particle detachment and they produce runoff at moderate rates. Soils having a high silt content are especially susceptible to erosion and have high K values, which can exceed 0.45 and can be as large as 0.65. Silt-size particles are easily detached and tend to crust, producing high rates and large volumes of runoff.

A soil erodibility nomograph is provided on page 4 to assist the discharger with determining the site-specific K factor.

K Factor Value = _____

c. Length-Slope (LS) Factor

The effect of topography on erosion is accounted for by the LS factor, which combines the effects of a hillslope-length factor, L, and a hillslope-gradient factor, S. Generally speaking, as hillslope length and/or hillslope gradient increase, soil loss increases. As hillslope length increases, total soil loss and soil loss per unit area increase due to the progressive accumulation of runoff in the downslope direction.

As the hillslope gradient increases, the velocity and erosivity of runoff increases.

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A length-slope table is provided on page 5 to assist the discharger with estimating the weighted LS factor for the site prior to construction.

LS Factor Value = _____

d. Watershed Erosion Estimate

Estimate watershed erosion by multiplying the R, K, and LS factors, then use the table below to determine the site-specific sediment risk for the project.

Watershed Erosion Estimate (tons/acre) = $R \times K \times LS =$ _____

Watershed Erosion Estimate (tons/acre)	Site-Specific Sediment Risk
Less than 15 tons/acre	Low
Greater than or equal to 15 tons/acre and less than 75 tons/acre	Medium
Greater than or equal to 75 tons/acre	High

Site-specific Sediment Risk (High, Medium, or Low) = _____

e. Sediment Risk GIS Map Method

In addition to the U.S. EPA Rainfall Erosivity Factor Calculator, State Water Board staff has prepared map tools to assist dischargers with estimating site-specific K and LS factors. Dischargers may use the map tools instead of manually determining the K and LS factors using the nomograph on page 4 and tables on page 5. Additionally, SMARTS is equipped with an auto-populate feature that can generate K and LS factors given the project latitude and longitude coordinates.

[K Factor Map](#)

(https://www.waterboards.ca.gov/water_issues/programs/stormwater/docs/constpermits/guidance/k_factor_map.pdf)

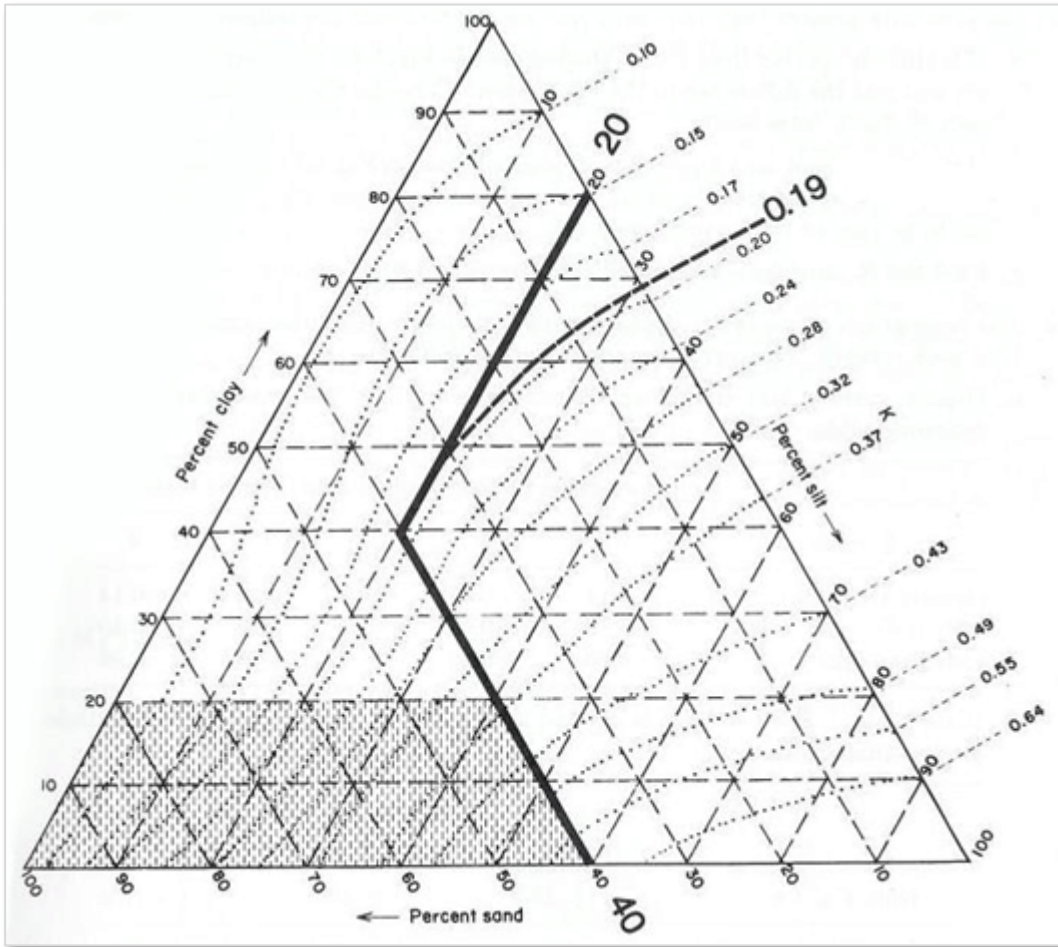
[LS Factor Map](#)

(https://www.waterboards.ca.gov/water_issues/programs/stormwater/docs/constpermits/guidance/ls_factor_map.pdf)

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Soil Erodibility (K) Factor Nomograph

The K factor can be determined by using the nomograph method, which requires that a particle size analysis (ASTM D-422)^{1,2} be conducted to determine the percentages of sand, very fine sand, silt, and clay. Use the figure below to determine the appropriate K factor value.



The figure above is the Erickson triangular nomograph used by the USDA to determine the K factor for a soil based on its texture (percent silt plus very fine sand, percent sand, percent organic matter, soil structure, and permeability).

1 ASTM D-422 is the standard test method used for the quantitative determination of the distribution of particle sizes in soils.

2 Environmental Protection Agency, [American Society for Testing and Materials \(ASTM\) Standards](https://www.epa.gov/sites/default/files/2020-01/documents/sedc_2004-2005_append.pdf), <https://www.epa.gov/sites/default/files/2020-01/documents/sedc_2004-2005_append.pdf> [as of June 22, 2022]

**Nomograph from Erickson 1977, as referenced in Goldman et. al., 1986.
Length-Slope (LS) Factor Table for Construction Sites**

To determine a construction site's specific LS factor locate the intercept of the site's Sheet Flow Length (ft) and Average Watershed Slope (percent). Table from Renard et. al., 1997.

Sheet Flow Length (ft)	Average Watershed Slope (percent)									
	0.2	0.5	1.0	2.0	3.0	4.0	5.0	6.0	8.0	10.0
< 3	0.05	0.07	0.09	0.13	0.17	0.20	0.23	0.26	0.32	0.35
6	0.05	0.07	0.09	0.13	0.17	0.20	0.23	0.26	0.32	0.37
9	0.05	0.07	0.09	0.13	0.17	0.20	0.23	0.26	0.32	0.38
12	0.05	0.07	0.09	0.13	0.17	0.20	0.23	0.26	0.32	0.39
15	0.05	0.07	0.09	0.13	0.17	0.20	0.23	0.26	0.32	0.40
25	0.05	0.07	0.10	0.16	0.21	0.26	0.31	0.36	0.45	0.57
50	0.05	0.08	0.13	0.21	0.30	0.38	0.46	0.54	0.70	0.91
75	0.05	0.08	0.14	0.25	0.36	0.47	0.58	0.69	0.91	1.20
100	0.05	0.09	0.15	0.28	0.41	0.55	0.68	0.82	1.10	1.46
150	0.05	0.09	0.17	0.33	0.50	0.68	0.86	1.05	1.43	1.88
200	0.06	0.10	0.18	0.37	0.57	0.79	1.02	1.25	1.72	2.34
250	0.06	0.10	0.19	0.40	0.64	0.89	1.16	1.43	1.99	2.72
300	0.06	0.10	0.20	0.43	0.69	0.98	1.28	1.60	2.24	3.09
400	0.06	0.11	0.22	0.48	0.80	1.14	1.51	1.90	2.70	3.75
600	0.06	0.12	0.24	0.56	0.96	1.42	1.91	2.43	3.52	4.95
800	0.06	0.12	0.26	0.63	1.10	1.65	2.25	2.89	4.24	6.03
1000	0.06	0.13	0.27	0.69	1.23	1.86	2.55	3.30	4.91	7.02

Sheet Flow Length (ft)	Average Watershed Slope (percent)									
	12.0	14.0	16.0	20.0	25.0	30.0	40.0	50.0	60.0	
< 3	0.36	0.38	0.39	0.41	0.45	0.48	0.53	0.58	0.63	
6	0.41	0.45	0.49	0.56	0.64	0.72	0.85	0.97	1.07	
9	0.45	0.51	0.56	0.67	0.80	0.91	1.13	1.31	1.47	
12	0.47	0.55	0.62	0.76	0.93	1.08	1.37	1.62	1.84	
15	0.49	0.58	0.67	0.84	1.04	1.24	1.59	1.91	2.19	
25	0.71	0.85	0.98	1.24	1.56	1.86	2.41	2.91	3.36	
50	1.15	1.40	1.64	2.10	2.67	3.22	4.24	5.16	5.97	
75	1.54	1.87	2.21	2.86	3.67	4.44	5.89	7.20	8.37	
100	1.88	2.31	2.73	3.57	4.59	5.58	7.44	9.13	10.63	
150	2.51	3.09	3.68	4.85	6.30	7.70	10.35	12.75	14.89	
200	3.07	3.81	4.56	6.04	7.88	9.67	13.07	16.16	18.92	
250	3.60	4.48	5.37	7.16	9.38	11.55	15.67	19.42	22.78	
300	4.09	5.11	6.15	8.23	10.81	13.35	18.17	22.57	26.51	
400	5.01	6.30	7.60	10.24	13.53	16.77	22.95	28.60	33.67	
600	6.67	8.45	10.26	13.94	18.57	23.14	31.89	39.95	47.18	
800	8.17	10.40	12.69	17.35	23.24	29.07	40.29	50.63	59.93	
1000	9.57	12.23	14.96	20.57	27.66	34.71	48.29	60.84	72.15	

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Step 2 – Receiving Water Risk Worksheet

Receiving water risk is based on whether a project drains to a water body or watershed that is sediment-sensitive. If the answer to either question below is “yes”, the project is considered a **high** receiving water risk. If the answer to both questions below is “no”, the project is considered a **low** receiving water risk.

1. Does the disturbed area discharge (either directly or indirectly) to a 303(d)-listed water body impaired by sediment? For help with identifying impaired water bodies, please refer to the [2020 – 2022 California Integrated Report \(Clean Water Act Section 303\(d\) - 305\(b\) Report\)](https://www.waterboards.ca.gov/water_issues/programs/water_quality_assessment/2020_2022_integrated_report.html) (https://www.waterboards.ca.gov/water_issues/programs/water_quality_assessment/2020_2022_integrated_report.html).

OR

2. Does the disturbed area discharge (either directly or indirectly) to a water body with designated beneficial uses of COLD, SPAWN, and MIGRATORY? For help with identifying designated beneficial uses, please refer to the appropriate Regional Water Quality Control Board Basin Plan below.

[Region 1 – North Coast Basin Plan](https://www.waterboards.ca.gov/northcoast/water_issues/programs/basin_plan/)

(https://www.waterboards.ca.gov/northcoast/water_issues/programs/basin_plan/)

[Region 2 – San Francisco Bay Basin Plan](https://www.waterboards.ca.gov/sanfranciscobay/basin_planning.html#2010basinplan)

(https://www.waterboards.ca.gov/sanfranciscobay/basin_planning.html#2010basinplan)

[Region 3 – Central Coast Basin Plan](https://www.waterboards.ca.gov/centralcoast/publications_forms/publications/basin_plan/index.html)

(https://www.waterboards.ca.gov/centralcoast/publications_forms/publications/basin_plan/index.html)

[Region 4 – Los Angeles Basin Plan](https://www.waterboards.ca.gov/losangeles/water_issues/programs/basin_plan/)

(https://www.waterboards.ca.gov/losangeles/water_issues/programs/basin_plan/)

[Region 5 – Central Valley Basin Plan](https://www.waterboards.ca.gov/centralvalley/water_issues/basin_plans/index.html)³

(https://www.waterboards.ca.gov/centralvalley/water_issues/basin_plans/index.html)

[Region 6 – Lahontan Basin Plan](https://www.waterboards.ca.gov/lahontan/water_issues/programs/basin_plan/index.html)

(https://www.waterboards.ca.gov/lahontan/water_issues/programs/basin_plan/index.html)

[Region 7 – Colorado River Basin Plan](https://www.waterboards.ca.gov/coloradoriver/water_issues/programs/basin_planning/)

(https://www.waterboards.ca.gov/coloradoriver/water_issues/programs/basin_planning/)

[Region 8 – Santa Ana Basin Plan](https://www.waterboards.ca.gov/santaana/water_issues/programs/basin_plan/index.html)

(https://www.waterboards.ca.gov/santaana/water_issues/programs/basin_plan/index.html)

³ The Central Valley Basin Plan lists the COLD beneficial use designation as part of the SPAWN and MIGRATORY beneficial uses. Waterbodies will be considered high-risk receiving waters if listed as SPAWN (COLD) and MIGRATORY (COLD).

[Region 9 – San Diego Basin Plan](https://www.waterboards.ca.gov/sandiego/water_issues/programs/basin_plan/index.html)

(https://www.waterboards.ca.gov/sandiego/water_issues/programs/basin_plan/index.html)

Sediment-Sensitive Watershed GIS Map Method

State Water Board staff has prepared a [High-Risk Receiving Watershed Map tool](https://www.waterboards.ca.gov/water_issues/programs/stormwater/docs/constpermits/guidance/receivingwaterrisk.pdf) (https://www.waterboards.ca.gov/water_issues/programs/stormwater/docs/constpermits/guidance/receivingwaterrisk.pdf) to assist dischargers with determining site-specific receiving water risk. Additionally, SMARTS is equipped with an auto-populate feature that can determine the receiving water risk based on the project latitude and longitude coordinates. Projects located in the watersheds highlighted in red are considered high-risk. Please note that the map option may not reflect the correct receiving watershed, lacking site-specific drainage information.

The discharger is responsible for identifying the appropriate receiving water. If the project does not discharge to the watershed as depicted on the High-Risk Receiving Watershed Map, please contact the appropriate Regional Water Quality Control Board.

Site-Specific Receiving Water Risk (High or Low) = _____

Step 3 – Combined Risk Level Matrix

The below matrix is used to determine the combined Risk Level of the project, factoring in both sediment risk and receiving water risk.

		Sediment Risk		
		Low	Medium	High
Receiving Water Risk	Low	Level 1	Level 2	
	High	Level 2		Level 3

Combined Risk Level (1, 2, or 3) = _____

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ATTACHMENT D.2

PERMIT REGISTRATION DOCUMENT REQUIREMENTS

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES) GENERAL PERMIT FOR STORMWATER DISCHARGES ASSOCIATED WITH CONSTRUCTION AND LAND DISTURBANCE ACTIVITIES (GENERAL PERMIT)

I. PERMIT REGISTRATION DOCUMENT REQUIREMENTS

All Linear Underground and Overhead Projects shall comply with the Permit Registration Document requirements in Attachments E, E.1, and E.2 of this General Permit. All traditional construction projects shall comply with Permit Registration Document requirements in this General Permit and this Attachment.

I.A. General Permit Registration Document Submittal Requirements

Dischargers of stormwater associated with construction activity that result in the disturbance of one acre or more of land area shall apply for and obtain coverage under NPDES General Construction for Stormwater Discharges Associated with Construction and Land Disturbance Activities (General Permit). Any construction activity that is a part of a larger common plan of development or sale must also be covered under this General Permit, regardless of size. For example, if 0.5 acre of a 20-acre subdivision is disturbed by the construction activities of discharger A and the remaining 19.5 acres is to be developed by discharger B, discharger A must obtain this General Permit for the 0.5-acre site.

Other discharges from construction activities that are covered under this General Permit can be found in Section II of the Order of this General Permit.

It is the Legally Responsible Person's responsibility to obtain coverage under this General Permit by electronically certifying and submitting complete Permit Registration Documents.

I.B. Fees

I.B.1. A discharger must submit the appropriate fee with its completed Notice of Intent application package. Fees are established through regulations adopted by the State Water Board every year.¹ Fees are subject to change by regulation.

I.B.2. Where the fee is calculated based upon the total area of land disturbed (opposed to the total acreage of land owned), total acreage includes all areas anticipated to be disturbed throughout the duration of the project (e.g., 10 acres are scheduled

¹ California Code of Regulations (CCR), Title 23, Division 3, Chapter 9. Waste Discharge Reports and Requirements, Article 1. Fees.

to be disturbed the first year and 10 acres in each subsequent year for 5 years; the fees would be based upon 50 acres of total disturbance).

- I.B.3. Dischargers that apply for and satisfy the Small Construction Rainfall Erosivity Wavier requirements shall pay the applicable fee.

I.C. Permit Registration Document Submittal Prior to Commencement of Construction

Dischargers proposing to conduct construction activities subject to this General Permit shall certify and submit Permit Registration Documents prior to the commencement of construction activity. Construction activity cannot commence until the WDID number is issued.

In all cases, except public emergencies (e.g., wildfire, flood), Permit Registration Documents must be completed and WDID number issued before construction can commence (refer to Section III.A.3 of the Order of this General Permit).

I.D. Submittal of Complete Permit Registration Documents

All dischargers required to comply with this General Permit shall electronically certify and submit the required Permit Registration Documents, through the Stormwater Multiple Application and Report Tracking System (SMARTS). The discharger shall assure that all information in its Permit Registration Documents complies with the Homeland Security Act and other federal law addressing security in the United States.

The discharger shall submit completed Permit Registration Documents to obtain coverage under this General Permit. If any of the required items are incomplete or missing, the submittal will be rejected.

The State Water Board will process the application package in the order received and assign a WDID number upon receipt of a complete submittal. Permit coverage begins once a WDID number is assigned.

II. STANDARD PERMIT REGISTRATION DOCUMENTS

II.A. Notice of Intent

The Notice of Intent is a site-specific application to obtain coverage for discharges of stormwater and authorized non-stormwater from construction and land disturbance activities to waters of the United States. The application includes the entry of site information, contact information, and site-specific requirements.

II.B. Risk Level Determination

All dischargers are required to conduct a Risk Level Determination, where the site's overall risk is separated into sediment risk and receiving water risk. The discharger must utilize either the Water Board's standard risk determination (provided in

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SMARTS), a site-specific risk determination, or a combination of the two as described in Attachment D.1 of this General Permit.

- II.B.1. A standard risk determination, using the Geographic Information Systems (GIS) map method, includes utilizing the following:
 - i. U.S. EPA Rainfall Erosivity (R) Factor Calculator website;
 - ii. Sediment Risk Map tool; and
 - iii. High-Risk Receiving Watershed Map tool.
- II.B.2. A site-specific risk determination, using the individual method, includes utilizing the following:
 - i. U.S. EPA Rainfall Erosivity (R) Factor Calculator website;
 - ii. Manually calculated soil erodibility (K) and length-slope (LS) factors; and
 - iii. 303(d) list of water bodies impaired for sediment.
- II.B.3. The applicable beneficial uses for the receiving water are listed in the Regional Water Quality Control Board Basin Plan applicable to the site.
- II.B.4. Sites that discharge to an unlisted receiving water that is tributary to a sediment-sensitive waterbody, within the Hydrologic Unit Code 10 (HUC 10) watershed scale, are considered high receiving water risk sites.
- II.B.5. The discharger may use a combination of the standard and site-specific risk determination methods to calculate the soil erodibility (K), length-slope (LS) sediment risk, and receiving water risk factors.
- II.B.6. The discharger shall calculate the site's sediment risk and receiving water risk during all phases of construction activity (e.g., demolition and pre-development site preparation, grading and land development, streets and utilities, vertical construction, final landscaping, and site stabilization). The construction start date begins with initial disturbance to land, including disturbances under previous landowners, and ends with final stabilization of the site.
- II.B.7. SMARTS will assign the higher Risk Level to the entire site for any site spanning two or more planning watersheds.
- II.B.8. Sites, parcels, or individual lots that are part of a larger plan of development shall include the larger plan of development in Risk Level determination. The discharger shall include this determination in the Permit Registration Documents submittal.

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- II.B.9. Dischargers may request that the Regional Water Board revise the site-specific Risk Level determination values in SMARTS by providing the following information to the Regional Water Board:
- i. A site-specific soils test (ASTM D-422)^{2,3} certified by an accredited Materials Testing Laboratory and reviewed by a QSD to determine the K factor used in the revised Risk Level determination. The soil testing must include the soil classification method used (e.g., Unified Soil Classification System);
 - ii. Review of a site-specific survey or plan by a QSD to determine the LS factor used in the revised Risk Level determination; and
 - iii. A revised Risk Level determination manually calculated in accordance with Attachment D.1 of this General Permit.

II.C. Site-Specific Stormwater Pollution Prevention Plan, Drawings, and Map

The Stormwater Pollution Prevention Plan (SWPPP) (including site-specific drawings and map) is a site-specific document developed for implementation of this General Permit. The SWPPP shall be developed by a Qualified SWPPP Developer and certified and submitted by each discharger with the other Permit Registration Documents.

II.D. Additional Requirements

- II.D.1. All dischargers, other than Linear Underground and Overhead Project dischargers or dischargers subject to the post-construction requirements of an existing NPDES Phase I or II MS4 permit, shall complete the post-construction calculations and upload post-construction plans and other supporting documentation as an attachment in SMARTS.
- II.D.2. All dischargers, other than Linear Underground and Overhead Project dischargers, within a Phase I or II municipal separate storm sewer system permitted area, shall upload the following items in SMARTS:
- II.D.2.a. An attachment or web-source containing the applicable NPDES Phase I or Phase II municipal separate storm sewer system permittee's post-construction requirements; and
 - II.D.2.b. The post-construction plans and calculations submitted to or approved by the applicable NPDES Phase I or Phase II municipal separate storm sewer system permittee.

2 ASTM D-422 is the standard test method used for the quantitative determination of the distribution of particle sizes in soils.

3 Environmental Protection Agency, [American Society for Testing and Materials \(ASTM\) Standards](https://www.epa.gov/sites/default/files/2020-01/documents/sedc_2004-2005_append.pdf), <https://www.epa.gov/sites/default/files/2020-01/documents/sedc_2004-2005_append.pdf> [as of June 22, 2022]

- II.D.3. Dischargers who are proposing to implement an Active Treatment System shall also certify and submit in SMARTS:
- II.D.3.a. Complete Active Treatment System Plan in accordance with Attachment F at least 14 days prior to the planned operation of the Active Treatment System and a copy shall be available on-site during Active Treatment System operation;
 - II.D.3.b. System design and supporting documentation; and
 - II.D.3.c. Proof that the system and/or Active Treatment System Plan was designed by a qualified Active Treatment System professional in accordance with Attachment F of this General Permit.
- II.D.4. Dischargers who are proposing to implement passive treatment shall certify and submit in SMARTS:
- II.D.4.a. Complete Passive Treatment Plan in accordance with Attachment G of this General Permit at least 14 days prior to the planned operation of the passive treatment system and a copy shall be available on-site during operation;
 - II.D.4.b. System design and supporting documentation; and
 - II.D.4.c. Proof that the Passive Treatment Plan and/or system was designed by an appropriate licensed professional (see Attachment G of this General Permit).
- II.D.5. Dischargers who are proposing an alternate Risk Justification shall include:
- II.D.5.a. Soil type identification through an accredited Materials Testing Laboratory analysis and reviewed by a QSD; and
 - II.D.5.b. Review of a site-specific slope survey or plan by a QSD to determine the LS factor used in the revised Risk Level determination.

II.E. Certification of Submitted Documents

The Legally Responsible Person shall certify and submit all Permit Registration Documents required by this General Permit through SMARTS. The discharger's Legally Responsible Person shall have a signed original Electronic Authorization Form on file with the State Water Board for each organization in SMARTS.

II.F. Exceptions to Standard Permit Registration Document Requirements

Construction sites with a valid Small Construction Rainfall Erosivity Waiver are not required to submit a SWPPP (including site-specific drawings and map).

II.G. Assistance

Dischargers and discharger representatives may email the State Water Board, Stormwater Help Desk, at stormwater@waterboards.ca.gov, to answer questions.

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ATTACHMENT E

LINEAR UNDERGROUND AND OVERHEAD PROJECT REQUIREMENTS

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES)
GENERAL PERMIT FOR STORMWATER DISCHARGES
ASSOCIATED WITH CONSTRUCTION AND LAND DISTURBANCE ACTIVITIES
(GENERAL PERMIT)

I. LINEAR UNDERGROUND AND OVERHEAD PROJECT BASELINE REQUIREMENTS

Linear underground and overhead projects are identified as one of three types of risk (Type 1, 2, and 3) based on the project area or segment's threat to water quality. Risk Types for linear projects are determined through SMARTS and clarified in Attachment E.1 of this General Permit when obtaining permit coverage. Risk Type 1, 2, and 3 dischargers shall implement the following minimum best management practices to reduce or prevent pollutants in construction stormwater discharges, and comply with monitoring and reporting requirements. If a requirement in this Attachment does not specify a specific Risk Type, then the requirement applies to Risk Type 1, 2, and 3 dischargers.

II. MINIMUM BEST MANAGEMENT PRACTICES

II.A. Good Site Management "Housekeeping"

- II.A.1. Dischargers shall implement good site management measures (i.e., "housekeeping") for construction materials on a linear project site that could potentially be a threat to water quality if discharged or exposed to stormwater. At a minimum, dischargers shall implement the following good housekeeping measures:
- a. Identify and protect the products used and/or expected to be used, and the end products that are produced and/or expected to be produced from exposure to stormwater. This requirement does not apply to materials and equipment that are designed to be outdoors and exposed to environmental conditions (e.g., poles, equipment pads, cabinets, conductors, insulators, bricks);
 - b. Apply best management practices (BMPs) to erodible stockpiled construction materials (e.g., soil, spoils, fly-ash, stucco, hydrated lime) to prevent erosion and pollutant transport;
 - c. Store chemicals in watertight containers with secondary containment to prevent any spillage or leakage or store in a complete enclosed storage area;
 - d. Minimize exposure of construction materials to precipitation. This requirement does not include materials and equipment that are designed to

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be outdoors and exposed to environmental conditions (e.g., poles, equipment pads, cabinets, conductors, insulators, bricks);

- e. Implement BMPs to control the off-site tracking of sediment and loose construction and landscape materials; and
- f. Implement BMPs to control the discharge of plastic materials and limit the use of plastic materials when more sustainable, environmentally friendly alternatives exist. Dischargers shall consider the use of plastic materials resistant to solar degradation where plastic materials are deemed necessary.

II.A.2. Dischargers shall implement good housekeeping measures for waste management, which, at a minimum to the extent feasible, shall consist of the following:

- a. Minimize the discharge of pollutants from equipment and vehicle washing, wheel wash water, masonry wash waters, and other wash waters. Wash waters shall be captured and treated prior to discharge or disposed of at a permitted facility that can accept that waste, to mitigate impacts to water quality;
- b. Provide containment (e.g., secondary containment) of sanitation facilities (e.g., portable toilets) to prevent discharges of pollutants to the stormwater drainage system or receiving water;
- c. Clean or replace sanitation facilities and inspecting them regularly for leaks and spills;
- d. Keep debris or trash in waste containers if it is subject to transport from the site by wind or runoff;
- e. Cover waste disposal containers at the end of every business day and during a precipitation event;
- f. Prevent discharges from waste disposal containers to the stormwater drainage system or receiving water (e.g., containers with solid bottoms and regular maintenance);
- g. Contain and securely protect stockpiled waste material from wind and precipitation unless actively being used; and
- h. Secure and contain concrete washout areas and other washout areas that may contain additional pollutants to minimize discharge into the underlying soil and onto the surrounding areas. Washout areas shall be covered prior to and during a precipitation event.

II.A.3. Dischargers shall implement good housekeeping for vehicle/equipment storage and maintenance, which shall consist of the following:

- a. Contain fuel, grease, and oil to prevent them from leaking into the ground, storm drains, or surface waters;

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- b. Place all equipment or vehicles, which are to be fueled, maintained, and stored in a designated area with BMPs installed; and
- c. Clean leaks immediately and dispose of leaked materials properly in accordance with the law.

II.A.4. Dischargers shall implement good housekeeping for landscape materials, which, at a minimum, shall consist of the following:

- a. Contain and protect stockpiled materials such as mulches and topsoil, or other erodible landscape materials, from wind and precipitations unless being actively used;
- b. Contain packaged landscape materials (e.g., fertilizers) when they are not being actively used;
- c. Discontinue the application of any erodible landscape material at least 2 days before a forecasted precipitation event as defined in Attachment B or during periods of precipitation; and
- d. Apply erodible landscape material at quantities and rates according to manufacturer recommendations or based on written specifications by knowledgeable and experienced field personnel.

II.A.5. Dischargers shall implement good housekeeping measures on the linear construction site, and of site operations, to control aerial deposition of site materials. Such particulates can include, but are not limited to, metals, nutrients, organics, sediment, other particulates, and trash.

II.A.6. Dischargers shall document all housekeeping BMPs in the Stormwater Pollution Prevention Plan (SWPPP) that correspond to the nature and phase of the construction activities.

II.B. Non-Stormwater Management

II.B.1. Dischargers shall implement the following measures to control all non-stormwater discharges during construction, to the extent feasible:

- a. Wash vehicles in such a manner as to prevent non-stormwater discharges to surface waters or municipal separate storm sewer system drainage systems;
- b. Clean streets in such a manner as to prevent unauthorized non-stormwater discharges from reaching surface water or municipal separate storm sewer system drainage systems; and
- c. Eliminate any non-stormwater discharges that are not specified in Section IV.A of this General Permit's Order, Authorized Non-Stormwater Discharges.

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II.C. Preserve Existing Topsoil

- II.C.1. Dischargers shall preserve existing topsoil, unless infeasible, through the following practices:
- a. Stockpiling existing topsoil, or transferring topsoil to other locations, to deploy and reestablish vegetation prior to termination of coverage; and
 - b. Stabilizing disturbed topsoil during construction.
- II.C.2. Preserving existing topsoil is not required where the intended function of a specific area of the site dictates that the topsoil be disturbed or removed.¹

II.D. Erosion Control

- II.D.1. Dischargers shall implement the following practices to eliminate or minimize site erosion. Erosion control BMPs (with the exception of sprayed products) shall be available on-site, or at a nearby location (e.g., common lay-down yard), year-round with trained persons able to deploy the product under the direction of the Qualified SWPPP Practitioner:
- a. Implement effective wind erosion controls;
 - b. Preserve existing vegetation;
 - c. Minimize the amount of soil exposed during construction activity;
 - d. Minimize the disturbance of steep slopes;
 - e. Schedule earthwork to minimize the amount of disturbed area when feasible;
 - f. Immediately initiate stabilization for disturbed areas whenever earth disturbing has permanently ceased on any portion of the site, or temporarily ceased on any portion of the site and will not resume for a period exceeding 14 calendar days;²
 - g. Minimize soil compaction in areas other than where the intended function of a specific area dictates that it be compacted;
 - h. Reestablish vegetation or non-vegetative erosion controls as soon as practicable;

1 Examples may include the removal of topsoil containing invasive seedbanks, lack of space to stockpile topsoil, and sites that are designed to be highly impervious after construction with little to no vegetation intended to remain.

2 In arid, semiarid, and drought-stricken areas where initiating vegetative stabilization measures immediately is infeasible, alternative stabilization measures shall be employed as specified by the Regional Water Board. Stabilization shall be completed within a period of time determined by the Regional Water Board. In limited circumstances stabilization may not be required if the intended function of a specific area of the site necessitates that it remains disturbed.

- i. If feasible, divert up gradient run-on water from contacting areas of exposed soils disturbed by construction activities or convey run-on through the site in a manner that prevents erosion from areas of construction and does not compromise the effectiveness of erosion, sediment, and perimeter controls;
- j. Run-on water flowing onto a site from off-site areas may be separated from a site's stormwater discharge to eliminate commingled contribution. Run-on diversion shall occur prior to entering an area affected by construction activity. Run-on flow diversion shall be conveyed through or around the construction activity in plastic pipe or an engineered conveyance channel in a manner that will not cause erosion due to flow diversion. Run-on combined with a site's stormwater discharge is considered a stormwater discharge;
- k. Limit the use of plastic materials when more sustainable, environmentally-friendly alternatives exist. Where plastic materials are deemed necessary, the discharger shall consider the use of plastic materials resistant to solar degradation;
- l. Control stormwater and non-stormwater discharges to minimize downstream channel and bank erosion; and
- m. Control peak flowrates and total volume of stormwater and authorized non-stormwater discharges to minimize channel and streambank erosion and scour in the immediate vicinity of discharge points.

II.D.2. Dischargers that stabilize soil using bonded-fiber matrices, hydromulches, spray tackifiers, or other land-applied products shall:

- a. Apply the product according to the manufacturer's instructions and guidance; and
- b. Apply the product according to the manufacturer's guidance to allow for ample cure time and to prevent treatment chemicals from being transported by runoff.

II.E. Sediment Controls

II.E.1. Dischargers shall implement the following site sediment controls:

- a. Establish and maintain effective perimeter controls;
- b. Stabilize all construction entrances and exits to sufficiently control erosion and sediment discharges from the site;
- c. Design, install, and maintain effective sediment controls to minimize the discharge of pollutants utilizing site-specific BMPs; and
- d. Design sediment basins and impoundments according to the California Stormwater Quality Association's (CASQA) current Construction BMP

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Guidance Handbook³ and utilize outlet structures that withdraw water from the surface, unless infeasible. Linear project dischargers utilizing sediment basins shall complete installation prior to other land disturbance activities unless infeasible.

II.F. Additional Linear Underground and Overhead Project Type 2 and 3 Requirements

- II.F.1. At Risk Type 2 and 3 sites, dischargers shall implement the following additional erosion and sediment control BMPs for areas under active construction:⁴
- a. Design and construct cut and fill slopes in a manner to ensure slope stability and to minimize erosion including, but not limited to, these practices:
 - i. Reduce continuous slope-length using terracing and diversions;
 - ii. Reduce slope steepness; and
 - iii. Roughen slope surfaces with large cobble or track walking.
 - b. Install linear sediment controls along the toe of the slope, face of the slope, and at the grade breaks of exposed slopes according to sheet flow lengths as shown in Table 1 until slope has reached Notice of Termination conditions for erosion protection. When infeasible to comply with Table 1 due to site-specific geology or topography, the Qualified SWPPP Developer shall include in the SWPPP a justification for the use of an alternative method to protect slopes from erosion and sediment loss.

Table 1 - Critical Slope and Sheet Flow Length Combinations for Linear Sediment Reduction Barrier

Slope Ratio (Vertical to Horizontal)	Sheet flow length not to exceed
≤ 1:20	Per Qualified SWPPP Developer's specification.
> 1:20 to ≤ 1:4	35 feet
> 1:4 to ≤ 1:3	20 feet
> 1:3 to ≤ 1:2	15 feet
> 1:2	10 feet

3 California Stormwater Quality Association (CASQA), [Construction BMP Handbook](https://www.casqa.org/sites/default/files/casqa-handbook-construction/master_hanbook_file_2015_sec.pdf) (January 2015), <https://www.casqa.org/sites/default/files/casqa-handbook-construction/master_hanbook_file_2015_sec.pdf> [as of May 20, 2021] (CASQA Construction BMP Handbook)

4 Active areas of construction are areas undergoing land surface disturbance and associated site areas included in the SWPPP. This includes construction activity during the preliminary phase, mass grading phase, streets and utilities phase, and the vertical construction phase.

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- II.F.2. Risk Type 2 and 3 dischargers shall limit construction activity traffic to and from the project to entrances and exits that employ effective controls to prevent off-site tracking of sediment.
- II.F.3. Risk Type 2 and 3 dischargers shall maintain and protect all storm drain inlets, perimeter controls, and BMPs at entrances and exits (e.g., tire wash off locations).
- II.F.4. Risk Type 2 and 3 dischargers shall remove any excess sediment or other construction activity-related materials that are deposited on the impervious roads by vacuuming or sweeping prior to any precipitation event.
- II.F.5. Risk Type 2 and 3 dischargers shall implement additional site-specific sediment controls upon written request by the Regional Water Boards when the implementation of the other requirements in this Section are determined to inadequately protect the site's receiving water(s).

II.G. Surface Water Buffer⁵

- II.G.1. Linear project dischargers shall provide and maintain natural buffers and/or equivalent erosion and sediment controls when a water of the United States is located within 50 feet of the site's earth disturbances, unless infeasible.
- II.G.2. Linear project dischargers shall comply with one of the following alternatives for any discharges to waters of the United States located within 50 feet of a site's earth disturbances:
 - a. Provide and maintain a 50-foot undisturbed natural buffer, from the edge of the disturbed area to the top of bank;
 - b. Provide and maintain an undisturbed natural buffer that is less than 50 feet and is supplemented by erosion and sediment controls that achieve, in combination, the sediment load reduction equivalent to a 50-foot undisturbed natural buffer. The equivalent sediment load may be calculated using the Revised Universal Soil Loss Equation, Volume 2 (RUSLE2) model or another method approved by the Regional Water Board; or
 - c. Implement erosion and sediment controls to achieve the sediment load reduction equivalent to a 50-foot undisturbed natural buffer when it is infeasible to provide and maintain an undisturbed natural buffer of any size. The equivalent sediment load may be calculated using RUSLE2 or another method approved by the Regional Water Board.

⁵ The surface water buffer requirements apply to work above the top-of-bank or high-water level of waters of the United States. Work within a channel or streambed (water body-dependent construction), Clean Water Act § 404 projects with § 401 certification, and projects where no natural surface buffer exists (e.g., concrete channelization) are exempt from the requirements. All types of in-channel work may be regulated under Section 401 (Clean Water Act - Regional Boards), Section 404 (Clean Water Act - Army Corps of Engineers), or Section 1602 (California Fish and Game Code).

II.H. Pesticide Application

Linear project dischargers shall only apply pesticides that have been authorized for use through California Department of Pesticide Regulation. The application of pesticides shall follow manufacturer's guidance.

II.I. Demolition of Existing Structure

Linear project dischargers shall prevent demolition materials from being exposed to precipitation. Demolition materials should be covered with an impermeable barrier such as, but not limited to, plastic sheeting prior to precipitation to prevent known contaminants from being mobilized. Dischargers unable to cover demolished material that were not previously investigated or found to be absent of applicable pollutants in reportable quantities shall sample for any non-visible pollutants that may be in stormwater discharges that may be present such as, but not limited to, asbestos, leaded paint, or poly chlorinated biphenyls (PCBs)⁶.

II.J. Maintenance and Repair

- II.J.1. Linear project dischargers shall begin maintaining, repairing, and/or implementing design changes (reviewing alternatives that have not been used yet) to BMPs within 72 hours of identification of failures or other short comings, and complete the changes as soon as possible, prior to the next forecasted precipitation event.
- II.J.2. Linear project dischargers shall have a Qualified SWPPP Practitioner (QSP) verify all BMP maintenance and repairs were appropriately implemented during the next visual inspection following completion. The QSP may delegate BMP maintenance and repair verification to an appropriately trained delegate.

III. MONITORING REQUIREMENTS

III.A. General Requirements

Linear project dischargers shall implement the Construction Site Monitoring Program in compliance with this Section at the time of the commencement of construction activity and shall continue implementation until the project is complete and the project site is stabilized as defined in Section III.H in the Order.

The monitoring requirements of this Section are issued pursuant to Water Code § 13383 and specify monitoring requirements for linear project dischargers subject to this Order.

6 PCBs were used between January 1, 1950 and January 1, 1980 and should be considered to be potentially present in structures built during that timeframe.

"Structure", in this instance, shall have been constructed with floor space (such as a building).

III.B. Monitoring Exceptions

- III.B.1. Linear project dischargers shall conduct visual inspections and collect samples to meet the requirements of this Attachment. Dischargers are not required to physically conduct visual inspections or collect samples under the following conditions:
 - a. During dangerous weather conditions such as electrical storms, flooding, and high winds above 40 miles per hour;
 - b. Outside of scheduled site operating hours; or
 - c. When the linear project site is not accessible to personnel.
- III.B.2. For linear project sites that are inactive, the discharger may reduce the visual inspection frequency and suspend sampling per Section III.G of the Order.
- III.B.3. Linear project dischargers shall provide an explanation with supporting information for all missed visual inspections or sampling required by this Attachment, to be included in the Annual Report.

III.C. Visual Inspection Requirements

- III.C.1. Linear project dischargers shall perform visual inspections, based on their Risk Type, in accordance with Table 2 below. The purpose of the visual inspections is to identify and record BMPs that need maintenance to operate effectively, that have failed, or that could fail to operate as intended. Except as specified in Section III.C.3 below, inspectors shall be the Qualified SWPPP Developer, Qualified SWPPP Practitioner, or be trained by the Qualified SWPPP Practitioner.

Table 2 – Visual Inspection Schedule⁷

Linear Underground and Overhead Project Type	Weekly	Pre-Qualifying Precipitation Event	During Qualifying Precipitation Event	Post-Qualifying Precipitation Event
1	X	X	X	Not Applicable
2	X	X	X	X
3	X	X	X	X

- III.C.2. Linear project dischargers shall conduct weekly visual inspections to ensure that BMPs are properly installed and maintained. A pre-, during, or post-qualifying precipitation event inspection satisfies the weekly visual inspection requirement.

⁷ This table is limited to routine weekly inspections and Qualifying Precipitation Event related inspections. Other visual inspections may be required under this Permit and are described in the applicable sections.

- III.C.3. Linear project dischargers shall have a QSP conduct a pre-Qualifying Precipitation Event inspection within 72 hours prior to any weather pattern that is forecasted to have a 50 percent chance of 0.5 inches or more in a 24-hour period. Precipitation forecast information shall be obtained from the [National Weather Service Forecast Office](https://www.weather.gov/) (e.g., by entering the zip code of the project location at <https://www.weather.gov/>) and shall be included as part of the inspection checklist weather information. If extended forecast precipitation data (greater than three days) is available from the National Weather Service, the pre-precipitation event inspection may be done up to 120 hours in advance. The pre-Qualifying Precipitation Event inspection shall include an inspection of the following:
- a. All stormwater drainage areas to identify leaks, spills, or uncontrolled pollutant sources and when necessary, implement appropriate corrective actions to control pollutant sources;
 - b. All BMPs to identify whether they have been properly implemented in accordance with the SWPPP and when necessary, implement appropriate corrective actions to control pollutant sources; and
 - c. All stormwater storage and containment areas to detect leaks and check for available capacity to prevent overflow.
- III.C.4. Dischargers shall conduct daily visual inspections at least once every 24-hour period during Qualifying Precipitation Events. Qualifying Precipitation Events are extended for each subsequent 24-hour period forecast to have at least 0.25 inches of precipitation.
- III.C.5. Risk Type 2 and 3 dischargers* shall conduct post-Qualifying Precipitation Event visual inspections within 96 hours after each Qualifying Precipitation Event if 0.5 inches or more precipitation is measured during the duration of the Qualifying Precipitation Event using the onsite rain gauge. The 96-hour time frame may include the two consecutive 24-hour periods with less than 0.25 inches forecast, which mark the end of the precipitation event. The inspection is to:
- a. Identify if BMPs were adequately designed, implemented, and effective;
 - b. Identify BMPs that require repair or replacement due to damage; and
 - c. Identify any additional BMPs that need to be implemented and revise the SWPPP accordingly.
- III.C.6. Linear project dischargers shall conduct all visual inspections during scheduled site operating hours.
- III.C.7. For each required inspection, Linear project dischargers shall develop and complete an inspection checklist that, at a minimum includes:

* The July 22, 2022 draft Order was clear that this monitoring requirement applied to only Risk Type 2 and 3 dischargers. Change Sheet #2, which was circulated September 7, 2022, inadvertently did not reflect this limitation. The final Order has been corrected to reflect that this requirement applies only to Risk Type 2 and 3.

- a. Inspection type (weekly, pre-precipitation, daily precipitation, or post-precipitation event);
- b. Inspection date and time the inspection was conducted;
- c. Weather information, including the presence or absence of precipitation, an estimate of the beginning of the Qualifying Precipitation Event, duration of the event, date of the Qualifying Precipitation Event, and the amount of precipitation in inches;
- d. Site information, including stage of construction, activities completed since last inspection, and approximate area of the site exposed;
- e. A description of any BMPs evaluated and any deficiencies noted, including those that may have resulted in the release of non-visible pollutants;
- f. A list of the inspections of all BMPs inspected, including erosion controls, sediment controls, chemical and waste controls, and non-stormwater controls;
- g. Report of the presence of any floating and suspended materials, odors, discolorations, visible sheens, and any sources of pollutants in discharges and contained stormwater;
- h. Any corrective actions required, including any necessary changes to the SWPPP and the associated implementation dates;
- i. Photographs of areas of concern and the QSP's description of the problem, if any; and
- j. Inspector's name, title, and certification, if any.

III.D. Water Quality Monitoring Requirements

Linear project dischargers shall collect samples of discharges, based on their Risk Type, in accordance with Table 3 and the requirements below, to monitor water quality and assess compliance with the requirements of this General Permit. Samplers shall be the Qualified SWPPP Developer, Qualified SWPPP Practitioner, or be trained by the Qualified SWPPP Practitioner.

Table 3 – Sample Collection Schedule

Linear Underground and Overhead Project Risk Type	Stormwater Discharge Sample Collection (when applicable)	Receiving Water Sample Collection (when applicable)	Non-Visible Sample Collection (when applicable)
1	Not Applicable	Not Applicable	X
2	X	Not Applicable	X
3	X	X (Post-exceedance)	X

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III.D.1. Risk Type 2 and 3 Stormwater Discharge Monitoring Requirements

- III.D.1.a. Risk Type 2 and 3 dischargers shall collect stormwater samples from sampling locations at one or more discharge locations representative of the project's construction activities, during discharge and within site operating hours. The samples shall be representative of the discharge flow and characteristics.
- III.D.1.b. Risk Type 2 and 3 dischargers shall obtain one sample from each representative sample location per 24-hour period of each qualifying precipitation event, during active discharge.
- III.D.1.c. Risk Type 2 and 3 dischargers shall collect samples of stored or contained stormwater during discharge from the impoundment, in accordance with Attachment J.
- III.D.1.d. Risk Type 2 and 3 dischargers shall analyze all their effluent samples for:
 - i. pH and turbidity (refer to Order, Section IV.C.3.c and d); and
 - ii. Additional parameter required by the Regional Water Board Executive Officer.
- III.D.1.e. Risk Type 2 and 3 dischargers may sample run-on from surrounding areas if there is reason to believe run-on may contribute to exceedance of numeric action levels and/or numeric effluent limits.

III.D.2. Risk Type 3 Receiving Water Monitoring Requirements

- III.D.2.a. Risk Type 3 dischargers who discharge directly into receiving waters are required to monitor that receiving water if sampling results from the discharge monitoring location meets either of the following conditions:
 - i. pH value falls outside of the range of 6.0 and 9.0 pH units; or
 - ii. Turbidity exceeds 500 NTU.
- III.D.2.b. Receiving water monitoring does not apply if run-on from a forest fire or any other natural disaster caused the stormwater results to fall outside the pH range or exceed the turbidity value.
- III.D.2.c. Risk Type 3 dischargers required to conduct receiving water monitoring shall collect samples as follows:
 - i. Collect, at minimum, one upstream receiving water sample from an accessible and safe location that is:
 - 1. Representative of the receiving water;
 - 2. As close as possible to the discharge location; and
 - 3. Upstream from the discharge location.
 - ii. Collect, at minimum, one downstream receiving water sample from an accessible and safe location that is:
 - 1. Representative of the receiving water;

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2. As close as possible to the discharge location; and
3. Downstream from the discharge location.

- III.D.2.d. Risk Type 3 dischargers shall analyze the samples for the parameter that triggered this monitoring (either pH or turbidity, or both).
- III.D.2.e. Risk Type 3 dischargers shall collect the samples once every 24-hour period of the qualifying precipitation event.
- III.D.2.f. Risk Type 3 dischargers shall specify the specific locations where samples were collected, date and time of sample collection, as well as constituents analyzed.
- III.D.2.g. The Regional Water Board Executive Officer delegate may require, in writing, that the discharger continue to sample the receiving water for the parameter that required this monitoring (pH and/or turbidity) after the qualifying precipitation event ends.

III.D.3. Non-Visible Pollutant Monitoring Requirements

- III.D.3.a. Linear project dischargers shall implement sampling and analysis requirements to monitor non-visible pollutants associated with:
- i. Evidence of pollutant releases that are not visually detectable in stormwater discharges; and
 - ii. Releases of substances that may cause or contribute to an exceedance of water quality objectives in the receiving waters.
- III.D.3.b. Linear project dischargers are required to conduct sampling and analysis for non-visible pollutants identified in the SWPPP or otherwise known to be on site, only when the pollutants may be discharged due to failure to implement BMPs, a container spill or leak, or a BMP breach, failure, or malfunction.
- III.D.3.c. Linear project dischargers shall collect at least one sample, within 8 hours, from each discharge location hydraulically downgradient from the observed triggering event or condition.
- III.D.3.d. Linear project dischargers shall continue to collect at least one sample per applicable discharge location for each 24-hour period that there is discharge, until the necessary corrective actions are completed to control further discharge of the pollutant.
- III.D.3.e. Linear project dischargers are not required to sample if one of the conditions described in Section III.D.3.b above (e.g., breach or spill) occurs and, prior to discharge, the material containing the pollutant is fully remediated or removed; and BMPs to control the pollutant are implemented, maintained, or replaced as necessary.
- III.D.3.f. Linear project dischargers shall analyze samples in the field or submit them to a laboratory as specified in Section III.F of this Attachment for all non-visible pollutant anticipated to be present in the discharge, including applicable TMDL-specific pollutants listed in Table H-2 in Attachment H.

III.E. Sample Collection and Handling Instructions

III.E.1. Linear project dischargers shall:

- a. Identify applicable parameters that require laboratory analysis to be tested for each stormwater discharge location (pH and turbidity are typically analyzed with field meters).
- b. Request the laboratory provide the appropriate number of sample containers, types of containers, sample container labels, blank Chain of Custody forms, and sample preservation instructions.
- c. Use the appropriate sample shipping method to the laboratory. The laboratory should receive samples within 48 hours of the physical sampling (unless otherwise required by the laboratory to meet all method hold times). The options are to either deliver the samples to the laboratory, arrange to have the laboratory pick them up, or ship them overnight to the laboratory.
- d. Use only the sample containers provided/specified by the laboratory to collect and store samples. Use of any other type of containers could cause sample contamination.
- e. Prevent sample contamination by not touching or putting anything into the sample containers before collecting stormwater samples.
- f. Not overfill sample containers. Overfilling can change the analytical results.
- g. Secure each sample container cap is tightly secured without stripping the cap threads.
- h. Label each sample container. The label shall identify the date and time of sample collection, the person taking the sample, and the sample collection location or discharge point. The label should also identify any sample containers that have been preserved.
- i. Carefully pack sample container into an ice chest or refrigerator to prevent breakage and maintain temperature during shipment; frozen ice packs or ice is placed into the shipping container to keep sample close to 4° C (39° F) until arriving at the laboratory (do not freeze samples).
- j. Complete a Chain of Custody form with each set of samples. The Chain of Custody form shall include the discharger's name, address, and phone number, identification of each sample container and sample collection point, person collecting the samples, the date and time each sample container was filled, the analysis that is required for each sample container, and both the signatures of the persons relinquishing and receiving the sample containers.

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- III.E.2. Personnel for Linear project dischargers shall be designated and trained for the collection, maintenance, and shipment of samples in accordance with the above sample protocols and laboratory-specific practices.
- III.E.3. Linear project dischargers shall perform all sampling and preservation protocols in accordance with the 40 Code of Federal Regulations Part 136 and the current edition of "Standard Methods for the Examination of Water and Wastewater" (American Public Health Association).⁸
- III.E.4. Linear project dischargers may refer to Surface Water Ambient Monitoring Program's (SWAMP) Quality Assurance Program Plan (QAPrP) for more information on sampling collection and analysis.⁹

III.F. Analytical Methods Requirements

- III.F.1. Linear project dischargers shall refer to Table 4 for applicable test methods, detection limits, and reporting units.

Table 4 - Test Methods, Method Detection Limits, and Reporting Units

Parameter	Test Method	Discharger Risk Type	Method Detection Limit	Reporting Units
pH	Field test with calibrated portable instrument using U.S. EPA approved procedures	Type 2 and 3	0.2	pH units
Turbidity	U.S. EPA 0180.1 and/or field test with calibrated portable instrument	Type 2 and 3	1	NTU
Non-Visible Pollutant Parameter(s)	U.S. EPA-approved test method for the specific pollutant parameter	All Types	Dependent on the test method	Dependent on the test method

- III.F.2. All monitoring instruments and equipment shall be calibrated and maintained in accordance with manufacturers' specifications to ensure accurate measurements. Additionally, records of calibration shall be retained for at least 3 years and made available upon request.
- III.F.3. Risk Type 2 and 3 dischargers shall perform pH analysis on-site with a calibrated pH meter using a U.S. EPA acceptable test method.

⁸ Unless other test procedures have been specified in this General Permit or by the Water Boards.

⁹ Additional information regarding [SWAMP's QAPrP](https://www.waterboards.ca.gov/water_issues/programs/swamp/quality_assurance.html#qappr) can be found at: https://www.waterboards.ca.gov/water_issues/programs/swamp/quality_assurance.html#qappr. [as of October 20, 2020]

- III.F.4. Risk Type 2 and 3 dischargers shall perform turbidity analysis using a calibrated turbidity meter (turbidimeter), either on-site or at a State Water Board Environmental Laboratory Accreditation Program (ELAP)-accredited laboratory. Acceptable test methods include Standard Method 2130 B or U.S. EPA Method 180.1.
- III.F.5. All analyses of laboratory-analyzed parameters shall be sent to and conducted at a laboratory recognized by the State Water Board Environmental Laboratory Accreditation Program (ELAP), with the exception of field analysis conducted by the discharger for turbidity and pH.
- III.F.6. Linear project dischargers shall assign a value of (0) for all non-visible pollutant analytical results less than the minimum level (reporting limit), as reported by the laboratory, used in calculations required by this Order (e.g., numeric action level and numeric effluent limitation exceedance determinations), so long as a sufficiently sensitive test method was used as evidenced by the reported method detection limit and minimum level.

III.G. Exceedance Response Requirements¹⁰

- III.G.1. Linear project dischargers are subject to the applicable numeric action levels and/or numeric effluent limitations based on the Risk Type as shown in Table 5 below.

Table 5 - Numeric Action Levels and Numeric Effluent Limitations

Parameter	Risk Type	Numeric Action Level	Numeric Effluent Limitation
pH	Type 2 and 3	Lower = 6.5 Upper = 8.5	Not Applicable
Turbidity	Type 2 and 3	250 NTU	Not Applicable
TMDL-related Pollutant	Responsible Dischargers with a project of any Risk Type	Refer to Table H-2 in Attachment H	Refer to Table H-2 in Attachment H

- III.G.2. For pH and turbidity, the discharger shall use the field meter readings obtained from each discharge location per day of discharge to determine if there has been an exceedance of the numeric action levels.
- III.G.3. When analytical results indicate that the discharge is below or above the numeric action levels for pH, exceeds the turbidity numeric action level, or exceeds an applicable TMDL-related numeric action level or numeric effluent

¹⁰ Terms including, but not limited to, numeric action level and exceedances are defined in Attachment B of this General Permit.

limitation, the discharger shall determine the source(s) of the pollutant and implement corrective actions to:

- a. Meet Best Available Technology Economically Achievable and Best Conventional Pollutant Control Technology requirements in 40 Code of Federal Regulations §§ 450.21 through 450.23¹¹; and
- b. Reduce or prevent pollutants in stormwater and authorized non-stormwater discharges from causing further exceedances.

III.G.4. Linear project dischargers shall iterate corrective actions until the discharge is in compliance with the applicable numeric action level(s).

III.G.5. The source evaluation shall be kept with the SWPPP and specifically address what corrective actions were taken or will be taken and provide a schedule for their completion.

IV. LINEAR PROJECT REPORTING REQUIREMENTS

IV.A. Visual Inspections

Linear project dischargers shall keep all completed inspection checklists and related documentation with the SWPPP on-site or electronically.

IV.B. Water Quality Monitoring

IV.B.1. Risk Type 2 and 3 Stormwater Discharge Monitoring Reporting¹²

IV.B.1.a. Risk Type 2 and 3 dischargers shall electronically submit through SMARTS all field sampling results within 30 days of the completion of the precipitation event or within 10 days if the field sampling results demonstrate the exceedance of the pH and/or turbidity numeric action levels.

IV.B.1.b. Risk Type 2 and 3 dischargers that exceeded the pH and/or turbidity numeric action levels shall prepare a Numeric Action Level Exceedance Report when requested, in writing, from a Regional Water Board delegate and shall submit and certify each Numeric Action Level Exceedance Report through SMARTS within 30 days of receiving the written request, in accordance with Section IV of this General Permit's Order.

IV.B.1.c. The Numeric Action Level Exceedance Report shall include:

- i. The analytical method(s), method reporting unit(s), and method detection limit(s) of each parameter;

11 United States Environmental Protection Agency, [Construction and Development Effluent Limitation Guidelines §§ 450.21 through 450.23](https://www.ecfr.gov/current/title-40/chapter-I/subchapter-N/part-450/subpart-B?toc=1), <<https://www.ecfr.gov/current/title-40/chapter-I/subchapter-N/part-450/subpart-B?toc=1>> [as of June 28, 2022].

12 Terms including, but not limited to, numeric action level and exceedances are defined in Attachment B of this General Permit.

- ii. The date, place, time of sampling, visual inspections, and/or measurements, including precipitation; and
 - iii. An assessment of the existing BMPs associated with the sample that exceeded the numeric action level, a description of each corrective action taken including photographs, and date of implementation.
- IV.B.1.d. Risk Type 2 and 3 dischargers that prepared a Numeric Action Level Exceedance Report shall retain a copy of the report for a minimum of three years after the date the exceedance report is certified and submitted.
- IV.B.2. Risk Type 3 Receiving Water Monitoring Reporting
- IV.B.2.a. Risk Type 3 dischargers conducting receiving water monitoring shall electronically submit through SMARTS all receiving water samples within 10 days after completion of the precipitation event.
- IV.B.3. Non-Visible Pollutant Monitoring Reporting¹³
- IV.B.3.a. All Linear project dischargers that conducted non-visible pollutant monitoring shall electronically submit through SMARTS all field and/or analytical sampling results within 30 days after obtaining the analytical result or within 10 days if the analytical results demonstrate the exceedance of an applicable TMDL-related numeric action level or numeric effluent limitation or Basin Plan parameter.
- IV.B.3.b. All Linear project dischargers that exceeded an applicable TMDL-related numeric action level shall prepare a Numeric Action Level Exceedance Report when requested, in writing, from a Regional Water Board delegate and shall submit and certify each Numeric Action Level Exceedance Report through SMARTS within 30 days of receiving the written request, in accordance with Section IV of this General Permit's Order.
- IV.B.3.c. The Numeric Action Level Exceedance Report shall include:
- i. The analytical method(s), method reporting unit(s), and method detection limit(s) for each parameter;
 - ii. The date, place, time of sampling, visual inspections, and/or measurements, including precipitation; and
 - iii. An assessment of the existing BMPs associated with the sample that exceeded the numeric action level, a description of each proposed corrective action taken, including photographs, and date of implementation.

¹³ Terms including, but not limited to, numeric action level, numeric effluent limitations, and exceedances are defined in Attachment B of this General Permit.

- IV.B.3.d. All Linear project dischargers that prepared a Numeric Action Level Exceedance Report shall retain a copy of the report for a minimum of three years after the date the exceedance report is certified and submitted.
- IV.B.3.e. All Linear project dischargers that exceed an applicable TMDL-related numeric effluent limitation shall comply with the water quality-based corrective action requirements in Section VI.Q of the Order.

EXHIBIT "C" (Stormwater Pollution Prevention Plan)

ATTACHMENT E.1

**LINEAR UNDERGROUND AND OVERHEAD PROJECT AREA OR SEGMENT
AREA TYPE DETERMINATION**

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES)
GENERAL PERMIT FOR STORMWATER DISCHARGES ASSOCIATED
WITH CONSTRUCTION AND LAND DISTURBANCE ACTIVITIES
(GENERAL PERMIT)

Part 1

1. Will ≥ 70 percent of the construction activity occur on paved surfaces or will < 30 percent of the soil disturbance occur on unpaved surfaces?
 - a. If Yes, proceed to question 2
 - b. If No, proceed to question 3
2. Will areas disturbed be returned to pre-construction condition or equivalent condition at the end of each day?
 - a. If Yes, this is a Project Type 1 Linear Underground and Overhead Project
 - b. If No, proceed to Part 2 on page 2
3. Will the construction activity occur on unpaved improved roads, including shoulders or land immediately adjacent to the roads?
 - a. If Yes, proceed to question 5
 - b. If No, proceed to question 4
4. Will > 30 percent of the construction activity occur within non-paved shoulders or land immediately adjacent to paved surfaces?
 - a. If Yes, proceed to question 5
 - b. If No, proceed to Part 2 on page 2
5. Will areas disturbed be returned to pre-construction conditions or equivalent conditions at the end of the day?
 - a. If Yes, proceed to question 6
 - b. If No, proceed to Part 2 on page 2
6. Will areas of established vegetation disturbed by the construction activity be stabilized and revegetated by the end of the project?
 - a. If Yes, proceed to question 7
 - b. If No, proceed to Part 2 on page 2

EXHIBIT "C" (Stormwater Pollution Prevention Plan)

7. When required, will adequate temporary stabilization BMPs be installed and maintained until vegetation is established to meet minimum vegetative cover requirements in this Order for stabilization?
 - a. If Yes, this is a Project Type 1 Linear Underground and Overhead Project
 - b. If No, proceed to Part 2 on page 2

Part 2

1. Calculate the Sediment Risk per Attachment D.1 or the Stormwater Multiple Application and Report Tracking System (SMARTS).

Project Sediment Risk =

LOW: <15 tons per acre; or

MEDIUM: ≥15 and <75 tons per acre; or

HIGH: ≥75 tons per acre
2. Is the project area or project segment area located within a Sediment Sensitive Watershed (refer to Attachment D.1 or SMARTS)?
 - a. If Yes, proceed to question 3*
 - b. If No, Receiving Water Risk is LOW
3. Is the project area or segment located within the flood plain or a flood prone area (riparian zone) of a Sensitive Receiving Water Body?
 - a. If Yes, Receiving Water Risk is HIGH
 - b. If No, Receiving Water Risk is MEDIUM

Use the combined risk matrix below to determine the site-specific type for the linear underground and overhead project.

		Sediment Risk		
		LOW	MEDIUM	HIGH
Receiving Water Risk	LOW	Type 1	Type 1	Type 2
	MEDIUM	Type 1	Type 2	Type 3
	HIGH	Type 2	Type 3	Type 3

Definition of Terms

Equivalent Condition – Equivalent condition means disturbed soils such as soils from trench excavation required to be hauled away, backfilled into the trench, and/or covered (e.g., metal plates, pavement, plastic covers over spoil piles) at the end of each construction day.

Sediment Sensitive Receiving Water Body – A sediment sensitive receiving water body is defined as a water body segment that is:

- Listed as impaired on [California’s 2020-2022 Clean Water Act 303\(d\) List of Impaired Waters](https://www.waterboards.ca.gov/water_issues/programs/water_quality_assessment/2020_2022_integrated_report.html) for sedimentation, siltation and/or turbidity; (https://www.waterboards.ca.gov/water_issues/programs/water_quality_assessment/2020_2022_integrated_report.html)

OR

- Designated with beneficial uses of COLD, SPAWN, and MIGRATORY.

Sediment Sensitive Watershed – A sediment sensitive watershed is defined as a watershed draining into a receiving water body (or receiving water body reach):

- Listed as impaired on [California’s 2020-2022 Clean Water Act 303\(d\) List of Impaired Waters](https://www.waterboards.ca.gov/water_issues/programs/water_quality_assessment/2020_2022_integrated_report.html) for sedimentation, siltation, and/or turbidity; (https://www.waterboards.ca.gov/water_issues/programs/water_quality_assessment/2020_2022_integrated_report.html)>

OR

- Designated with beneficial uses of COLD, SPAWN, and MIGRATORY.

EXHIBIT "C" (Stormwater Pollution Prevention Plan)

ATTACHMENT E.2

**PERMIT REGISTRATION DOCUMENT REQUIREMENTS FOR LINEAR
UNDERGROUND AND OVERHEAD PROJECTS**

**NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES)
GENERAL PERMIT FOR STORMWATER DISCHARGES ASSOCIATED
WITH CONSTRUCTION AND LAND DISTURBANCE ACTIVITIES
(GENERAL PERMIT)**

I. PERMIT REGISTRATION DOCUMENT REQUIREMENTS

All linear underground and overhead projects shall comply with the Permit Registration Document requirements in this Attachment and Attachments E and E.1 of this General Permit.

I.A. General Permit Registration Document Requirements

- I.A.1. A discharger with construction activities associated with linear projects shall designate a Legally Responsible Person to electronically certify and submit Permit Registration Documents to apply for regulatory coverage under this General Permit through the Stormwater Multiple Application and Report Tracking System (SMARTS) in accordance with Attachment E and E.1 of this General Permit.
- I.A.2. Linear Projects Associated with Private or Public Construction Projects
 - I.A.2.a. A discharger with a linear project with total disturbed land area from construction activities greater than one acre (see Section II.G below) shall obtain coverage under this General Permit.¹
 - I.A.2.b. A discharger with linear project construction activities associated with new development and re-development construction projects shall obtain coverage under this General Permit for a linear project where the total disturbed land area of the linear project is greater than 1 acre.
- I.A.3. Linear projects not associated with private or municipal pre-development, new development or re-development projects must obtain coverage under this General Permit for its linear project construction activities where the total disturbed land area is greater than one acre.

¹ Obtaining coverage means certifying and submitting complete Permit Registration Documents in SMARTS for the Linear Underground and Overhead Project. Dischargers or LRPs shall have a signed original Electronic Authorization Form on file with the State Water Board for each organization in SMARTS.

I.B. Linear Project Land Disturbance Area Calculations

- I.B.1. The total land area disturbed for linear projects is the sum of the:
- a. Surface areas of trenches, laterals, and ancillary facilities; plus
 - b. Area of the base of stockpiles on unpaved surfaces; plus
 - c. Surface area of the borrow area; plus
 - d. Areas of paved surfaces to be constructed for the project; plus
 - e. Areas of new roads constructed or areas of major reconstruction to existing roads (e.g., improvements to two-track surfaces or road widening) for the sole purpose of accessing construction activities or as part of the final project; plus
 - f. Equipment and material storage, staging, and preparation areas (laydown areas) not on paved surfaces; plus
 - g. Construction activities areas outside the surface area of trenches, laterals, and ancillary facilities that will be graded and/or disturbed by the use of construction equipment, vehicles, and machinery during construction activities.
- I.B.2. Stockpiling Areas
- I.B.2.a. Stockpiling areas, borrow areas, and the removal of soils from a linear project shall be included when calculating the area of disturbed soil for a site when:
- i. The area of the base of stockpiled soil on-site or immediately adjacent to a linear project and the stockpile is not on a paved surface.
 - ii. The surface borrow areas that are on-site or immediately adjacent to a linear project.
 - iii. The area of the base of stockpiled soil that is hauled off-site to a location owned or operated by the discharger that is not a paved surface, except when the off-site location is already subject to a separate NPDES permit covering potential discharges to a waters of the United States.
 - iv. The surface area of the borrow pit for soil that is brought to the project from an off-site location owned or operated by the discharger except when the off-site location is already subject to a separate stormwater permit or greater than one fourth mile from the linear project.
- I.B.2.b. Trench spoils on a paved surface that are either returned to the trench or excavation or hauled away from the project daily for disposal or reuse, will not be included in the disturbed area calculation.

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I.C. Fees

- I.C.1. A discharger must submit the appropriate fee with its completed Notice of Intent application package. Fees are established through regulations adopted by the State Water Board every year.² Fees are subject to change by regulation.
- I.C.2. Where the fee is calculated based upon the total acreage of land disturbed (opposed to the total acreage of land owned), total acreage includes all areas anticipated to be disturbed throughout the duration of the project (e.g., 10 acres is scheduled to be disturbed the first year and 10 acres for four subsequent; the fees would be based upon 50 acres of total disturbance).
- I.C.3. Dischargers that apply for and satisfy the Small Construction Rainfall Erosivity Wavier requirements shall pay the applicable fee.

I.D. Permit Registration Documents Submittal Prior to Commencement of Construction

- I.D.1. Linear project dischargers proposing to conduct construction activities subject to this General Permit shall certify and submit Permit Registration Documents prior to the commencement of construction activity. Construction activity cannot commence until a Waste Discharge Identification (WDID) number is issued.
- I.D.2. A linear project discharger with coverage under a Programmatic Notice of Intent shall certify and submit a Linear Construction Activity Notification for each non-contiguous linear project site prior to the start of construction.
- I.D.3. In all cases, except public emergencies (e.g., wildfire, flood), Permit Registration Documents must be completed and WDID number issued before construction can commence (refer to Section III.A.3 of the Order of this General Permit).

I.E. Submittal of Complete Permit Registration Documents

All dischargers required to comply with this General Permit shall electronically certify and submit the required Permit Registration Documents, through the Stormwater Multiple Application and Report Tracking System (SMARTS). The discharger shall assure that all information in its Permit Registration Documents complies with the Homeland Security Act and other federal law addressing security in the United States.

The discharger shall submit completed Permit Registration Documents to obtain coverage under this General Permit. If any of the required items are incomplete or missing, the Permit Registration Documents submittal will be rejected.

The State Water Board will process the application package in the order received and assign a WDID number upon receipt of a complete Permit Registration Documents submittal. Permit coverage begins once a WDID number is assigned.

² California Code of Regulations (CCR), Title 23, Division 3, Chapter 9. Waste Discharge Reports and Requirements, Article 1. Fees.

II. STANDARD PERMIT REGISTRATION DOCUMENTS FOR ALL LINEAR PROJECT DISCHARGERS

II.A. Notice of Intent

- II.A.1. A Notice of Intent is a project-specific application to obtain regulatory coverage for discharges of stormwater and authorized non-stormwater from construction activities to waters of the United States. The application includes the entry of site information, contact information, and Permit Registration Document-specific information requirements.
- II.A.2. Per Order, Section III.B.4, a Programmatic Notice of Intent covers all sites, of similar scope, within a Regional Water Board boundary or statewide under a single common SWPPP. A regional programmatic Notice of Intent shall include the common SWPPP and contact information. A statewide programmatic Notice of Intent shall include the common SWPPP, contact information, the estimated total disturbed site acreage for the duration of the project, and an identification of the element of Executive Order N-73-20 directing the project. Disturbed acreage for linear project activities regulated under a separate Notice of Intent is excluded from the statewide programmatic permitting disturbed area.

For regional and statewide programmatic permit coverage, each specific site is required to submit a Linear Construction Activity Notification which shall describe site-specific information including:

- a. Site name and/or reference number;
- b. Site location;
- c. Site-specific SWPPP map detailing pollutant sources and implemented BMPs;
- d. Total disturbed site acreage;
- e. Estimated start and end date;
- f. Risk type determination and supporting documentation; and
- g. Site contact information (name, phone number, address).

II.B. Risk Type Determination

All linear project dischargers are required to conduct a Risk Type Determination, where the site's overall risk is separated into sediment risk and receiving water risk. The discharger must utilize either the Water Board's standard risk determination (provided in SMARTS), a site-specific risk determination, or a combination of the two as described in Attachment E.1 of this General Permit.

- II.B.1. The standard risk determination (Geographic Information Systems (GIS) Map Method) includes utilizing the following:
- a. U.S. EPA Rainfall Erosivity (R) Factor Calculator website;
 - b. Sediment Risk Map tool; and

EXHIBIT "C" (Stormwater Pollution Prevention Plan)

- c. High-Risk Receiving Watershed Map tool.
- II.B.2. The site-specific risk determination (Individual Method) includes utilizing the following:
- U.S. EPA Rainfall Erosivity (R) Factor Calculator website;
 - Manually calculated soil erodibility (K) and length-slope (LS) factors;
 - 303(d) list of water bodies impaired for sediment; and
 - List of beneficial uses for the receiving water, found in Regional Water Quality Control Board Basin Plans.
- II.B.3. Sites that discharge to an unlisted receiving water that is tributary to a sediment-sensitive waterbody, within the Hydrologic Unit Code 10 (HUC 10) watershed scale, are considered high receiving water risk sites.
- II.B.4. The discharger may use a combination of the standard and site-specific risk determination methods to calculate the soil erodibility (K), length-slope (LS), sediment risk, and receiving water risk.
- II.B.5. The discharger shall calculate the site's sediment risk and receiving water risk during all phases of construction activity (e.g., demolition and pre-development site preparation, grading and land development, streets and utilities, vertical construction, final landscaping, and site stabilization).
- II.B.6. SMARTS will assign the higher Risk Type to the entire site for any site spanning two or more planning watersheds.
- II.B.7. Sites, parcels, or individual lots that are part of a larger plan of development shall include the larger plan of development in Risk Type determination. The discharger shall include this determination in the Permit Registration Documents submittal.
- II.B.8. Dischargers may request that the Regional Water Board revise the site-specific Risk Type determination values in SMARTS by providing the following information to the Regional Water Board:
- A site-specific soils test (ASTM D-422)^{3,4} certified by a California licensed professional engineer or geologist to determine the K factor used in the revised Risk Level determination. The soil testing must include the soil classification method used (e.g., Unified Soil Classification System);
 - A site-specific survey of the elevation change to determine the LS factor used in the revised Risk Type determination certified by a professional licensed by

3 ASTM D-422 is the standard test method used for the quantitative determination of the distribution of particle sizes in soils.

4 Environmental Protection Agency, [American Society for Testing and Materials \(ASTM\) Standards](https://www.epa.gov/sites/default/files/2020-01/documents/sedc_2004-2005_append.pdf), <https://www.epa.gov/sites/default/files/2020-01/documents/sedc_2004-2005_append.pdf> [as of July 2022]

the California Board of Professional Engineers, Land Surveyors and Geologists for this work; and

- c. A revised Risk Type determination manually calculated in accordance with Attachment E.1 of this General Permit.

II.C. Site Specific Stormwater Pollution Prevention Plan, Drawings, and Map

The SWPPP (including site-specific drawings and map) is a linear project-specific document developed for implementation of this General Permit. The SWPPP shall be developed by a Qualified SWPPP Developer and certified and submitted by each discharger with the other Permit Registration Documents.

II.D. Additional Permit Registration Document Requirements Related to Specific Projects

- II.D.1. Dischargers who are proposing to implement active treatment systems shall also certify and submit in SMARTS:
 - a. A complete Active Treatment System Plan in accordance with Attachment F at least 14 days prior to the planned operation of the active treatment system, and a copy shall be available on-site during active treatment system operation;
 - b. The system design and supporting documentation; and
 - c. Proof that the system and/or Active Treatment System Plan was designed by a qualified active treatment system professional in accordance with Attachment F.
- II.D.2. Dischargers who are proposing to implement passive treatment shall certify and submit in SMARTS:
 - a. A complete Passive Treatment Plan in accordance with Attachment G at least 14 days prior to the planned operation of the passive treatment system, and a copy shall be available on-site during operation;
 - b. The system design and any supporting documentation; and
 - c. Proof that the Passive Treatment Plan and/or system was designed by an appropriate licensed professional (see Attachment G).
- II.D.3. Dischargers who are proposing an alternate Risk Justification shall include:
 - a. Soil type identification through laboratory analysis, certified by a CBPELSG⁵ license holder; and
 - b. Site slope determination topographic survey certified by a CBPELSG license holder.

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5 California Board of Professional Engineers, Land Surveyors, and Geologists

- II.D.4. Dischargers with linear projects applying for programmatic permitting shall use SMARTS to apply, manage, submit, and certify Permit Registration Documents.

II.E. Certification of Submitted Documents

The Legally Responsible Person (LRP) shall certify and submit all Permit Registration Documents required by this General Permit through SMARTS. The discharger's LRP shall have a signed original Electronic Authorization Form on file with the State Water Board for each organization in SMARTS.

II.F. Exceptions to Standard Permit Registration Document Requirements

Dischargers with a valid Small Construction Rainfall Erosivity Waiver for a linear project are not required to submit a SWPPP (including site-specific drawings and map).

II.G. Projects and Activities Not Subject to Coverage Under This General Permit

- II.G.1. Coverage under this General Permit is not required where stormwater discharges from the same linear project construction activities are covered by another NPDES permit. Other discharges from construction activities that are covered under this General Permit can be found in the General Permit Order Section II if not specified below.
- II.G.2. Linear project construction activity does not include routine maintenance projects to maintain the original line and grade, hydraulic capacity, or original purpose of the facility. Routine maintenance projects are projects associated with operations and maintenance activities that are conducted on existing lines and facilities and within existing right-of-way, easements, franchise agreements or other legally binding agreements of the discharger. Routine maintenance projects include, but are not limited to projects that are conducted to:
- a. Maintain the original purpose of the facility, or hydraulic capacity.
 - b. Update existing lines⁶ and facilities to comply with applicable codes, standards, and regulations regardless of if such projects result in increased capacity.
 - c. Repairing leaks.
- II.G.3. Routine maintenance does not include:
- a. Construction of new lines⁷ or facilities resulting from compliance with applicable codes, standards, and regulations.

⁶ Update existing lines includes replacing existing lines with new materials or pipes.

⁷ New lines are those that are not associated with existing facilities and are not part of a project to update or replace existing lines.

- b. Areas of maintenance projects that are outside of an existing right-of-way, franchise, easements, or agreements, or those temporary facilities (e.g., laydown or staging yards) located outside the existing right of way that directly support conductance of maintenance activity. When a linear project acquires new areas, those areas are subject to this General Permit based on the area of construction activity, material storage, vehicle staging, etc., outside the original right of way.
 - c. Temporary facilities (e.g., laydown or staging yards) that are shared between maintenance (i.e., inside the existing right of way) and areas on a maintenance project (i.e., outside the existing right of way) are subject to this General Permit when the new area (staging/maintenance yard and linear project) has one or more acres of construction activity.
- II.G.4. Linear project construction activity does not include field activities associated with the planning and design of a project (e.g., activities associated with route selection).
- II.G.5. Tie-ins conducted immediately adjacent to “energized” or “pressurized” facilities by the discharger are not considered small construction activities where all other linear project construction activities associated with the tie-in are covered by a Notice of Intent and SWPPP of a third party or municipal agency.
- II.G.6. Miscellaneous connections to the linear projects that are conducted after all other soil disturbing activities are completed, and the total construction activity remains less than one acre.

II.H. Assistance

Dischargers and discharger representatives may email the State Water Board, Stormwater Help Desk, at stormwater@waterboards.ca.gov, for assistance with Permit Registration Documents.

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ATTACHMENT F

ACTIVE TREATMENT SYSTEM REQUIREMENTS

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES)
GENERAL PERMIT FOR STORMWATER DISCHARGES
ASSOCIATED WITH CONSTRUCTION AND LAND DISTURBANCE ACTIVITIES
(GENERAL PERMIT)

A. GENERAL ACTIVE TREATMENT SYSTEM REQUIREMENTS

- A.1. The discharger choosing to implement an active treatment system on its site shall comply with all the requirements in this Attachment.
- A.2. Active treatments systems are treatment technologies that employ chemical coagulation, chemical flocculation, or electrocoagulation to reduce turbidity caused by fine suspended sediment, and/or to control pH levels. An active treatment system relies on enclosed computerized systems with pumps, filters, and real-time controls.
- A.3. The discharger shall assign a lead person (or project manager) who has either a minimum of five years construction stormwater experience or who is a licensed contractor specifically holding a California Class A Contractors license¹ to oversee the operation of the active treatment system.
- A.4. An active treatment system may be bypassed if the discharger has met the following conditions:
- a. The discharger demonstrates all discharges from the watershed area that the active treatment system was designed to treat are in compliance with the numeric action levels, numeric effluent limitations, and receiving water limitations established by this General Permit through the applicable monitoring requirements in Attachments D or E; and
 - b. If dewatering is occurring as part of the bypass, the discharger shall comply with the dewatering requirements in Attachment J.
- A.5. The discharger shall comply with applicable local pre-treatment requirements per the local sanitation agency if the active treatment system effluent is locally authorized to be discharge into a sanitary sewer system. The discharger shall include proof of authorization and specific criteria required by the local sanitation agency in its Active Treatment System Plan.

¹ [Business and Professions Code Division 3, Chapter 9, Article 4](http://www.cslb.ca.gov/About_Us/Library/Licensing_Classifications/A_General_Engineering_Contractor.aspx), Class A Contractor: A general engineering contractor is a contractor whose principal contracting business is in connection with fixed works requiring specialized engineering knowledge and skill. Web. <http://www.cslb.ca.gov/About_Us/Library/Licensing_Classifications/A_General_Engineering_Contractor.aspx>. [as of May 20, 2021].

B. DESIGN CRITERIA AND SPECIFICATIONS

B.1. Design Criteria

- B.1.a. The active treatment system shall be designed to capture and treat (within a 72-hour period) a volume equivalent to the runoff from a 10-year, 24-hour storm event using a watershed coefficient of 1.0.
- B.1.b. The watershed runoff coefficient used to size the active treatment system shall be 1.0.
- B.1.c. All discharges from the active treatment system must comply with numeric effluent limitations as specified in Section D.4 below.
- B.1.d. Runoff in excess of the design storm used to size the active treatment system shall not be routed through the active treatment system and must meet the bypass requirements in Section A.4, above.
- B.1.e. The discharger shall design the active treatment system to preclude the discharge of treatment chemicals or settled floc² from the system.
- B.1.f. The discharger shall design outlets to dissipate energy from concentrated flows.
- B.1.g. The discharger shall design the bypass conveyance to dissipate energy from concentrated flows.

B.2. Treatment Chemicals for Coagulation and Flocculation

- B.2.a. The discharger shall select, for use within the active treatment system, treatment chemical(s) capable of complying with the technology-based numeric effluent limitations by using one of the following methods:
 - i. The discharger shall conduct, at minimum, six site-specific jar tests (per treatment chemical with one test serving as a control) for each site to determine the proper treatment chemical and dosage levels for their active treatment system. The discharger shall conduct the jar tests using water samples that represent typical site conditions and in accordance with the current version of ASTM D2035.³
 - ii. Single field jar tests may also be conducted during a project if conditions warrant; an example includes, if construction activities disturb changing types of soils, which consequently cause change in stormwater and runoff characteristics.

² Floc is defined as a clump of solids formed by a chemical action.

³ ASTM D2035 is the standard test practice used for coagulation-flocculation jar testing of water, which assists in the evaluation of a treatment to reduce dissolved, suspended, colloidal, and nonsettleable matter in water via chemical coagulation-flocculation.

B.3. Filtration

- B.3.a. The active treatment system shall include a filtration step between the coagulant treatment train and the effluent discharge. This is commonly provided by sand, bag, or cartridge filters.
- B.3.b. The discharger shall remove, dispose of, or recirculate (to the beginning of the treatment process) all backwash water.

B.4. Instrumentation

- B.4.a. The active treatment system shall be equipped with instrumentation that automatically measures and records effluent water quality data and flow rate.
- B.4.b. The minimum data recorded shall be consistent with the monitoring and reporting requirements below, and shall include:
 - i. Influent turbidity;
 - ii. Effluent turbidity;
 - iii. Influent pH;
 - iv. Effluent pH;
 - v. Residual chemical;
 - vi. Effluent flow rate;
 - vii. Effluent flow volume;
 - viii. Total volume; and
 - ix. Freeboard on storage.
- B.4.c. Systems shall be equipped with a data recording system, such as data loggers or webserver-based systems, which records each measurement on a frequency no longer than once every 15 minutes.
- B.4.d. Cumulative flow volume shall be recorded daily. The data recording system shall have the capacity to record a minimum of seven days continuous data.
- B.4.e. Instrumentation systems shall be interfaced with system control to provide auto shutoff or recirculation in the event that effluent measurements exceed turbidity or pH numeric action levels or numeric effluent limitations.
- B.4.f. The system shall also assure that upon system upset, power failure, or other catastrophic event, the active treatment system will default to a recirculation mode or safe shut down.
- B.4.g. Instrumentation (flow meters, probes, valves, streaming current detectors, controlling computers, etc.) shall be installed and maintained per manufacturer's recommendations, which shall be included in the discharger's Quality Assurance/Quality Control plan.
- B.4.h. The Quality Assurance/Quality Control plan shall specify calibration procedures and frequencies, instrument method detection limit or sensitivity verification, laboratory duplicate procedures, and other pertinent procedures.

- B.4.i. The instrumentation system shall include a method for controlling coagulant or flocculant dose, to prevent potential overdosing. Available technologies include flow/turbidity proportional metering, periodic jar testing and metering pump adjustment, and ionic charge measurement controlling the metering pump.

C. ACTIVE TREATMENT SYSTEM MAINTENANCE REQUIREMENTS

C.1. Operation and Maintenance

- C.1.a. The discharger shall operate and maintain the active treatment system in accordance with the site-specific Operation and Maintenance Manual.
- C.1.b. The Operation and Maintenance Manual shall only be used in conjunction with appropriate site-specific design specifications that describe the system configuration and operating parameters.

C.2. Residuals Management

- C.2.a. Sediment shall be removed from the storage or treatment cells as necessary to ensure that the cells maintain their required water storage, sediment storage, and settling zone capacity.
- C.2.b. Handling and disposal of all solids generated during active treatment system operations shall be done in accordance with all local, state, and federal laws and regulations.

D. ACTIVE TREATMENT SYSTEM MONITORING REQUIREMENTS

D.1. Visual Observations

- D.1.a. The discharger shall visually observe the active treatment system for proper performance during each day of operation, including but not limited to:
 - i. All instrumentation; and
 - ii. Filter loading to confirm that the final filter stage is functioning properly.
- D.1.b. The discharger shall visually observe the active treatment system through either of the following two options:
 - i. A designated responsible person who is on-site at all times during treatment operations to visually observe all portions of the active treatment system.

OR

 - ii. An operator continuously monitoring the active treatment system off-site. The active treatment system must be able to conduct a safe shut down autonomously when the operator connection is lost and/or the system is discharging above levels specified by this Attachment. The active treatment system shall have redundant monitoring of dosing amounts, influent, and effluent pollutant monitoring. The system shall be able to perform self-diagnostics for safe system shut down when one or more sensors is not performing as desired. All data relevant to system operation shall be collected, monitored, and recorded.

D.2. Water Quality Monitoring

- D.2.a. The discharger shall continuously monitor and record flow at not greater than 15-minute intervals for total volume treated and discharged.
- D.2.b. The discharger shall continuously monitor and record influent and effluent pH at 15-minute intervals if not more frequently.
- D.2.c. The discharger shall continuously monitor and record influent and effluent turbidity (expressed in NTU) at 15-minute intervals if not more frequently.
- D.2.d. The discharger shall monitor and record the type and amount of chemical(s) used for pH adjustment, if any.
- D.2.e. The discharger shall monitor and record the dose rate of chemical used in the active treatment system (expressed in mg/L) 15-minutes after startup and every eight hours of operation.
- D.2.f. The discharger shall monitor the effluent for residual all chemical(s) and/or additive levels, performing monthly laboratory duplicates for residual coagulant analysis.

D.3. Residual Chemical and Toxicity Monitoring

- D.3.a. The discharger shall utilize a residual chemical test method that has a method detection limit of 10 percent or less than the maximum allowable threshold concentration⁴ for the specific coagulant in use and for the most sensitive species to the chemical used.
- D.3.b. The discharger shall utilize a residual chemical test method that produces a result within one hour of sampling.
- D.3.c. The discharger shall have a State Water Board Environmental Laboratory Accreditation Program (ELAP) accredited laboratory validate the selected residual chemical test is appropriate for the coagulant or flocculant used. Specifically, the laboratory will review the test protocol, test parameters, and the detection limit of the coagulant or flocculant. The discharger shall electronically certify and submit this documentation as part of the Active Treatment System Plan through SMARTS.

4 The Maximum Allowable Threshold Concentration (MATC) is the allowable concentration of residual, or dissolved, coagulant/flocculant in effluent. The MATC shall be coagulant/flocculant-specific, and based on toxicity testing conducted by an independent, third-party laboratory. A typical MATC would be:

The MATC is equal to the geometric mean of the No Observed Effect Concentration and Lowest Observed Effect Concentration Acute and Chronic toxicity results for most sensitive species determined for the specific coagulant. The most sensitive species test shall be used to determine the MATC.

- D.3.d. The discharger shall operate the active treatment system in batch treatment mode if the discharger cannot utilize a residual chemical test method that meets the requirements above, Section D.3.a through D.3.c.
- D.3.e. The discharger shall not cause adverse physical impacts on receiving waters through the use of active treatment system batch storage and treatment, including but not limited to, inadequate storage volume, sudden released of the batches, and improperly designed discharge points.
- D.3.f. The discharger operating in batch treatment mode shall perform toxicity testing in accordance with the following:
- i. The discharger shall initiate acute toxicity testing on effluent samples representing effluent from each batch prior to discharge.⁵ All bioassays shall be sent to a laboratory accredited by the State Water Board Environmental Laboratory Accreditation Program.⁶
 - ii. Acute toxicity tests shall be conducted with the following species and protocols. The methods to be used in the acute toxicity testing shall be those outlined for a 96-hour acute test in “Methods for Measuring the Acute Toxicity of Effluents and Receiving Water to Freshwater and Marine Organisms, U.S. EPA-821-R-02-012” for Fathead minnow, *Pimephales promelas* or Rainbow trout, *Oncorhynchus mykiss* may be used as a substitute for Fathead minnow.
 - iii. All toxicity tests shall meet quality assurance criteria and test acceptability criteria in the most recent versions of the U.S. EPA test method for whole effluent toxicity testing.⁷
 - iv. All toxicity tests and analysis shall be consistent with statewide requirements for acute and chronic toxicity, including implementation requirements. See Toxicity Provisions.
- D.4. Active Treatment System Numeric Effluent Limitation Requirements
- D.4.a. Effluent at the point of discharge from the active treatment system shall comply with the technology-based numeric effluent limitations established for active treatment system.
- D.4.b. Numeric effluent limitations for discharges from an active treatment system are listed below and in Table 1:
- i. pH of all active treatment system discharges shall be within the range of 6.0 to 9.0.

5 This requirement only requires that the test be initiated prior to discharge.

6 Addition information can be found on the [ELAP webpage](https://www.waterboards.ca.gov/drinking_water/certlic/labs/).
<https://www.waterboards.ca.gov/drinking_water/certlic/labs/>

7 [U.S. EPA. Whole Effluent Toxicity \(WET\)](https://www.epa.gov/npdes/whole-effluent-toxicity-wet). Web. <<https://www.epa.gov/npdes/whole-effluent-toxicity-wet>>. [as of May 20, 2021].

- ii. Turbidity of all active treatment system discharges shall be less than 10 NTU for daily flow-weighted average of all samples and 20 NTU for any single sample.
- iii. Residual Chemical shall be < 10 percent of Maximum Allowable Threshold Concentration⁸ for the most sensitive species to the chemical used.

Table 1 – Numeric Effluent Limitations, Test Methods, Method Detection Limits, and Reporting Units for Active Treatment System Discharges

Parameter	Test Method	Method Detection Limit	Reporting Units	Numeric Effluent Limitation
pH	Field test with calibrated portable instrument	0.2	pH Units	Lower = 6.0 Upper = 9.0
Turbidity	EPA 0180.1 and/or field test with a calibrated portable instrument	1	NTU ⁹	10 NTU for Daily Flow-Weighted Average & 20 NTU for Any Single Sample
Residual Chemicals	U.S. EPA-approved test method for the specific pollutant parameter	Less than 10 percent of MATC for most sensitive species to the chemical used	Dependent on the test method	Less than 10 percent of MATC for most sensitive species to the chemical used

D.4.c. If an analytical effluent sampling result is outside the range of pH numeric effluent limitations (i.e., is below the lower numeric effluent limitation for pH or exceeds the upper numeric effluent limitation for pH), exceeds the turbidity numeric effluent limitation, or exceeds the residual chemical numeric effluent limitation, the discharger shall cease discharge from the active treatment system and comply with the reporting requirements in Section E.3 of this Attachment.

⁸ The Maximum Allowable Threshold Concentration (MATC) is the allowable concentration of residual, or dissolved, coagulant/flocculant in effluent. The MATC shall be coagulant/flocculant-specific, and based on toxicity testing conducted by an independent, third-party laboratory. The MATC is equal to the geometric mean of the NOEC (No Observed Effect Concentration) and LOEC (Lowest Observed Effect Concentration) Acute and Chronic toxicity results for most sensitive species determined for the specific coagulant. The most sensitive species test shall be used to determine the MATC.

⁹ Nephelometric Turbidity Unit

- D.4.d. Discharges from active treatment system shall comply with applicable numeric effluent limitations (above) unless the precipitation event causing the discharge is determined, after the fact, to be equal to or larger than the compliance precipitation event (expressed in inches of rainfall). The compliance precipitation event for active treatment system discharges is the 10-year, 24-hour storm, as determined using the National Weather Service's Hydrometeorological Design Studies Center Precipitation Frequency Data Server¹⁰ or equivalent.
- D.4.e. The discharger may resume operation of the active treatment system if corrective actions were implemented to prevent future exceedances of the numeric effluent limitations.

E. ACTIVE TREATMENT SYSTEM REPORTING REQUIREMENTS

E.1. Active Treatment System Plan

- E.1.a. The discharger shall prepare an Active Treatment System Plan that combines the site-specific data and treatment system information required to safely and efficiently operate an active treatment system.
- E.1.b. The Active Treatment System Plan shall be electronically certified and submitted through SMARTS as an attachment to the SWPPP, at least 14 days prior to the planned operation of the active treatment system, and a copy shall be available on-site during active treatment system operation.
- E.1.c. At a minimum, the Active Treatment System Plan shall include:
 - i. Contact information of all personnel responsible for monitoring and maintaining the active treatment system;
 - ii. A map depicting the watershed area treated by the active treatment system, shown in acres;
 - iii. Specifications of any storage ponds, tanks, or other stormwater containment associated with the active treatment system;
 - iv. The treatment capacity of the active treatment system, defined as the number of hours needed to treat the captured volume from a given design storm (e.g., 5-year, 24-hour) using a watershed runoff coefficient of 1.0;
 - v. An Active Treatment System Operation and Maintenance Manual for all equipment that at minimum:
 - 1. Covers the procedures required to install, operate, and maintain the active treatment system;¹¹

10 NOAA's National Weather Service. Web.

https://hdsc.nws.noaa.gov/hdsc/pfds/pfds_map_cont.html [as of May 20, 2022].

11 The operation and maintenance manual is typically in a modular format addressing generalized operating and maintenance procedures for each system-specific component.

2. Includes information for specific pumps, generators, control systems, and other equipment used to operate the active treatment system; and
 3. Includes a failure plan that gives procedural details on when (failure indicators) and how to shut the system down (procedure), and who at the Regional Water Board to contact.
- vi. A monitoring and sampling plan, including quality assurance and quality control documentation that at minimum specifies:
1. Calibration methods and frequencies for all system and field measurement instruments;
 2. The methods for determining method detection limits for each residual coagulant measurement method;
 3. Acceptable minimum method detection limits for each method, specific to individual coagulants; and
 4. Specific procedures for monthly laboratory duplicates for residual coagulant analysis.
- vii. An Active Treatment System Health and Safety Plan; and
- viii. An Active Treatment System Spill Prevention and Response Plan.

E.2. Visual Observations

- E.2.a. The discharger shall keep all completed inspections checklists and related documentation with the SWPPP on-site or electronically.

E.3. Water Quality Monitoring

- E.3.a. At a minimum, every 30 days the Legally Responsible Person representing the discharger shall electronically certify and submit active treatment system field data through SMARTS.
- E.3.b. The discharger shall report any indications of toxicity or other violations of water quality objectives to the appropriate regulatory agency as required by this General Permit.
- E.3.c. The system operator shall immediately report any measurements exceeding water quality standards to the discharger, who shall notify the Regional Water Board.
- E.3.d. Dischargers in violation of any of the active treatment system numeric effluent limitations shall electronically certify and submit through SMARTS the analytical results within 24-hours of obtaining the results.
- E.3.e. The discharger shall electronically certify and submit a Numeric Effluent Limitation Violation Report in SMARTS with 14 days after the numeric effluent limitation exceedance has been identified for any monitoring data exceeding an applicable numeric effluent limitation in this General Permit.

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- E.3.f. The discharger shall include in the Numeric Effluent Limitation Violation Report:
- i. The analytical method(s), method reporting unit(s), and method detection limit(s) of each analytical parameter (analytical results that are less than the method detection limit shall be reported as “less than the method detection limit”);
 - ii. The date, place, time of sampling, visual observation (inspections), and/or measurements, including precipitation; and
 - iii. An assessment of what caused the active treatment system to exceed the numeric effluent limitation, and the proposed corrective actions taken to prevent future exceedances.
- E.3.g. The active treatment system dischargers shall report the on-site rain gauge reading and nearby governmental rain gauge readings for verification if an applicable numeric effluent limitation has been exceeded during a precipitation event equal to or larger than the compliance precipitation event.

EXHIBIT "C" (Stormwater Pollution Prevention Plan)

ATTACHMENT G

REQUIREMENTS FOR THE USE OF PASSIVE TREATMENT TECHNOLOGIES

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES)
GENERAL PERMIT FOR STORMWATER DISCHARGES ASSOCIATED WITH
CONSTRUCTION AND LAND DISTURBANCE ACTIVITIES
(GENERAL PERMIT)

A. GENERAL PASSIVE TREATMENT TECHNOLOGIES REQUIREMENTS

- A.1. The discharger choosing to implement passive treatment technologies (passive treatment) on their site shall comply with all requirements in this Attachment and this General Permit.
- A.2. Passive treatment is the application of natural or synthetic chemicals and products to reduce turbidity in discharges through coagulation and flocculation. Passive treatment does not rely on computerized, enclosed systems with pumps, filters, and real-time controls. Passive treatment may include pumps where they are necessary to move water around the site.¹ This Attachment is for the use of water applied passive treatment products that remove suspended solids such as sediment from stormwater (e.g., liquid treatment chemicals, powders, slow-releasing solid blocks/socks) without using an active treatment system.
- A.3. The discharger shall not use chemical treatment as a standalone Best Management Practice (BMP) for site erosion and sediment controls and shall maximize the use of non-chemical BMPs for site erosion and sediment controls.
- A.4. The discharger shall employ a trained person knowledgeable in the principles and practices of passive treatment to oversee the product application or installation.
- A.5. The discharger shall store products at the site in leak-proof containers with secondary containment kept under a storm-resistant shelter. The discharger shall follow the manufacturer's instructions for handling and storage.
- A.6. The discharger shall use passive treatment in a manner that precludes the accidental discharge of passive treatment products during storage, application, and after being applied.
- A.7. The discharger shall maintain a copy of the site-specific Passive Treatment Plan in the Stormwater Pollution Prevention Plan (SWPPP). This document shall be kept updated in the Stormwater Multiple Application and Report Tracking System

¹ U.S. EPA. Federal Register V 77. No 1. [Effluent Limitations Guidelines and Standards for the Construction and Development Point Source Category](https://www.govinfo.gov/content/pkg/FR-2012-01-03/pdf/2011-33661.pdf). Web. January 3, 2012. <<https://www.govinfo.gov/content/pkg/FR-2012-01-03/pdf/2011-33661.pdf>> [as of May 20, 2021].

(SMARTS) and on-site in compliance with the record retention requirements in the Standard Provisions of this General Permit (Section VI).

B. PASSIVE TREATMENT DESIGN AND TOXICOLOGY REQUIREMENTS

- B.1. The use of cationic chemicals for passive treatment is not authorized by this General Permit. Cationic chemicals are only authorized for use in active treatment systems complying with the criteria in Attachment F of this General Permit. Anionic chemicals are authorized for use in passive treatment systems, typically consisting of polyacrylamides². Passive treatment consisting of polyacrylamides must:
- Be free of nonylphenol and nonylphenol ethoxylates, often used as surfactants in emulsion-based products. Emulsion-based products may contain surfactants and petroleum distillates that can be toxic to aquatic life;³
 - Be food grade (National Sanitary Foundation/American National Standards Institute) products, or contain less than 0.05 percent residual monomer by volume;⁴
 - Have a charge density between 10 and 55 percent by weight;
 - Have a molecular weight between 6 and 25 milligrams per mole; and
 - Be mixed and applied in accordance with Occupational Safety and Health Administration Safety Data Sheet requirements and the manufacturer's recommendations.
- B.2. A California licensed Professional Engineer shall design the discharge location(s) from the area treated with passive treatment products (treatment zone) to dissipate energy from concentrated flows.
- B.3. Stormwater treated with passive treatment products in a treatment zone prior to being discharged from the construction site shall pass through a sediment control

2 Michigan Department of Environmental Quality, Water Resources Division, [Technical Guidance for the Use of Polyacrylamide Products for Soil Erosion and Sedimentation Control \(SESC\)](#). Web. November 2014.

<https://www.michigan.gov/documents/deq/wb-stormwater-TechnicalGuidancePAMs_197048_7.pdf>. [as of May 20, 2021].

3 Michigan Department of Environmental Quality, Water Resources Division, [Technical Guidance for the Use of Polyacrylamide Products for Soil Erosion and Sedimentation Control \(SESC\)](#). Web. November 2014.

<https://www.michigan.gov/documents/deq/wb-stormwater-TechnicalGuidancePAMs_197048_7.pdf>. [as of May 20, 2021].

4 The U.S. EPA. [Support Document for the Third Six-Year Review of Drinking Water Regulations for Acrylamide and Epichlorohydrin](#). Web. December 2016.

<<https://www.epa.gov/sites/production/files/2016-12/documents/810r16019.pdf>>. [as of May 20, 2021].

BMP (including, but not limited to, a sediment basin or trap) or filter (including, but not limited to, sand filter or geotextile bag) to settle or remove flocculants prior to discharge from the site.

- B.4. The discharger shall include in the Passive Treatment Plan, current acute and chronic toxicological test data provided by the manufacturer, a laboratory employed by the manufacturer, or a third-party organization.
 - B.4.a. The methods for the acute toxicity testing shall be those outlined for a 96-hour acute test in “Methods for Measuring the Acute Toxicity of Effluents and Receiving Water to Freshwater and Marine Organisms, U.S. EPA-821-R-02-012” for *Pimephales promelas* (fathead minnow). Acute toxicity for *Oncorhynchus mykiss* (rainbow trout) may be used as a substitute for testing fathead minnows.
 - B.4.b. The methods for the chronic toxicity testing shall be those outlined for an 8-day chronic test in “Short-term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms, U.S. EPA-821-R-02-013” for *Ceriodaphnia dubia* (Daphnia).
 - B.4.c. All toxicity tests shall meet quality assurance criteria and test acceptability criteria in the most recent versions of the U.S. EPA test method for Whole Effluent Toxicity (WET) testing⁵ as well any toxicity provisions adopted by the State Water Board.
 - B.4.d. The toxicological information in the Passive Treatment Plan shall indicate the safety of the passive treatment product(s) based on expected release rates, toxicity reports, the anticipated concentration (calculated from product release rate) and intended use at the site.

C. PASSIVE TREATMENT APPLICATION REQUIREMENTS

- C.1. The discharger shall ensure passive treatment product(s) are used as follows:
 - C.1.a. The distance or barrier between the treatment zone and the receiving water(s) shall comply with surface water buffer requirements, in Attachment D, Section II.G for traditional construction projects or Attachment E, Section II.G for linear underground and overhead projects, to prevent a discharge of treated effluent to the receiving water. Applying passive treatment products directly into a receiving water is prohibited.
 - C.1.b. Passive treatment application rates, dosing, and methods used in treatment zones shall be determined based on the manufacturer’s guidance to provide adequate sediment control without having an excess amount in runoff.

⁵ U.S. EPA. Whole Effluent Toxicity (WET). Web. <<https://www.epa.gov/npdes/whole-effluent-toxicity-wet>>. [as of May 20, 2021].

- C.1.c. Passive treatment re-application rates, dosing, and methods used in treatment zones shall occur based on the manufacturer's recommended frequency and on-site conditions such as soil type, precipitation, and slope to avoid the discharge of excess product in runoff.
- C.2. The Passive Treatment Chemicals Performance Testing,⁶ Dosing, Mixing, and Settling for use in Sediment Control BMPs
 - C.2.a. The discharger shall ensure stormwater is treated and sediment from the site is tested by a person trained in the use of the passive treatment product prior to being applied at the site. The testing should demonstrate that the selected formulation is an effective product for removing suspended sediment.
 - C.2.b. The discharger shall employ a trained person to calculate the appropriate standard passive treatment product quantity per unit flow rate value using the following factors:
 - i. The specific chemical(s) or product(s) formulation being used;
 - ii. The amount of chemical/product applied;
 - iii. The flow rate of water through the system;
 - iv. The soil type and site topography; and
 - v. The physical structure of the system.
 - C.2.c. This calculated value shall be included in the Passive Treatment Plan and be recalculated and resubmitted via SMARTS as site conditions change.
 - C.2.d. The discharger shall employ a trained person to ensure that the mixing and reaction time recommended by the manufacturer is followed during passive treatment application.
 - C.2.e. The discharger shall ensure that the settling area for the passive treatment product-sediment laden stormwater is sized to hold the sediment and allows the reasonable cleanout frequency specified in the Passive Treatment Plan. A sedimentation basin BMP shall be implemented upon any evidence that previously settled sediment is being re-suspended.

D. PASSIVE TREATMENT MONITORING REQUIREMENTS

- D.1. The discharger using passive treatment shall comply with the monitoring requirements of the General Permit's Order and all other applicable Attachments.

⁶ Toronto and Region Conservation. [Canada Anionic Polyacrylamide Application Guide for Urban Construction in Ontario](https://sustainabletechnologies.ca/app/uploads/2013/02/Polymer-Guide-Final_NewFormat.pdf). Web. June 2013.

<https://sustainabletechnologies.ca/app/uploads/2013/02/Polymer-Guide-Final_NewFormat.pdf>. [as of May 20, 2021].

D.2. Passive Treatment Plan

A Qualified SWPPP Developer shall prepare the Passive Treatment Plan describing the appropriate application rates, dosing, mixing, settling, and filtration (if applicable). The Passive Treatment Plan shall include:⁷

- a. A list of other erosion and sediment control BMPs implemented in the drainage area and treatment zones. Passive treatment shall not be used as a standalone BMP;
- b. Manufacturer product details (e.g., function, physical form, product name, expiration date and any other identifiers), specifications, and current acute and chronic toxicological and ecological information;
- c. The design details and drawings for maintenance and removal procedures for the products applied on-site;
- d. Contact information (name, position, email, phone number) of the trained person who is implementing passive treatment for the discharger; Qualified SWPPP Practitioner; and other site personnel who are trained to assist the discharger with the passive treatment implementation;
- e. Inspection and maintenance requirements for treatment zones;
- f. Monitoring, sampling and reporting plan, including quality assurance/quality control (QA/QC);
- g. Health and safety procedures;
- h. Spill prevention and response procedures;
- i. Calculated and re-calculated quantities of passive treatment products used (Section C.2 above);
- j. Site-specific performance testing results and the associated dosage/application rate(s) (Section C.2 above);
- k. Site map of:
 - i. Site area location(s) where the product(s) is used (treatment zone);
 - ii. Treatment zone effluent discharge location(s);
 - iii. Site location(s) where product(s) will be stored;
 - iv. Locations of product recovery BMP(s), including but not limited to, ponds, chemicals and/or product recovery BMPs etc.; and

⁷ Toronto and Region Conservation. [Canada Anionic Polyacrylamide Application Guide for Urban Construction in Ontario](https://sustainabletechnologies.ca/app/uploads/2013/02/Polymer-Guide-Final_NewFormat.pdf). Web. June 2013.

<https://sustainabletechnologies.ca/app/uploads/2013/02/Polymer-Guide-Final_NewFormat.pdf>. [as of May 20, 2021].

- v. Surface water buffer between the passive treatment zone and receiving waters.
 - l. Treatment zone soil type(s);
 - m. Proposed application date(s) or schedule; and
 - n. Application method(s);
- D.3. The discharger shall ensure a Qualified SWPPP Practitioner visually inspects the passive treatment zone surface condition within 72 hours before forecasted precipitation events and within 48 hours after qualifying precipitation events.
- D.4. The discharger shall ensure that the trained person employed to implement the passive treatment completes a checklist with the following information during each passive treatment product application:
- a. Application date(s);
 - b. Application method(s);
 - c. Weather condition(s) during application;
 - d. Estimated flow rate;
 - e. Estimated volume of water being treated;
 - f. Application rate(s), dosing, and mixing, consistent with the Passive Treatment Plan; and
 - g. Any other site-specific conditions or observations relevant to the functioning of the product.
- D.5. The Regional Water Boards may use site-specific information to require additional sampling and monitoring⁸ to confirm the toxicological requirements are being met and to ensure there are no adverse impacts to waters of the United States.

E. PASSIVE TREATMENT REPORTING REQUIREMENTS

- E.1. The discharger using passive treatment shall comply with the reporting requirements of the General Permit's Order and all other applicable Attachments.
- E.2. The Passive Treatment Plan shall be electronically certified and submitted through SMARTS 14 days prior to passive treatment use. A copy shall be available on-site during active construction. The Passive Treatment Plan shall be updated in accordance with the SWPPP update schedule specified in the Standard Provisions of this General Permit (Section VI).

⁸ Aquatic toxicity testing and applicable reporting, recordkeeping, and corrective action requirements; and/or residual chemical testing and applicable reporting, recordkeeping, and corrective action requirements.

- E.3. The discharger shall ensure that all passive treatment application checklists are kept with the Passive Treatment Plan in accordance with Section VI.F in the Order.

EXHIBIT "C" (Stormwater Pollution Prevention Plan)

ATTACHMENT H

**TOTAL MAXIMUM DAILY LOAD IMPLEMENTATION REQUIREMENTS APPLICABLE TO
 CONSTRUCTION STORMWATER DISCHARGES**

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES)
 GENERAL PERMIT FOR STORMWATER DISCHARGES ASSOCIATED
 WITH CONSTRUCTION AND LAND DISTURBANCE ACTIVITIES
 (GENERAL PERMIT)

The following table contains a list of existing Total Maximum Daily Loads (TMDLs) that are identified as applicable to construction stormwater dischargers covered under this General Permit. The listed TMDLs were adopted by a Regional Water Quality Control Board or established by the U.S. EPA prior to the adoption date of this General Permit. The State Water Board may reopen this General Permit to update TMDL-specific requirements in this Attachment, or incorporate new applicable TMDLs adopted during the term of this General Permit.

Responsible Dischargers shall comply with the applicable TMDL-specific requirements by, and after, the Compliance Deadline date listed in Table H-2.

**Table H-1: List of Applicable TMDLs
 North Coast Regional Water Quality Control Board (Region 1)**

TMDL	Pollutant
Albion River Sediment TMDL	Sediment
Big River Sediment TMDL	Sediment
Eel River – Lower Main Sediment TMDL	Sediment
Eel River – Lower Main Temperature TMDL	Temperature
Eel River – Middle Fork Sediment TMDL	Sediment
Eel River – Middle Main Sediment TMDL	Sediment
Eel River – Middle Main Temperature TMDL	Temperature
Eel River – North Fork Sediment TMDL	Sediment
Eel River – North Fork Temperature TMDL	Temperature
Eel River – South Fork Sediment TMDL	Sediment
Eel River – Upper Main Sediment TMDL	Sediment
Eel River – Upper Main Temperature TMDL	Temperature
Gualala River Sediment TMDL	Sediment
Mad River Sediment TMDL	Sediment
Mattole River Sediment TMDL	Sediment
Mattole River Temperature TMDL	Temperature
Navarro River Sediment TMDL	Sediment
Navarro River Temperature TMDL	Temperature
Noyo River Sediment TMDL	Sediment
Scott River Sediment TMDL	Sediment
Scott River Temperature TMDL	Temperature

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TMDL	Pollutant
Ten Mile River Sediment TMDL	Sediment
Trinity River Sediment TMDL	Sediment
Van Duzen River Sediment TMDL	Sediment

San Francisco Bay Regional Water Quality Control Board (Region 2)

TMDL	Pollutant
Lagunitas Creek Sediment TMDL	Sediment
Napa River Sediment TMDL	Sediment
Pescadero and Butano Creek Sediment TMDL	Sediment
Sonoma Creek Sediment TMDL	Sediment

Central Coast Regional Water Quality Control Board (Region 3)

TMDL	Pollutant
Pajaro River Nutrients TMDL	Nitrogen Compounds and Orthophosphate
San Lorenzo River Siltation TMDL	Sediment

Los Angeles Regional Water Quality Control Board (Region 4)

TMDL	Pollutant
Ballona Creek, Ballona Estuary and Sepulveda Channel Bacteria TMDL	Bacteria
Ballona Creek Metals TMDL	Metals
Ballona Creek Estuary Toxics TMDL	Toxics
Calleguas Creek Watershed Salts TMDL	Salts (Boron, Chloride, Sulfate, TDS)
Calleguas Creek Watershed Metals and Selenium TMDL	Metals and Selenium
Calleguas Creek Watershed OC Pesticides and PCBs TMDL	Organochlorine Pesticides and PCBs
Colorado Lagoon Toxics TMDL	Metals, Organochlorine Pesticides, PAHs, PCBs, and Sediment Toxicity
Harbor Beaches of Ventura County Bacteria TMDL	Bacteria
Long Beach City Beaches and Los Angeles River Estuary Bacteria TMDL	Bacteria
Los Angeles Area Lakes TMDLs	Mercury, Nitrogen, Organochlorine Pesticides, PCBs, and Phosphorus
Los Angeles and Long Beach Harbor Waters TMDL	Metals and Toxics
Los Angeles Harbor Bacteria TMDL	Bacteria
Los Angeles River Bacteria TMDL	Bacteria
Los Angeles River Metals TMDL	Metals
Los Angeles River Nutrients TMDL	Nutrients
Los Cerritos Channel Metals TMDL	Metals

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TMDL	Pollutant
Machado Lake Nutrients TMDL	Nutrients
Machado Lake Toxics TMDL	PCBs and Pesticides
Malibu Creek Bacteria TMDL	Bacteria
Marina del Rey Harbor Bacteria TMDL	Bacteria
Marina Del Rey Harbor Toxics TMDL	Toxics
Oxnard Drain No. 3 TMDL	PCBs, Pesticides, and Sediment Toxicity
San Gabriel River Metals and Selenium TMDL	Metals and Selenium
Santa Clara River Bacteria TMDL	Bacteria
Santa Clara River Nitrogen Compounds TMDL	Nutrients
Santa Clara River Reach 3 Chloride TMDL	Chloride
Santa Monica Bay Beaches Bacteria TMDL	Bacteria
Santa Monica Bay DDTs and PCBs TMDL	DDTs and PCBs
Upper Santa Clara River Chloride TMDL	Chloride
Ventura River Algae TMDL	Nutrients

Lahontan Regional Water Quality Control Board (Region 6)

TMDL	Pollutant
Squaw Creek Sediment TMDL	Sediment
Truckee River Sediment TMDL	Sediment

Santa Ana Regional Water Quality Control Board (Region 8)

TMDL	Pollutant
San Diego Creek and Newport Bay Nutrients TMDL	Nutrients
San Diego Creek and Newport Bay Organochlorine Compounds TMDL	Organochlorine Compounds
San Diego Creek and Newport Bay Sediment TMDL	Sediment
San Diego Creek and Newport Bay Toxics TMDL	Toxics

San Diego Regional Water Quality Control Board (Region 9)

TMDL	Pollutant
Chollas Creek Diazinon TMDL	Diazinon
Chollas Creek Metals TMDL	Metals
Los Peñasquitos Lagoon Sediment TMDL	Sediment

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**Table H-2: Compliance Table for TMDL Implementation Requirements
 North Coast Regional Water Quality Control Board (Region 1) ¹**

Responsible dischargers for the TMDLs listed in this table are not subject to additional TMDL-related numeric action levels or numeric effluent limitations.

TMDL	Applicable Water Body/ Watershed	Pollutants	Compliance Actions	Compliance Deadline <i>* Denotes Effective Date of this General Permit</i>
Albion River Sediment TMDL	Albion River Watershed	Sediment	Comply with General Permit and the additional Sediment TMDL Requirements in Section I.E.2 below.	September 1, 2023*
Big River Sediment TMDL	Big River Watershed	Sediment	Comply with General Permit and the additional Sediment TMDL Requirements in Section I.E.2 below.	September 1, 2023*
Eel River – Lower Main Sediment TMDL	Lower Eel River Watershed	Sediment	Comply with General Permit and the additional Sediment TMDL Requirements in Section I.E.2 below.	September 1, 2023*

¹ Some TMDLs do not specifically state total concentrations for the constituents. Unless otherwise stated in Attachment H, Table H-2, the pollutant shall be reported in total concentrations.

TMDL	Applicable Water Body/ Watershed	Pollutants	Compliance Actions	Compliance Deadline <i>* Denotes Effective Date of this General Permit</i>
Eel River – Lower Main Temperature TMDL	Lower Eel River Watershed	Temperature	Comply with General Permit	September 1, 2023*
Eel River – Middle Fork Sediment TMDL	Middle Fork Eel River Watershed	Sediment	Comply with General Permit and the additional Sediment TMDL Requirements in Section I.E.2 below.	September 1, 2023*
Eel River – Middle Main Sediment TMDL	Middle Main Eel River Watershed	Sediment	Comply with General Permit and the additional Sediment TMDL Requirements in Section I.E.2 below.	September 1, 2023*
Eel River – Middle Main Temperature TMDL	Middle Main Eel River Watershed	Temperature	Comply with General Permit	September 1, 2023*
Eel River – North Fork Sediment TMDL	North Fork Eel River Watershed	Sediment	Comply with General Permit and the additional Sediment TMDL Requirements in Section I.E.2 below.	September 1, 2023*

EXHIBIT "C" (Stormwater Pollution Prevention Plan)

TMDL	Applicable Water Body/ Watershed	Pollutants	Compliance Actions	Compliance Deadline <i>* Denotes Effective Date of this General Permit</i>
Eel River – North Fork Temperature TMDL	North Fork Eel River Watershed	Temperature	Comply with General Permit	September 1, 2023*
Eel River – South Fork Sediment TMDL	South Fork Eel River Watershed	Sediment	Comply with General Permit and the additional Sediment TMDL Requirements in Section I.E.2 below.	September 1, 2023*
Eel River – Upper Main Sediment TMDL	Upper Eel River Watershed	Sediment	Comply with General Permit and the additional Sediment TMDL Requirements in Section I.E.2 below.	September 1, 2023*
Eel River – Upper Main Temperature TMDL	Upper Eel River Watershed	Temperature	Comply with General Permit	September 1, 2023*
Gualala River Sediment TMDL	Gualala River Watershed	Sediment	Comply with General Permit and the additional Sediment TMDL Requirements in Section I.E.2 below.	September 1, 2023*

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TMDL	Applicable Water Body/ Watershed	Pollutants	Compliance Actions	Compliance Deadline <i>* Denotes Effective Date of this General Permit</i>
Mad River Sediment TMDL	Mad River Watershed	Sediment	Comply with General Permit and the additional Sediment TMDL Requirements in Section I.E.2 below.	September 1, 2023*
Mattole River Sediment TMDL	Mattole River Watershed	Sediment	Comply with General Permit and the additional Sediment TMDL Requirements in Section I.E.2 below.	September 1, 2023*
Mattole River Temperature TMDL	Mattole River Watershed	Temperature	Comply with General Permit	September 1, 2023*
Navarro River Sediment TMDL	Navarra River Watershed	Sediment	Comply with General Permit and the additional Sediment TMDL Requirements in Section I.E.2 below.	September 1, 2023*
Navarro River Temperature TMDL	Navarro River Watershed	Temperature	Comply with General Permit	September 1, 2023*

EXHIBIT "C" (Stormwater Pollution Prevention Plan)

TMDL	Applicable Water Body/ Watershed	Pollutants	Compliance Actions	Compliance Deadline <i>* Denotes Effective Date of this General Permit</i>
Noyo River Sediment TMDL	Noyo River Watershed	Sediment	Comply with General Permit and the additional Sediment TMDL Requirements in Section I.E.2 below.	September 1, 2023*
Scott River Sediment TMDL	Scott River Watershed	Sediment	Comply with General Permit	September 1, 2023*
Scott River Temperature TMDL	Scott River Watershed	Temperature	Comply with General Permit	September 1, 2023*
Ten Mile River Sediment TMDL	Ten Mile River Watershed	Sediment	Comply with General Permit and the additional Sediment TMDL Requirements in Section I.E.2 below.	September 1, 2023*
Trinity River Sediment TMDL	Trinity River Watershed	Sediment	Comply with General Permit and the additional Sediment TMDL Requirements in Section I.E.2 below.	September 1, 2023*

EXHIBIT "C" (Stormwater Pollution Prevention Plan)

TMDL	Applicable Water Body/ Watershed	Pollutants	Compliance Actions	Compliance Deadline <i>* Denotes Effective Date of this General Permit</i>
Van Duzen River Sediment TMDL	Van Duzen River Watershed	Sediment	Comply with General Permit and the additional Sediment TMDL Requirements in Section I.E.2 below.	September 1, 2023*

EXHIBIT "C" (Stormwater Pollution Prevention Plan)

San Francisco Bay Regional Water Quality Control Board (Region 2)²

Responsible dischargers for the TMDLs listed in this table are not subject to additional TMDL-related numeric action levels or numeric effluent limitations.

TMDL	Applicable Water Body/ Watershed	Pollutants	Compliance Actions	Compliance Deadline <i>* Denotes Effective Date of this General Permit</i>
Lagunitas Creek Sediment TMDL	Lagunitas Creek Watershed	Sediment	Comply with General Permit	September 1, 2023*
Napa River Sediment TMDL	Napa River Watershed	Sediment	Comply with General Permit	September 1, 2023*
Pescadero and Butano Creek Sediment TMDL	Pescadero-Butano Watershed	Sediment	Comply with General Permit	September 1, 2023*
Sonoma Creek Sediment TMDL	Sonoma Creek Watershed	Sediment	Comply with General Permit	September 1, 2023*

² Some of the TMDLs did not specifically state total concentrations for the constituents. Unless otherwise stated in Attachment H Table H-2, the pollutant should be reported in total concentrations.

EXHIBIT "C" (Stormwater Pollution Prevention Plan)

Central Coast Regional Water Quality Control Board (Region 3)³

TMDL	Applicable Water Body/ Watershed	Pollutants	Additional TMDL-Related Numeric Action Level(s) or Numeric Effluent Limitation (NAL/NEL)	Compliance Actions	Compliance Deadline <i>* Denotes Effective Date of this General Permit</i>
Pajaro River Nutrients TMDL	Pajaro River Watershed	Un-ionized Ammonia	NAL of 0.025 mg/L	Comply with General Permit and the additional Nutrients TMDL Requirements in Section I.D.3 below.	July 12, 2041
Pajaro River Nutrients TMDL	Pajaro River Watershed Streams with MUN Beneficial Use	Nitrate-Nitrogen	NAL of 10.0 mg/L	Comply with General Permit and the additional Nutrients TMDL Requirements in Section I.D.3 below.	July 12, 2041

³ Some of the TMDLs did not specifically state total concentrations for the constituents. Unless otherwise stated in Attachment H Table H-2, the pollutant should be reported in total concentrations.

TMDL	Applicable Water Body/ Watershed	Pollutants	Additional TMDL-Related Numeric Action Level(s) or Numeric Effluent Limitation (NAL/NEL)	Compliance Actions	Compliance Deadline <i>* Denotes Effective Date of this General Permit</i>
Pajaro River Nutrients TMDL	Pajaro River and Pajaro River Estuary Corralitos Creek and Salsipuedes Creek Beach Road Ditch and McGowan Ditch	Nitrate-Nitrogen	NAL of 8.0 mg/L	Comply with General Permit and the additional Nutrients TMDL Requirements in Section I.D.3 below.	July 12, 2041
Pajaro River Nutrients TMDL	Pajaro River and Pajaro River Estuary Corralitos Creek and Salsipuedes Creek Beach Road Ditch and McGowan Ditch	Orthophosphate-Phosphorus	NAL of 0.3 mg/L	Comply with General Permit and the additional Nutrients TMDL Requirements in Section I.D.3 below.	July 12, 2041

EXHIBIT "C" (Stormwater Pollution Prevention Plan)

TMDL	Applicable Water Body/ Watershed	Pollutants	Additional TMDL-Related Numeric Action Level(s) or Numeric Effluent Limitation (NAL/NEL)	Compliance Actions	Compliance Deadline <i>* Denotes Effective Date of this General Permit</i>
Pajaro River Nutrients TMDL	Llagas Creek (Downstream of Cheseboro Reservoir), Carnadero Creek, Uvas Creek, and Furlong Creek San Juan Creek and West Branch of San Juan Creek Tequisquita Slough Watsonville Slough, Harkins Slough, Gallighan Slough, and Struve Slough Millers Canal	Nitrate-Nitrogen	NAL of 8.0 mg/L	Comply with General Permit and the additional Nutrients TMDL Requirements in Section I.D.3 below.	July 12, 2041

EXHIBIT "C" (Stormwater Pollution Prevention Plan)

TMDL	Applicable Water Body/ Watershed	Pollutants	Additional TMDL-Related Numeric Action Level(s) or Numeric Effluent Limitation (NAL/NEL)	Compliance Actions	Compliance Deadline <i>* Denotes Effective Date of this General Permit</i>
Pajaro River Nutrients TMDL	Llagas Creek (Downstream of Cheseboro Reservoir), Carnadero Creek, Uvas Creek, and Furlong Creek San Juan Creek and West Branch of San Juan Creek Tequisquita Slough Watsonville Slough, Harkins Slough, Gallighan Slough, and Struve Slough Millers Canal	Orthophosphate-Phosphorus	NAL of 0.3 mg/L	Comply with General Permit and the additional Nutrients TMDL Requirements in Section I.D.3 below.	July 12, 2041
San Lorenzo River Siltation TMDL	San Lorenzo River Watershed	Sediment	None	Comply with General Permit	September 1, 2023*

EXHIBIT "C" (Stormwater Pollution Prevention Plan)

Los Angeles Regional Water Quality Control Board (Region 4)⁴

TMDL	Applicable Water Body/ Watershed	Pollutants	Additional TMDL- Related Numeric Action Level(s) or Numeric Effluent Limitation (NAL/NEL)	Compliance Actions	Compliance Deadline <i>* Denotes Effective Date of this General Permit</i>
Ballona Creek, Ballona Estuary, and Sepulveda Channel Bacteria TMDL	Ballona Creek	E. coli, Fecal Coliform	None	Comply with General Permit and the additional Bacteria TMDL Requirements in Section I.A below.	September 1, 2023*
Ballona Creek, Ballona Estuary, and Sepulveda Channel Bacteria TMDL	Ballona Estuary	Enterococcus, Fecal Coliform, Total Coliform	None	Comply with General Permit and the additional Bacteria TMDL Requirements in Section I.A below.	September 1, 2023*
Ballona Creek, Ballona Estuary, and Sepulveda Channel Bacteria TMDL	Sepulveda Channel	E. coli	None	Comply with General Permit and the additional Bacteria TMDL Requirements in Section I.A below.	September 1, 2023*

⁴ Some of the TMDLs did not specifically state total concentrations for the constituents. Unless otherwise stated in Attachment H Table H-2, the pollutant should be reported in total concentrations.

TMDL	Applicable Water Body/ Watershed	Pollutants	Additional TMDL-Related Numeric Action Level(s) or Numeric Effluent Limitation (NAL/NEL)	Compliance Actions	Compliance Deadline <i>* Denotes Effective Date of this General Permit</i>
Ballona Creek Metals TMDL	Ballona Creek or Sepulveda Canyon Channel	Copper, Lead, and Zinc	None	Comply with General Permit and the additional Metals TMDL Requirements in Section I.G.2 below.	September 1, 2023*
Ballona Creek Estuary Toxics TMDL	Ballona Creek or Ballona Creek Estuary	Cadmium, Chlordane, Copper, DDT, Lead, PCBs, Silver, and Zinc	None	Comply with General Permit and the additional Metals TMDL Requirements in Section I.G.2 below.	September 1, 2023*
Calleguas Creek Watershed Salts TMDL	Calleguas Creek Watershed	Boron, Chloride, Sulfate, and Total Dissolved Solids (TDS)	None	Comply with General Permit	September 1, 2023*
Calleguas Creek Watershed Metals and Selenium TMDL	Calleguas Creek or Conejo Creek	Total Copper	Interim NAL of 0.204 mg/L	Comply with General Permit and the additional Metals TMDL Requirements in Section I.G.3 below.	September 1, 2023*

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TMDL	Applicable Water Body/ Watershed	Pollutants	Additional TMDL-Related Numeric Action Level(s) or Numeric Effluent Limitation (NAL/NEL)	Compliance Actions	Compliance Deadline <i>* Denotes Effective Date of this General Permit</i>
Calleguas Creek Watershed Metals and Selenium TMDL	Calleguas Creek or Conejo Creek	Copper, Nickel, and Selenium	None	Comply with General Permit and the additional Metals TMDL Requirements in Section I.G.2 below.	September 1, 2023*
Calleguas Creek Watershed Metals and Selenium TMDL	Calleguas Creek or Conejo Creek	Mercury	None	Comply with General Permit and the additional Metals TMDL Requirements in Section I.G.2 below.	September 1, 2023*
Calleguas Creek Watershed Metals and Selenium TMDL	Revolon Slough	Total Copper	Interim NAL of 0.204 mg/L	Comply with General Permit and the additional Metals TMDL Requirements in Section I.G.3 below.	September 1, 2023*
Calleguas Creek Watershed Metals and Selenium TMDL	Revolon Slough	Copper, Nickel, and Selenium	None	Comply with General Permit and the additional Metals TMDL Requirements in Section I.G.2 below.	September 1, 2023*

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TMDL	Applicable Water Body/ Watershed	Pollutants	Additional TMDL-Related Numeric Action Level(s) or Numeric Effluent Limitation (NAL/NEL)	Compliance Actions	Compliance Deadline <i>* Denotes Effective Date of this General Permit</i>
Calleguas Creek Watershed Metals and Selenium TMDL	Revolon Slough	Mercury	None	Comply with General Permit and the additional Metals TMDL Requirements in Section I.G.2 below.	September 1, 2023*
Calleguas Creek Watershed Organochlorine Pesticides and PCBs TMDL	Calleguas Creek Watershed	Chlordane, 4,4-DDD, 4,4-DDE, 4,4-DDT, Dieldrin, PCBs, and Toxaphene	None	Comply with General Permit and the additional Toxics TMDL Requirements in Section I.G.2 below.	September 1, 2023*
Colorado Lagoon Toxics TMDL	Colorado Lagoon Watershed	Chlordane, Dieldrin, DDT, Lead, PAHs, PCBs, and Zinc	None	Comply with General Permit and the additional Toxics TMDL Requirements in Section I.G.2 below.	September 1, 2023*
Harbor Beaches of Ventura County Bacteria TMDL	Kiddie and Hobie Beaches in the Channel Islands Harbor	Enterococcus, Fecal Coliform, Total Coliform	None	Comply with General Permit and the additional Bacteria TMDL Requirements in Section I.A below.	September 1, 2023*

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TMDL	Applicable Water Body/ Watershed	Pollutants	Additional TMDL-Related Numeric Action Level(s) or Numeric Effluent Limitation (NAL/NEL)	Compliance Actions	Compliance Deadline <i>* Denotes Effective Date of this General Permit</i>
Long Beach City Beaches and Los Angeles River Estuary Bacteria TMDL	Long Beach City Beaches or Los Angeles River Estuary	Enterococcus, Fecal Coliform, Total Coliform	None	Comply with General Permit and the additional Bacteria TMDL Requirements in Section I.A below.	September 1, 2023*
Los Angeles Area Lakes TMDL	Echo Park Lake	Total Nitrogen	NAL of 1.33 mg/L	Comply with General Permit and the additional Nutrients TMDL Requirements in Section I.D.3 below.	September 1, 2023*
Los Angeles Area Lakes TMDL	Echo Park Lake	Total Phosphorous	NEL of 0.16 mg/L	Comply with General Permit and the additional Nutrients TMDL Requirements in Section I.D.4 below.	September 1, 2023*
Los Angeles Area Lakes TMDL	Echo Park Lake	Chlordane	NEL of 100 mg/L TSS (if applicable per Section I.G.5 below)	Comply with General Permit and the additional Toxics TMDL Requirements in Section I.G.5 below.	September 1, 2023*

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TMDL	Applicable Water Body/ Watershed	Pollutants	Additional TMDL-Related Numeric Action Level(s) or Numeric Effluent Limitation (NAL/NEL)	Compliance Actions	Compliance Deadline <i>* Denotes Effective Date of this General Permit</i>
Los Angeles Area Lakes TMDL	Echo Park Lake	Dieldrin	NEL of 100 mg/L TSS (if applicable per Section I.G.5 below)	Comply with General Permit and the additional Toxics TMDL Requirements in Section I.G.5 below.	September 1, 2023*
Los Angeles Area Lakes TMDL	Echo Park Lake	Total PCBs	NEL of 100 mg/L TSS (if applicable per Section I.G.5 below)	Comply with General Permit and the additional Toxics TMDL Requirements in Section I.G.5 below.	September 1, 2023*
Los Angeles Area Lakes TMDL	Legg Lakes	Total Nitrogen	NAL of 1.8 mg/L	Comply with General Permit and the additional Nutrients TMDL Requirements in Section I.D.3 below.	September 1, 2023*
Los Angeles Area Lakes TMDL	Legg Lakes	Total Phosphorous	NEL of 0.64 mg/L	Comply with General Permit and the additional Nutrients TMDL Requirements in Section I.D.4 below.	September 1, 2023*

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TMDL	Applicable Water Body/ Watershed	Pollutants	Additional TMDL-Related Numeric Action Level(s) or Numeric Effluent Limitation (NAL/NEL)	Compliance Actions	Compliance Deadline <i>* Denotes Effective Date of this General Permit</i>
Los Angeles Area Lakes TMDL	Peck Road Park Lake	Total Nitrogen	NAL of 3.61 mg/L	Comply with General Permit and the additional Nutrients TMDL Requirements in Section I.D.3 below.	September 1, 2023*
Los Angeles Area Lakes TMDL	Peck Road Park Lake	Total Phosphorous	NEL of 0.37 mg/L	Comply with General Permit and the additional Nutrients TMDL Requirements in Section I.D.4 below.	September 1, 2023*
Los Angeles Area Lakes TMDL	Peck Road Park Lake	Chlordane	NEL of 100 mg/L TSS (if applicable per Section I.G.5 below)	Comply with General Permit and the additional Toxics TMDL Requirements in Section I.G.5 below.	September 1, 2023*
Los Angeles Area Lakes TMDL	Peck Road Park Lake	Dieldrin	NEL of 100 mg/L TSS (if applicable per Section I.G.5 below)	Comply with General Permit and the additional Toxics TMDL Requirements in Section I.G.5 below.	September 1, 2023*

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TMDL	Applicable Water Body/ Watershed	Pollutants	Additional TMDL-Related Numeric Action Level(s) or Numeric Effluent Limitation (NAL/NEL)	Compliance Actions	Compliance Deadline <i>* Denotes Effective Date of this General Permit</i>
Los Angeles Area Lakes TMDL	Peck Road Park Lake	Total DDTs	NEL of 100 mg/L TSS (if applicable per Section I.G.5 below)	Comply with General Permit and the additional Toxics TMDL Requirements in Section I.G.5 below.	September 1, 2023*
Los Angeles Area Lakes TMDL	Peck Road Park Lake	Total PCBs	NEL of 100 mg/L TSS (if applicable per Section I.G.5 below)	Comply with General Permit and the additional Toxics TMDL Requirements in Section I.G.5 below.	September 1, 2023*
Los Angeles Area Lakes TMDL	Puddingstone Reservoir	Total Nitrogen	NAL of 2.0 mg/L	Comply with General Permit and the additional Nutrients TMDL Requirements in Section I.D.3 below.	September 1, 2023*
Los Angeles Area Lakes TMDL	Puddingstone Reservoir	Total Phosphorous	NEL of 0.4 mg/L	Comply with General Permit and the additional Nutrients TMDL Requirements in Section I.D.4 below.	September 1, 2023*

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TMDL	Applicable Water Body/ Watershed	Pollutants	Additional TMDL-Related Numeric Action Level(s) or Numeric Effluent Limitation (NAL/NEL)	Compliance Actions	Compliance Deadline <i>* Denotes Effective Date of this General Permit</i>
Los Angeles Area Lakes TMDL	Puddingstone Reservoir	Chlordane	NEL of 100 mg/L TSS (if applicable per Section I.G.5 below)	Comply with General Permit and the additional Toxics TMDL Requirements in Section I.G.5 below.	September 1, 2023*
Los Angeles Area Lakes TMDL	Puddingstone Reservoir	Dieldrin	NEL of 100 mg/L TSS (if applicable per Section I.G.5 below)	Comply with General Permit and the additional Toxics TMDL Requirements in Section I.G.5 below.	September 1, 2023*
Los Angeles Area Lakes TMDL	Puddingstone Reservoir	Total DDTs	NEL of 100 mg/L TSS (if applicable per Section I.G.5 below)	Comply with General Permit and the additional Toxics TMDL Requirements in Section I.G.5 below.	September 1, 2023*
Los Angeles Area Lakes TMDL	Puddingstone Reservoir	Total PCBs	NEL of 100 mg/L TSS (if applicable per Section I.G.5 below)	Comply with General Permit and the additional Toxics TMDL Requirements in Section I.G.5 below.	September 1, 2023*

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TMDL	Applicable Water Body/ Watershed	Pollutants	Additional TMDL-Related Numeric Action Level(s) or Numeric Effluent Limitation (NAL/NEL)	Compliance Actions	Compliance Deadline <i>* Denotes Effective Date of this General Permit</i>
Los Angeles and Long Beach Harbor Waters TMDL	Dominguez Channel or Torrance Lateral	Total Copper	Interim NAL of 0.20751 mg/L	Comply with General Permit and the additional Metals TMDL Requirements in Section I.G.3 below.	September 1, 2023*
Los Angeles and Long Beach Harbor Waters TMDL	Dominguez Channel or Torrance Lateral	Total Lead	Interim NAL of 0.12288 mg/L	Comply with General Permit and the additional Metals TMDL Requirements in Section I.G.3 below.	September 1, 2023*
Los Angeles and Long Beach Harbor Waters TMDL	Dominguez Channel or Torrance Lateral	Total Zinc	Interim NAL of 0.89887 mg/L	Comply with General Permit and the additional Metals TMDL Requirements in Section I.G.3 below.	September 1, 2023*
Los Angeles and Long Beach Harbor Waters TMDL	Dominguez Channel or Torrance Lateral	Total Copper	NEL of 100 mg/L TSS (if applicable per Section I.G.5 below)	Comply with General Permit and the additional Metals TMDL Requirements in Section I.G.5 and I.G.6 below.	March 23, 2032

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TMDL	Applicable Water Body/ Watershed	Pollutants	Additional TMDL-Related Numeric Action Level(s) or Numeric Effluent Limitation (NAL/NEL)	Compliance Actions	Compliance Deadline <i>* Denotes Effective Date of this General Permit</i>
Los Angeles and Long Beach Harbor Waters TMDL	Dominguez Channel or Torrance Lateral	Total Lead	NEL of 100 mg/L TSS (if applicable per Section I.G.5 below)	Comply with General Permit and the additional Metals TMDL Requirements in Section I.G.5 and I.G.6 below.	March 23, 2032
Los Angeles and Long Beach Harbor Waters TMDL	Dominguez Channel or Torrance Lateral	Total Zinc	NEL of 100 mg/L TSS (if applicable per Section I.G.5 below)	Comply with General Permit and the additional Metals TMDL Requirements in Section I.G.5 and I.G.6 below.	March 23, 2032

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TMDL	Applicable Water Body/ Watershed	Pollutants	Additional TMDL-Related Numeric Action Level(s) or Numeric Effluent Limitation (NAL/NEL)	Compliance Actions	Compliance Deadline <i>* Denotes Effective Date of this General Permit</i>
Los Angeles and Long Beach Harbor Waters TMDL	Dominguez Channel Estuary and Greater Los Angeles/ Long Beach Harbor Waters including: Inner and Outer Harbor Main Channel Southwest Slip Cabrillo Marina Inner Cabrillo Beach Los Angeles River Estuary San Pedro Bay	Copper, DDT, Lead, PAHs, PCBs, and Zinc	None	Comply with General Permit and the additional Toxics TMDL Requirements in Section I.G.2 below.	September 1, 2023*

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TMDL	Applicable Water Body/ Watershed	Pollutants	Additional TMDL-Related Numeric Action Level(s) or Numeric Effluent Limitation (NAL/NEL)	Compliance Actions	Compliance Deadline <i>* Denotes Effective Date of this General Permit</i>
Los Angeles and Long Beach Harbor Waters TMDL	Dominguez Channel Estuary	4,4-DDT	Final NAL of 5.9×10^{-7} mg/L	Comply with General Permit and the additional Metals and Toxics TMDL Requirements in Section I.G.3 below.	March 23, 2032
Los Angeles and Long Beach Harbor Waters TMDL	Dominguez Channel Estuary	Chlordane	Final NAL of 5.9×10^{-7} mg/L	Comply with General Permit and the additional Metals and Toxics TMDL Requirements in Section I.G.3 below.	March 23, 2032
Los Angeles and Long Beach Harbor Waters TMDL	Dominguez Channel Estuary	Dieldrin	Final NAL of 1.4×10^{-7} mg/L	Comply with General Permit and the additional Metals and Toxics TMDL Requirements in Section I.G.3 below.	March 23, 2032

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TMDL	Applicable Water Body/ Watershed	Pollutants	Additional TMDL-Related Numeric Action Level(s) or Numeric Effluent Limitation (NAL/NEL)	Compliance Actions	Compliance Deadline <i>* Denotes Effective Date of this General Permit</i>
Los Angeles and Long Beach Harbor Waters TMDL	Dominguez Channel Estuary	Total Copper	Final NAL of 0.0058 mg/L	Comply with General Permit and the additional Metals and Toxics TMDL Requirements in Section I.G.3 below.	March 23, 2032
Los Angeles and Long Beach Harbor Waters TMDL	Dominguez Channel Estuary	Total Lead	Final NAL of 0.221 mg/L	Comply with General Permit and the additional Metals and Toxics TMDL Requirements in Section I.G.3 below.	March 23, 2032
Los Angeles and Long Beach Harbor Waters TMDL	Dominguez Channel Estuary	PAHs	Final NAL of 4.9×10^{-5} mg/L	Comply with General Permit and the additional Metals and Toxics TMDL Requirements in Section I.G.3 below.	March 23, 2032

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TMDL	Applicable Water Body/ Watershed	Pollutants	Additional TMDL-Related Numeric Action Level(s) or Numeric Effluent Limitation (NAL/NEL)	Compliance Actions	Compliance Deadline <i>* Denotes Effective Date of this General Permit</i>
Los Angeles and Long Beach Harbor Waters TMDL	Dominguez Channel Estuary	Total PCBs	Final NAL of 1.7×10^{-7} mg/L	Comply with General Permit and the additional Metals and Toxics TMDL Requirements in Section I.G.3 below.	March 23, 2032
Los Angeles and Long Beach Harbor Waters TMDL	Dominguez Channel Estuary	Total Zinc	Final NAL if 0.095 mg/L	Comply with General Permit and the additional Metals and Toxics TMDL Requirements in Section I.G.3 below.	March 23, 2032
Los Angeles and Long Beach Harbor Waters TMDL	Dominguez Channel Estuary	Cadmium	None	Comply with General Permit and the additional Metals TMDL Requirements in Section I.G.2 below.	March 23, 2032

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TMDL	Applicable Water Body/ Watershed	Pollutants	Additional TMDL-Related Numeric Action Level(s) or Numeric Effluent Limitation (NAL/NEL)	Compliance Actions	Compliance Deadline <i>* Denotes Effective Date of this General Permit</i>
Los Angeles and Long Beach Harbor Waters TMDL	Consolidated Slip	Cadmium, Chromium, and Mercury	None	Comply with General Permit and the additional Metals TMDL Requirements in Section I.G.2 below.	March 23, 2032
Los Angeles and Long Beach Harbor Waters TMDL	Fish Harbor	Mercury	None	Comply with General Permit and the additional Metals TMDL Requirements in Section I.G.2 below.	March 23, 2032
Los Angeles Harbor Bacteria TMDL	Los Angeles Harbor (Inner Cabrillo Beach and Main Ship Channel)	Enterococcus, Fecal Coliform, Total Coliform	None	Comply with General Permit and the additional Bacteria TMDL Requirements in Section I.A below.	September 1, 2023*
Los Angeles River Bacteria TMDL	Los Angeles River Watershed	E. coli	None	Comply with General Permit and the additional Bacteria TMDL Requirements in Section I.A below.	September 1, 2023*

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TMDL	Applicable Water Body/ Watershed	Pollutants	Additional TMDL-Related Numeric Action Level(s) or Numeric Effluent Limitation (NAL/NEL)	Compliance Actions	Compliance Deadline <i>* Denotes Effective Date of this General Permit</i>
Los Angeles River Metals TMDL	Los Angeles River Watershed	Total Cadmium	NAL of 0.0031 mg/L	Comply with General Permit and the additional Metals TMDL Requirements in Section I.G.3 below.	September 1, 2023*
Los Angeles River Metals TMDL	Los Angeles River Watershed	Total Copper	NAL of 0.06749 mg/L	Comply with General Permit and the additional Metals TMDL Requirements in Section I.G.3 below.	September 1, 2023*
Los Angeles River Metals TMDL	Los Angeles River Watershed	Total Lead	NAL of 0.094 mg/L	Comply with General Permit and the additional Metals TMDL Requirements in Section I.G.3 below.	September 1, 2023*
Los Angeles River Metals TMDL	Los Angeles River Watershed	Total Zinc	NAL of 0.159 mg/L	Comply with General Permit and the additional Metals TMDL Requirements in Section I.G.3 below.	September 1, 2023*

EXHIBIT "C" (Stormwater Pollution Prevention Plan)

TMDL	Applicable Water Body/ Watershed	Pollutants	Additional TMDL-Related Numeric Action Level(s) or Numeric Effluent Limitation (NAL/NEL)	Compliance Actions	Compliance Deadline <i>* Denotes Effective Date of this General Permit</i>
Los Angeles River Nutrients TMDL	Los Angeles River above the LA-Glendale WRP	Ammonia	NAL of 4.7 mg/L	Comply with General Permit and the additional Nutrients TMDL Requirements in Section I.D.3 below.	September 1, 2023*
Los Angeles River Nutrients TMDL	Los Angeles River below the LA-Glendale WRP	Ammonia	NAL of 8.7 mg/L	Comply with General Permit and the additional Nutrients TMDL Requirements in Section I.D.3 below.	September 1, 2023*
Los Angeles River Nutrients TMDL	Los Angeles River Watershed	Ammonia	NAL of 10.1 mg/L	Comply with General Permit and the additional Nutrients TMDL Requirements in Section I.D.3 below.	September 1, 2023*
Los Angeles River Nutrients TMDL	Los Angeles River Watershed	Nitrate-Nitrogen	NAL of 8.0 mg/L	Comply with General Permit and the additional Nutrients TMDL Requirements in Section I.D.3 below.	September 1, 2023*

EXHIBIT "C" (Stormwater Pollution Prevention Plan)

TMDL	Applicable Water Body/ Watershed	Pollutants	Additional TMDL-Related Numeric Action Level(s) or Numeric Effluent Limitation (NAL/NEL)	Compliance Actions	Compliance Deadline <i>* Denotes Effective Date of this General Permit</i>
Los Angeles River Nutrients TMDL	Los Angeles River Watershed	Nitrite-Nitrogen	NAL of 1.0 mg/L	Comply with General Permit and the additional Nutrients TMDL Requirements in Section I.D.3 below.	September 1, 2023*
Los Angeles River Nutrients TMDL	Los Angeles River Watershed	Nitrate-Nitrogen + Nitrite-Nitrogen	NAL of 8.0 mg/L	Comply with General Permit and the additional Nutrients TMDL Requirements in Section I.D.3 below.	September 1, 2023*
Los Cerritos Channel Metals TMDL	Los Cerritos Channel	Total Copper	NAL of 0.0098 mg/L	Comply with General Permit and the additional Metals TMDL Requirements in Section I.G.3 below.	September 1, 2023*
Los Cerritos Channel Metals TMDL	Los Cerritos Channel	Total Lead	NAL of 0.0558 mg/L	Comply with General Permit and the additional Metals TMDL Requirements in Section I.G.3 below.	September 1, 2023*

EXHIBIT "C" (Stormwater Pollution Prevention Plan)

TMDL	Applicable Water Body/ Watershed	Pollutants	Additional TMDL-Related Numeric Action Level(s) or Numeric Effluent Limitation (NAL/NEL)	Compliance Actions	Compliance Deadline <i>* Denotes Effective Date of this General Permit</i>
Los Cerritos Channel Metals TMDL	Los Cerritos Channel	Total Zinc	NAL of 0.0956 mg/L	Comply with General Permit and the additional Metals TMDL Requirements in Section I.G.3 below.	September 1, 2023*
Machado Lake Nutrients TMDL	Machado Lake, Drain 553, Wilmington Drain, Project 77/510, and WALTERIA Lake	Total Nitrogen	NAL of 1.0 mg/L	Comply with General Permit and the additional Nutrients TMDL Requirements in Section I.D.3 below.	September 1, 2023*
Machado Lake Nutrients TMDL	Machado Lake, Drain 553, Wilmington Drain, Project 77/510, and WALTERIA Lake	Total Phosphorus	NAL of 0.1 mg/L	Comply with General Permit and the additional Nutrients TMDL Requirements in Section I.D.3 below.	September 1, 2023*

EXHIBIT "C" (Stormwater Pollution Prevention Plan)

TMDL	Applicable Water Body/ Watershed	Pollutants	Additional TMDL-Related Numeric Action Level(s) or Numeric Effluent Limitation (NAL/NEL)	Compliance Actions	Compliance Deadline <i>* Denotes Effective Date of this General Permit</i>
Machado Lake Toxics TMDL	Machado Lake, Drain 553, Wilmington Drain, Project 77/510, and Waleria Lake	Chlordane, DDD (all congeners), DDE (all congeners), DDT (all congeners), Dieldrin, Total DDTs, and Total PCBs	None	Comply with General Permit and the additional Toxics TMDL Requirements in Section I.G.2 below.	September 1, 2023*
Malibu Creek Watershed Bacteria TMDL	Malibu Creek Watershed	E. coli	None	Comply with General Permit and the additional Bacteria TMDL Requirements in Section I.A below.	September 1, 2023*
Malibu Creek Watershed Bacteria TMDL	Malibu Lagoon and Adjacent Beach	Enterococcus, Fecal Coliform, Total Coliform	None	Comply with General Permit and the additional Bacteria TMDL Requirements in Section I.A below.	September 1, 2023*

EXHIBIT "C" (Stormwater Pollution Prevention Plan)

TMDL	Applicable Water Body/ Watershed	Pollutants	Additional TMDL-Related Numeric Action Level(s) or Numeric Effluent Limitation (NAL/NEL)	Compliance Actions	Compliance Deadline <i>* Denotes Effective Date of this General Permit</i>
Marina del Rey Harbor Bacteria TMDL	Marina del Rey Harbor Mother's Beach and Back Basins D, E, and F	Enterococcus, Fecal Coliform, Total Coliform	None	Comply with General Permit and the additional Bacteria TMDL Requirements in Section I.A below.	September 1, 2023*
Marina del Rey Harbor Toxics TMDL	Marina del Rey Harbor	Chlordane, Copper, Lead, p,p'-DDE, Total DDTs, Total PCBs, and Zinc	None	Comply with General Permit and the additional Metals and Toxics TMDL Requirements in Section I.G.2 below.	September 1, 2023*
Oxnard Drain No. 3 TMDL	Oxnard Drain No. 3	4,4'-DDD, 4,4'-DDE, 4,4'-DDT, Bifenthrin, Chlordane, Chlorpyrifos, Dieldrin, PCBs, Sediment Toxicity, and Toxaphene	None	Comply with General Permit and the additional Toxics TMDL Requirements in Section I.G.2 below.	September 1, 2023*

EXHIBIT "C" (Stormwater Pollution Prevention Plan)

TMDL	Applicable Water Body/ Watershed	Pollutants	Additional TMDL-Related Numeric Action Level(s) or Numeric Effluent Limitation (NAL/NEL)	Compliance Actions	Compliance Deadline <i>* Denotes Effective Date of this General Permit</i>
San Gabriel River Metals and Selenium	San Gabriel River Reach 2 and Upper Reaches Watersheds	Total Lead	NAL 0.166 mg/L	Comply with General Permit and the additional Metals TMDL Requirements in Section I.G.3 below.	September 1, 2023*
San Gabriel River Metals and Selenium	Coyote Creek Watershed	Total Copper	NAL 0.027 mg/L	Comply with General Permit and the additional Metals TMDL Requirements in Section I.G.3 below.	September 1, 2023*
San Gabriel River Metals and Selenium	Coyote Creek Watershed	Total Lead	NAL 0.106 mg/L	Comply with General Permit and the additional Metals TMDL Requirements in Section I.G.3 below.	September 1, 2023*
San Gabriel River Metals and Selenium	Coyote Creek Watershed	Total Zinc	NAL 0.158 mg/L	Comply with General Permit and the additional Metals TMDL Requirements in Section I.G.3 below.	September 1, 2023*

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TMDL	Applicable Water Body/ Watershed	Pollutants	Additional TMDL-Related Numeric Action Level(s) or Numeric Effluent Limitation (NAL/NEL)	Compliance Actions	Compliance Deadline <i>* Denotes Effective Date of this General Permit</i>
Santa Clara River Bacteria	Santa Clara River Estuary	Enterococcus, Fecal Coliform, Total Coliform	None	Comply with General Permit and the additional Bacteria TMDL Requirements in Section I.A below.	September 1, 2023*
Santa Clara River Bacteria	Santa Clara River Reaches 3, 4, 5, 6, 7	E. coli	None	Comply with General Permit and the additional Bacteria TMDL Requirements in Section I.A below.	September 1, 2023*
Santa Clara River Nitrogen Compounds TMDL	Santa Clara River Reach 3	Ammonia	NAL of 4.2 mg/L	Comply with General Permit and the additional Nutrients TMDL Requirements in Section I.D.3 below.	September 1, 2023*
Santa Clara River Nitrogen Compounds TMDL	Santa Clara River Reach 7	Ammonia	NAL of 5.2 mg/L	Comply with General Permit and the additional Nutrients TMDL Requirements in Section I.D.3 below.	September 1, 2023*

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TMDL	Applicable Water Body/ Watershed	Pollutants	Additional TMDL-Related Numeric Action Level(s) or Numeric Effluent Limitation (NAL/NEL)	Compliance Actions	Compliance Deadline <i>* Denotes Effective Date of this General Permit</i>
Santa Clara River Reach 3 Chloride TMDL	Santa Clara River Reach 3	Chloride	None	Comply with General Permit	September 1, 2023*
Santa Monica Bay Beaches Bacteria TMDL	Santa Monica Bay Watershed Management Area	Enterococcus, Fecal Coliform, Total Coliform	None	Comply with General Permit and the additional Bacteria TMDL Requirements in Section I.A below.	September 1, 2023*
Santa Monica Bay DDTs and PCBs TMDL	Santa Monica Bay	DDT and PCBs	None	Comply with General Permit and the additional Toxics TMDL Requirements in Section I.G.2 below.	September 1, 2023*
Upper Santa Clara River Chloride TMDL	Santa Clara River Reach 5 and 6	Chloride	Chloride NAL of 100 mg/L	Comply with General Permit and the additional TMDL Requirements in Section I.B below.	September 1, 2023*

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TMDL	Applicable Water Body/ Watershed	Pollutants	Additional TMDL-Related Numeric Action Level(s) or Numeric Effluent Limitation (NAL/NEL)	Compliance Actions	Compliance Deadline <i>* Denotes Effective Date of this General Permit</i>
Ventura River Algae TMDL	Ventura River Estuary and Ventura River Reach 1	Total Nitrogen	NAL of 7.4 mg/L	Comply with General Permit and the additional Nutrients TMDL Requirements in Section I.D.3 below.	September 1, 2023*
Ventura River Algae TMDL	Ventura River Reach 2 and Cañada Larga	Nitrate-Nitrogen + Nitrite-Nitrogen	NAL of 10 mg/L	Comply with General Permit and the additional Nutrients TMDL Requirements in Section I.D.3 below.	September 1, 2023*
Ventura River Algae TMDL	Ventura River Reaches 3, 4, 5, and San Antonio Creek	Nitrate-Nitrogen + Nitrite-Nitrogen	NAL of 5 mg/L	Comply with General Permit and the additional Nutrients TMDL Requirements in Section I.D.3 below.	September 1, 2023*

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Lahontan Regional Water Quality Control Board (Region 6) ⁵

TMDL	Applicable Water Body/ Watershed	Pollutants	Compliance Actions	Compliance Deadline <i>* Denotes Effective Date of this General Permit</i>
Squaw Creek Sediment TMDL	Squaw Creek Watershed	Sediment	Comply with General Permit	September 1, 2023*
Truckee River Sediment TMDL	Middle Truckee River Watershed	Sediment	Comply with General Permit	September 1, 2023*

⁵ Some of the TMDLs did not specifically state total concentrations for the constituents. Unless otherwise stated in Attachment H Table H-2, the pollutant should be reported in total concentrations.

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Santa Ana Regional Water Quality Control Board (Region 8)⁶

TMDL	Applicable Water Body/ Watershed	Pollutants	Additional TMDL-Related Numeric Action Level(s) or Numeric Effluent Limitation(s) (NAL/NEL)	Compliance Actions	Compliance Deadline <i>* Denotes Effective Date of this General Permit</i>
San Diego Creek and Newport Bay Nutrients TMDL	San Diego Creek, Newport Bay Watershed	Total Phosphorus	None	Comply with General Permit and the additional TMDL Requirements in Section I.D.2 below.	September 1, 2023*
San Diego Creek and Newport Bay Organochlorine Compounds TMDL	San Diego Creek Watershed	Total DDT and Toxaphene	None	Comply with General Permit and the additional Toxics TMDL Requirements in Section I.G.2 below.	September 1, 2023*
San Diego Creek and Newport Bay Organochlorine Compounds TMDL	Upper Newport Bay	Chlordane, Total DDT, and Total PCBs	None	Comply with General Permit and the additional Toxics TMDL Requirements in Section I.G.2 below.	September 1, 2023*

⁶ Some of the TMDLs did not specifically state total concentrations for the constituents. Unless otherwise stated in Attachment H Table H-2, the pollutant should be reported in total concentrations.

TMDL	Applicable Water Body/ Watershed	Pollutants	Additional TMDL-Related Numeric Action Level(s) or Numeric Effluent Limitation(s) (NAL/NEL)	Compliance Actions	Compliance Deadline <i>* Denotes Effective Date of this General Permit</i>
San Diego Creek and Newport Bay Organochlorine Compounds TMDL	Lower Newport Bay	Chlordane, Total DDT, and Total PCBs	None	Comply with General Permit and the additional Toxics TMDL Requirements in Section I.G.2 below.	September 1, 2023*
San Diego Creek and Newport Bay Sediment TMDL	Newport Bay/San Diego Creek Watershed	Sediment	None	Comply with General Permit	September 1, 2023*
San Diego Creek and Newport Bay Toxics TMDL	San Diego Creek Watershed	Total Cadmium	NAL of 0.0097 mg/L	Comply with General Permit and the additional Metals TMDL Requirements in Section I.G.3 below.	September 1, 2023*
San Diego Creek and Newport Bay Toxics TMDL	San Diego Creek Watershed	Total Copper	NAL of 0.027 mg/L	Comply with General Permit and the additional Metals TMDL Requirements in Section I.G.3 below.	September 1, 2023*

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TMDL	Applicable Water Body/ Watershed	Pollutants	Additional TMDL-Related Numeric Action Level(s) or Numeric Effluent Limitation(s) (NAL/NEL)	Compliance Actions	Compliance Deadline <i>* Denotes Effective Date of this General Permit</i>
San Diego Creek and Newport Bay Toxics TMDL	San Diego Creek Watershed	Total Lead	NAL of 0.194 mg/L	Comply with General Permit and the additional Metals TMDL Requirements in Section I.G.3 below.	September 1, 2023*
San Diego Creek and Newport Bay Toxics TMDL	San Diego Creek Watershed	Total Zinc	NAL of 0.21 mg/L	Comply with General Permit and the additional Metals TMDL Requirements in Section I.G.3 below.	September 1, 2023*
San Diego Creek and Newport Bay Toxics TMDL	Upper Newport Bay	Total Cadmium	NAL of 0.042 mg/L	Comply with General Permit and the additional Metals TMDL Requirements in Section I.G.3 below.	September 1, 2023*
San Diego Creek and Newport Bay Toxics TMDL	Upper Newport Bay	Total Copper	NAL of 0.00578 mg/L	Comply with General Permit and the additional Metals TMDL Requirements in Section I.G.3 below.	September 1, 2023*

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TMDL	Applicable Water Body/ Watershed	Pollutants	Additional TMDL-Related Numeric Action Level(s) or Numeric Effluent Limitation(s) (NAL/NEL)	Compliance Actions	Compliance Deadline <i>* Denotes Effective Date of this General Permit</i>
San Diego Creek and Newport Bay Toxics TMDL	Upper Newport Bay	Total Lead	NAL of 0.221 mg/L	Comply with General Permit and the additional Metals TMDL Requirements in Section I.G.3 below.	September 1, 2023*
San Diego Creek and Newport Bay Toxics TMDL	Upper Newport Bay	Total Zinc	NAL of 0.095 mg/L	Comply with General Permit and the additional Metals TMDL Requirements in Section I.G.3 below.	September 1, 2023*
San Diego Creek and Newport Bay Toxics TMDL	Lower Newport Bay, Bay Segments (including Costa Mesa Channel and Santa Ana Delhi Channel), and Rhine Channel Area	Total Copper	NAL of 0.00578 mg/L	Comply with General Permit and the additional Metals TMDL Requirements in Section I.G.3 below.	September 1, 2023*

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TMDL	Applicable Water Body/ Watershed	Pollutants	Additional TMDL-Related Numeric Action Level(s) or Numeric Effluent Limitation(s) (NAL/NEL)	Compliance Actions	Compliance Deadline <i>* Denotes Effective Date of this General Permit</i>
San Diego Creek and Newport Bay Toxics TMDL	Lower Newport Bay, Bay Segments (including Costa Mesa Channel and Santa Ana Delhi Channel), and Rhine Channel Area	Total Lead	NAL of 0.221 mg/L	Comply with General Permit and the additional Metals TMDL Requirements in Section I.G.3 below.	September 1, 2023*
San Diego Creek and Newport Bay Toxics TMDL	Lower Newport Bay, Bay Segments (including Costa Mesa Channel and Santa Ana Delhi Channel), and Rhine Channel Area	Total Zinc	NAL of 0.095 mg/L	Comply with General Permit and the additional Metals TMDL Requirements in Section I.G.3 below.	September 1, 2023*

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San Diego Regional Water Quality Control Board (Region 9)⁷

TMDL	Applicable Water Body/ Watershed	Pollutants	Additional TMDL-Related Numeric Action Level(s) or Numeric Effluent Limitation(s) (NAL/NEL)	Compliance Actions	Compliance Deadline <i>* Denotes Effective Date of this General Permit</i>
Chollas Creek Diazinon TMDL	Chollas Creek Watershed	Diazinon	None	Comply with General Permit and the use of Diazinon at the site is prohibited.	September 1, 2023*
Chollas Creek Metal TMDL	Chollas Creek	Dissolved Copper	Interim NAL of 0.083 mg/L	Comply with General Permit and the additional Toxics TMDL Requirements in Section I.G.3 below.	September 1, 2023*
Chollas Creek Metal TMDL	Chollas Creek	Dissolved Lead	Interim NAL of 0.068 mg/L	Comply with General Permit and the additional Toxics TMDL Requirements in Section I.G.3 below.	September 1, 2023*

⁷ Some of the TMDLs did not specifically state total concentrations for the constituents. Unless otherwise stated in Attachment H Table H-2, the pollutant should be reported in total concentrations.

TMDL	Applicable Water Body/ Watershed	Pollutants	Additional TMDL- Related Numeric Action Level(s) or Numeric Effluent Limitation(s) (NAL/NEL)	Compliance Actions	Compliance Deadline <i>* Denotes Effective Date of this General Permit</i>
Chollas Creek Metal TMDL	Chollas Creek	Dissolved Zinc	Interim NAL of 0.175 mg/L	Comply with General Permit and the additional Toxics TMDL Requirements in Section I.G.3 below.	September 1, 2023*
Chollas Creek Metal TMDL	Chollas Creek	Dissolved Copper	Final NEL of 0.083 mg/L	Comply with General Permit and the additional Toxics TMDL Requirements in Section I.G.4 below.	October 22, 2028
Chollas Creek Metal TMDL	Chollas Creek	Dissolved Lead	Final NEL of 0.068 mg/L	Comply with General Permit and the additional Toxics TMDL Requirements in Section I.G.4 below.	October 22, 2028
Chollas Creek Metal TMDL	Chollas Creek	Dissolved Zinc	Final NEL of 0.175 mg/L	Comply with General Permit and the additional Toxics TMDL Requirements in Section I.G.4 below.	October 22, 2028

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TMDL	Applicable Water Body/ Watershed	Pollutants	Additional TMDL- Related Numeric Action Level(s) or Numeric Effluent Limitation(s) (NAL/NEL)	Compliance Actions	Compliance Deadline <i>* Denotes Effective Date of this General Permit</i>
Los Peñasquitos Lagoon Sediment TMDL	Los Peñasquitos Lagoon Watershed	Sediment	None	Comply with General Permit and the additional Sediment TMDL Requirements in Section I.E.3 below.	July 14, 2034

EXHIBIT "C" (Stormwater Pollution Prevention Plan)

I. TOTAL MAXIMUM DAILY LOAD (TMDL) IMPLEMENTATION REQUIREMENTS

This Section contains the TMDL-specific requirements that Responsible Dischargers shall implement to comply with applicable TMDLs by the TMDL Compliance Deadline provided in Table H-2. The requirements in this Section are listed in order of pollutant category, whereas Table H-2 is organized by Regional Water Board jurisdiction and watershed. The terms including, but not limited to, Responsible Discharger, numeric action levels and exceedances, and numeric effluent limitations and exceedances, are defined in Attachment B, Glossary, of this General Permit.

I.A. Bacteria TMDL Implementation Requirements

I.A.1. Compliance with General Permit

All Responsible Dischargers for the Bacteria TMDLs listed in Table H-2 shall comply with the requirements of this General Permit.

I.A.2. Bacteria TMDL BMPs

I.A.2.a. Minimum BMPs

I.A.2.a.i. The Responsible Discharger that identifies on-site sources of indicator bacteria in their pollutant source assessment shall implement BMPs specific to preventing or controlling stormwater exposure to indicator bacteria in addition to complying with this General Permit's requirements. The minimum bacteria source control BMPs include the following:

1. Qualified SWPPP Practitioner-conducted training for construction site staff; and
2. Routine housekeeping and sanitary waste management of identified sources of bacteria (e.g., portable toilets, dumpsters, etc.).

I.A.2.b. Structural BMPs

The Responsible Discharger shall evaluate and implement any necessary structural BMPs designed for retention, infiltration, or diversion of stormwater when the implemented minimum BMPs are inadequate to reduce bacteria loading to receiving waters.

I.A.2.c. The Responsible Discharger shall ensure all BMPs are implemented and address Bacteria TMDL requirements. The BMPs shall be visually inspected, maintained, repaired, and kept updated in the SWPPP in accordance with General Permit requirements specified in the Order and applicable requirements in Attachments D or Attachment E (per project Risk or Type).

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I.B. Chloride and Salts TMDL Implementation Requirements

I.B.1. Compliance with this General Permit

All Responsible Dischargers for the Chloride and Salts TMDLs listed in Table H-2 shall comply with the requirements of this General Permit. Compliance with the requirements of this General Permit is consistent with the requirements and assumptions of the Chloride and Salts TMDL(s), unless specified below.

I.B.2. Numeric Action Level

- I.B.2.a. The Responsible Discharger shall implement BMPs to address chloride and salts and prevent exceedances of the applicable numeric action levels to the extent possible. The BMPs shall be visually inspected, maintained, repaired, and updated in the SWPPP in accordance with this General Permit's requirements specified in the Order and applicable requirements in Attachments D or E for the site's Risk or Type.
- I.B.2.b. The Responsible Discharger shall conduct non-visible pollutant monitoring, as required in Attachment D or E Section III.D.3, when the TMDL-specific pollutant may be discharged due to a failure to implement BMPs, a container spill or leak, or a BMP breach, failure, or malfunction.
- I.B.2.c. The Responsible Discharger shall compare the non-visible pollutant monitoring analytical results to the applicable numeric action level(s) in Table H-2.
- I.B.2.d. The Responsible Discharger shall certify and submit all analytical results in SMARTS within 30 days of receiving the results, or within 10 days of receiving results above an applicable numeric action level.
- I.B.2.e. A TMDL-related numeric action level exceedance occurs on the second, and each subsequent, analytical result for samples taken from any and all discharge location(s) within the same drainage area, during the same reporting year and taken in accordance with Attachment D or E Section III.D.3, that is above the concentration set forth in the applicable numeric action level. A numeric action level exceedance is not a violation of this General Permit; however, it is a violation when the discharger fails to report and respond to the numeric action level exceedance(s).
- I.B.2.f. The Regional Water Boards may assign additional monitoring, reporting, and BMP requirements upon obtaining site-specific information, including information about numeric action level exceedance(s).

I.C. Diazinon TMDL Implementation Requirements

I.C.1. Compliance with this General Permit

All Responsible Dischargers for the Diazinon TMDLs listed in Table H-2 shall comply with the requirements of this General Permit. Compliance with the requirements of this General Permit is consistent with the requirements and

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assumptions of the TMDL. The use of diazinon has been banned for non-agricultural use by the California Department of Pesticide Regulation and the use is prohibited at construction sites.

I.D. Nutrient TMDL Implementation Requirements

I.D.1. Compliance with this General Permit

All Responsible Dischargers for the Nutrient TMDLs listed in Table H-2 shall comply with the requirements of this General Permit.

I.D.2. Erosion and Sediment Control and RUSLE2⁸ Modeling

I.D.2.a A Responsible Discharger that identifies on-site sources of nutrients in their pollutant source assessment and that were assigned a mass-based waste load allocation in an applicable Nutrient TMDL(s),⁹ shall address the TMDL through the following in addition to complying with this General Permit:

- i. Comply with the site-specific erosion and sediment control, post-construction, and all other requirements in this General Permit;
- ii. Install erosion and sediment controls that will result in predicted erosion rates that are equal to pre-construction conditions (e.g., undisturbed vegetation for the area) for each phase of the construction project; and
- iii. Use RUSLE2 modeling to calculate the predicted soil losses and sediment delivery rates when selecting temporary BMPs and controls to be applied during each phase of the project. The RUSLE2 modeling included in the SWPPP shall include:
 1. Appropriate climatic variables, soil types, and slope topography for the area disturbed; and
 2. Calculated soil loss and sediment delivery rates for the selected BMPs and controls equal to, or less than, the soil loss and sediment delivery rates for pre-construction conditions during each phase of the construction project.

I.D.3. Numeric Action Level

I.D.3.a. The Responsible Discharger shall implement BMPs to address nutrients listed in the TMDL and prevent exceedances of the applicable numeric action levels to the extent possible. The BMPs shall be visually inspected, maintained, repaired, and updated in the SWPPP in accordance with this General Permit's

⁸ Revised Universal Soil Loss Equation, Version 2

⁹ Table H-2 specifies this section in the Compliance Action column for these TMDLs.

requirements specified in the Order and applicable requirements in Attachments D or E for the site's Risk or Type.

- I.D.3.b. The Responsible Discharger shall conduct non-visible pollutant monitoring, as required in Attachment D or E Section III.D.3, when the TMDL-specific pollutant may be discharged due to a failure to implement BMPs, a container spill or leak, or a BMP breach, failure, or malfunction.
- I.D.3.c. The Responsible Discharger shall compare the non-visible pollutant monitoring analytical results to the applicable numeric action level(s) in Table H-2.
- I.D.3.d. The Responsible Discharger shall certify and submit all analytical results in SMARTS within 30 days of receiving the results, or within 10 days of receiving results above an applicable numeric action level.
- I.D.3.e. A TMDL-related numeric action level exceedance occurs on the second, and each subsequent, analytical result for samples taken from any and all discharge location(s) within the same drainage area, during the same reporting year and taken in accordance with Attachment D or E Section III.D.3, that is above the concentration set forth in the applicable numeric action level. A numeric action level exceedance is not a violation of this General Permit; however, it is a violation when the discharger fails to report and respond to the numeric action level exceedance(s).
- I.D.3.f. The Regional Water Boards may assign additional monitoring, reporting, and BMP requirements upon obtaining site-specific information, including information about the numeric action level exceedance(s).
- I.D.4. Numeric Effluent Limitation
 - I.D.4.a. The Responsible Discharger shall implement BMPs to address nutrients and prevent exceedances of the applicable numeric effluent limitations. The BMPs shall be visually inspected, maintained, repaired, and updated in the SWPPP in accordance with this General Permit's requirements specified in the Order and applicable requirements in Attachments D or E for the site's Risk or Type.
 - I.D.4.b. The Responsible Discharger shall conduct non-visible pollutant monitoring, as required in Attachment D or E Section III.D.3, when the TMDL-specific pollutant may be discharged due to a failure to implement BMPs, a container spill or leak, or a BMP breach, failure, or malfunction.
 - I.D.4.c. The Responsible Discharger shall compare the non-visible pollutant monitoring analytical results to the applicable numeric effluent limitation(s) in Table H-2.
 - I.D.4.d. The Responsible Discharger shall certify and submit the analytical results in SMARTS within 30 days of receiving the results, or within 10 days of receiving results above an applicable numeric effluent limitation.

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- I.D.4.e. A TMDL-related numeric effluent limitation exceedance occurs on the second, and each subsequent, analytical result for samples taken from any and all discharge location(s) within the same drainage area, during the same reporting year and taken in accordance with Attachment D or E Section III.D.3, that is above the concentration set forth in the applicable numeric effluent limitation. Upon exceedance of the applicable numeric effluent limitation, the Responsible Discharger shall comply with the Water Quality Based Corrective Actions in Section VI.Q of this General Permit's Order. A numeric effluent limitation exceedance is a violation of this General Permit and is subject to mandatory minimum penalties.
- I.D.4.f. The Regional Water Boards may assign additional monitoring, reporting, and BMP requirements upon obtaining site-specific information, including information about exceedances of the numeric effluent limitation(s).

I.E. Sediment TMDL Implementation Requirements

I.E.1. Compliance with this General Permit

All Responsible Dischargers for the Sediment TMDLs listed in Table H-2 are to comply with the requirements of this General Permit. Compliance with the requirements of this General Permit is consistent with the requirements and assumptions of the Sediment TMDLs, unless specified below.

I.E.2. Erosion and Sediment Control BMPs and RUSLE2 Modeling

I.E.2.a. A Responsible Discharger assigned a mass-based sediment waste load allocation for sediment shall address the TMDL through the following in addition to complying with this General Permit:

- I.E.2.a.i. Comply with the site-specific erosion and sediment control, post-construction, and all other requirements in this General Permit; and
- I.E.2.a.ii. Use RUSLE2 modeling to calculate the predicted soil losses and sediment delivery rates when selecting temporary BMPs and controls to be applied during each phase of the project. The RUSLE2 modeling included in the SWPPP shall include:
 - 1. Appropriate climatic variables, soil types, and slope topography for the area disturbed; and
 - 2. Calculated soil loss and sediment delivery rates for the selected BMPs and controls equal to, or less than, the soil loss and sediment delivery rates for pre-construction conditions during each phase of the construction project.

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- I.E.2.a.iii. A Responsible Discharger that is assigned a mass-based sediment waste load allocation of zero (0),¹⁰ shall install erosion and sediment controls that will result in predicted erosion rates that are as protective as pre-construction conditions (e.g., undisturbed vegetation for the area). The calculated RUSLE2 soil loss and sediment delivery rates for the selected BMPs and controls shall be equal to, or less than, the soil loss and sediment delivery rates for pre-construction conditions during each phase of the construction project.
- I.E.2.a.iv. A Responsible Discharger that is assigned a site-specific mass-based sediment waste load allocation,¹¹ shall install erosion and sediment controls that will result in predicted erosion rates that are equal to or less than the site-specific allocation for sediment loading. The calculated RUSLE2 soil loss and sediment delivery rates for the selected BMPs and controls shall be equal to, or less than, the site-specific mass-based sediment waste load allocation. The Responsible Discharger is required to calculate their site-specific mass-based sediment waste load allocation by multiplying the construction site's area by the water body's applicable load allocation, provided in Table H-3.

Table H-3: TMDL Watersheds with Site-Specific Mass-Based Sediment Waste Load Allocations¹²

TMDL Watershed	Waste Load Allocation (tons/mi ² /yr)
Lower Eel River Watershed (Road, Episodic) ¹³	9
Lower Eel River Watershed (Road, Chronic)	17
Lower Eel River Watershed (Bank Erosion)	6
Middle Fork Eel River – Black Butte Subwatershed	7
Middle Fork Eel River – Elk Creek Subwatershed	41
Middle Fork Eel River – Round Valley Subwatershed	9
Middle Fork Eel River – Upper Middle Fork Subwatershed	9
Middle Fork Eel River – Williams/Thatcher Subwatershed	19
Middle Fork Eel River Watershed	23
Upper Main Eel River Watershed (Large Features >3,000 yds ³)	36
Upper Main Eel River Watershed (Road Related – Small Features)	14
Mad River Watershed (Roads)	174

10 Table H-2 specifies this section in the Compliance Action column for these TMDLs.

11 Table H-2 specifies this section in the Compliance Action column for these TMDLs.

12 More information for specific TMDL watersheds and site-specific mass-based sediment TMDLs can be found in Section W.6.e of this General Permit's Fact Sheet.

13 Some waste load allocations may only apply to certain projects (e.g., roads, along banks, small or large features). Waste load allocations that only apply to certain projects are noted in parentheses.

TMDL Watershed	Waste Load Allocation (tons/mi²/yr)
Scott River Watershed (Roads and Small Streamside Features)	69
Trinity River – Upper Area Reference Subwatersheds ¹⁴	281
Trinity River – Westside Tributaries Subwatershed	105
Trinity River – Upper Trinity Subwatershed	690
Trinity River – East Fork Tributaries Subwatershed	65
Trinity River – Eastside Tributaries Subwatershed	60
Trinity River – Weaver and Rush Creeks Subwatershed	169
Trinity River – Deadwood Creek, Hoadley Gulch, and Poker Bar Area Subwatershed	68
Trinity River – Lewiston Lake Area Subwatershed	49
Trinity River – Grass Valley Creek Subwatershed	44
Trinity River – Indian Creek Subwatershed	81
Trinity River – Reading and Browns Creek Subwatershed	66
Trinity River – Lower Middle Area Reference Subwatersheds ¹⁵	24
Trinity River – Canyon Creek Subwatershed	326
Trinity River – Upper Tributaries Subwatershed	67
Trinity River – Middle Tributaries Subwatershed	53
Trinity River – Lower Tributaries Subwatershed	55
Trinity River – Lower Area Reference Subwatersheds ¹⁶	528
Trinity River – Mill Creek and Tish Tang Subwatershed	210
Trinity River – Willow Creek Subwatershed	94
Trinity River – Campbell Creek and Supply Creek Subwatershed	1961
Trinity River – Lower Mainstem Area and Coon Creek Subwatershed	63

I.E.3. Los Peñasquitos Lagoon Sediment TMDL

- I.E.3.a. All Responsible Dischargers for the Los Peñasquitos Lagoon Sediment TMDL shall provide an estimate of the representative flow rate of discharge from the construction project for at least one precipitation event each reporting year, in addition to complying with this General Permit.
- I.E.3.b. The Responsible Discharger shall submit the representative flow estimate as a PDF attachment to the Annual Report (due in SMARTS no later than September 1 of each year).

14 Stuarts Fork, Swift Creek, and Coffee Creek

15 New River, Big French, Manzanita, North Fork, East Fork, North Fork

16 Horse Linto Creek

I.F. Temperature TMDL Implementation Requirements

I.F.1. Compliance with this General Permit

All Responsible Dischargers for the Temperature TMDLs listed in Table H-2 shall comply with the requirements of this General Permit. Compliance with this General Permit is consistent with the requirements and assumptions of the North Coast Temperature TMDL Implementation Policy and no additional requirements are incorporated into this General Permit to implement Temperature TMDLs listed in Table H-2.

I.G. Metals and Toxics TMDL Implementation Requirements

I.G.1. Compliance with this General Permit

All Responsible Dischargers for the Metals or Toxics TMDLs listed in Table H-2 shall comply with the requirements of this General Permit. Compliance with the requirements of this General Permit is consistent with the requirements and assumptions of the Metals or Toxics TMDLs, unless specified below.

I.G.2. Erosion and Sediment Control BMPs and RUSLE2 Modeling

I.G.2.a. A Responsible Discharger that identifies on-site sources of metals or toxics in their pollutant source assessment and are assigned a mass-based waste load allocation, shall address the TMDL through the following in addition to complying with this General Permit:

- i. Comply with the site-specific erosion and sediment control, post-construction, and all other requirements in this General Permit;
- ii. Install erosion and sediment controls that will result in predicted erosion rates that are as protective as pre-construction conditions (e.g., undisturbed vegetation for the area) for each phase of the construction project; and
- iii. Use RUSLE2 modeling to calculate the predicted soil losses and sediment delivery rates when selecting temporary BMPs and controls to be applied during each phase of the project. The RUSLE2 modeling included in the SWPPP shall include:
 1. Appropriate climatic variables, soil types, and slope topography for the area disturbed; and
 2. Calculated soil loss and sediment delivery rates for the selected BMPs and controls equal to, or less than, the soil loss and sediment delivery rates for pre-construction conditions during each phase of the construction project.

I.G.3. Numeric Action Level

I.G.3.a. The Responsible Discharger shall implement BMPs to address the metals or toxics listed in the TMDL and prevent exceedances of the applicable numeric

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action levels to the extent possible. The BMPs shall be visually inspected, maintained, repaired, and updated in the SWPPP in accordance with this General Permit's requirements specified in the Order and applicable requirements in Attachments D or E for the site's Risk or Type.

- I.G.3.b. The Responsible Discharger shall conduct non-visible pollutant monitoring, as required in Attachment D or E Section III.D.3, when the TMDL-specific pollutant may be discharged due to a failure to implement BMPs, a container spill or leak, or a BMP breach, failure, or malfunction.
- I.G.3.c. The Responsible Discharger shall compare the non-visible pollutant monitoring analytical results to the applicable numeric action level(s) in Table H-2. The Responsible Discharger may provide the Water Boards adequate information demonstrating that it is infeasible to analyze the samples for compliance with a numeric action level using an ELAP-accredited laboratory for methods compliant with 40 Code of Federal Regulations Part 136. The Water Boards will specify the appropriate monitoring methods to determine compliance if it is demonstrated that it is infeasible to analyze samples for compliance with a numeric effluent limitation.
- I.G.3.d. The Responsible Discharger shall certify and submit all analytical results in SMARTS within 30 days of receiving the results, or within 10 days of receiving results above an applicable numeric action level.
- I.G.3.e. A TMDL-related numeric action level exceedance occurs on the second, and each subsequent, analytical result for samples taken from any and all discharge location(s) within the same drainage area, during the same reporting year and taken in accordance with Attachment D or E Section III.D.3, that is above the concentration set forth in the applicable numeric action level. A numeric action level exceedance is not a violation of this General Permit; however, it is a violation when the discharger fails to report and respond to the numeric action level exceedance(s).
- I.G.3.f. The Regional Water Boards may assign additional monitoring, reporting, and BMP requirements upon obtaining site-specific information, including information about the numeric action level exceedance(s).
- I.G.4. Numeric Effluent Limitation
 - I.G.4.a. The Responsible Discharger shall implement BMPs to address the metals or toxics listed in the TMDL and prevent exceedances of the applicable numeric effluent limitations. The BMPs shall be visually inspected, maintained, repaired, and updated in the SWPPP in accordance with this General Permit's requirements specified in the Order and applicable requirements in Attachments D or E for the site's Risk Level or Type.
 - I.G.4.b. The Responsible Discharger shall conduct non-visible pollutant monitoring, as required in Attachment D or E Section III.D.3, when the TMDL specific pollutant

may be discharged due to a failure to implement BMPs, a container spill or leak, or a BMP breach, failure, or malfunction.

- I.G.4.c. The Responsible Discharger shall compare the non-visible pollutant monitoring analytical results to the applicable numeric effluent limitation(s) in Table H-2. The Responsible Discharger may provide the Water Boards information demonstrating that it is infeasible to analyze the samples for compliance with a numeric effluent limitation using an ELAP-accredited laboratory for methods compliant with 40 Code of Federal Regulations Part 136. The Water Boards will specify the appropriate monitoring methods to determine compliance if it is demonstrated that it is infeasible to analyze samples for compliance with a numeric effluent limitation. See the TMDL-related soil screening investigation and associated total suspended solids (TSS) numeric effluent limitations for the Los Angeles Area Lakes TMDL and the Los Angeles and Long Beach Harbor Waters TMDL in Section I.G.5 below, if applicable.
- I.G.4.d. The Responsible Discharger shall certify and submit the analytical results in SMARTS within 30 days of receiving the results, or within 10 days of receiving results above an applicable numeric effluent limitation.
- I.G.4.e. A TMDL-related numeric effluent limitation exceedance occurs on the second, and each subsequent, analytical result for samples taken from any and all discharge location(s) within the same drainage area, during the same reporting year and taken in accordance with Attachment D or E Section III.D.3, that is above the concentration set forth in the applicable numeric effluent limitation. Upon exceedance of the applicable numeric effluent limitation, the Responsible Discharger shall comply with the Water Quality Based Corrective Actions in Section VI.Q of this General Permit's Order. A numeric effluent limitation exceedance is a violation of this General Permit and is subject to mandatory minimum penalties.
- I.G.4.f. The Regional Water Boards may assign additional monitoring, reporting, and BMP requirements upon obtaining site-specific information, including information about exceedances of the numeric effluent limitation(s).
- I.G.5. TMDL-related Soil Screening Investigation and Associated TSS Numeric Effluent Limitations
 - I.G.5.a. To comply with the Los Angeles Area Lakes TMDL for chlordane, DDT, dieldrin, and PCBs and, beginning March 23, 2032, the Los Angeles and Long Beach Harbor Waters TMDL for copper, lead, and zinc, dischargers that discharge to: 1) Peck Road Park Lake, Echo Park Lake, or Puddingstone Reservoir; or 2) Dominguez Channel or Torrance Lateral Channel shall use the following soil screening investigation as part of their pollutant source assessment and comply with the numeric effluent limitation for TSS, if applicable. As set forth in Order, Section VI.O.4, this General Permit may be reopened prior to March 23, 2032,

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to revise the requirements implementing the Los Angeles and Long Beach Harbor Waters TMDL for copper, lead, and zinc. As set forth in Order, Section VI.O.5, this General Permit may be reopened to revise the requirements implementing the Los Angeles Lakes TMDL for chlordane, DDT, dieldrin, and PCBs at a publicly noticed Board meeting.

- I.G.5.a.i. The discharger shall conduct a soil screening investigation as part of the pollutant source assessment, prior to initiation of land disturbance activities at the site, to determine whether subsequent numeric effluent limitation sampling is required. The soil screening investigation shall be conducted by, or under the direction of, a California Professional Engineer (PE), California Professional Geologist (PG), or Qualified SWPPP Developer (QSD).
- I.G.5.a.ii. Soil Sampling Locations¹⁷
 - I.G.5.a.ii.1. The discharger shall determine sampling plots by graphically applying a sampling grid with perpendicular line intersections to a map or other representation of the entire parcel or construction site. Each plot or block of the grid overlay must be sized in accordance with the scale specifications in Table H-4 below.

Table H-4: Soil Sampling Plot Specifications

Total Parcel or Site Area	>1 to 5 acres	>5 to 20 acres	>20 acres
Sampling Grid Scale	One-quarter acre	One-half acre	One acre

- I.G.5.a.ii.2. The discharger shall collect at least one soil sample from a randomly selected location within each sampling plot. To ensure randomness, each plot shall be further divided into nine equal subsections, each assigned a unique number from one to nine. The discharger shall use a random number generator to select which subsection will be sampled; the soil sample location may be anywhere within the selected subsection.
- I.G.5.a.iii. Soil Sample Collection
 - I.G.5.a.iii.1. The discharger may utilize hand sampling methods or devices such as mechanical or hydraulic earth drills to collect soil samples. Hand methods may be economically preferable as the required soil sample depths are less than two feet.
 - I.G.5.a.iii.2. The discharger shall obtain a three-point composite sample of in-situ soil, consisting of roughly equal volumes from 6 inches, 12 inches, and 18 inches

¹⁷ The sampling protocol was modified from United States Environmental Protection Agency [“Superfund Soil Screening Guidance”](#) and United States Department of Agriculture and Natural Resource Conservation Service [“Sampling Soils for Nutrient Management”](#).

below surface at each soil sample location. The listed depths are the 'start depths' or 'top depths' for each composite portion. Soil samples shall be obtained from below the grass or forb root zone if present. The total quantity of each soil sample shall be approximately 20 cubic inches of volume, or one pound (0.5 kilograms) by weight.

- I.G.5.a.iii.3. The discharger shall immediately seal brass or acrylic sampling tubes sealed with Teflon™ squares and plastic caps. Otherwise, soil samples shall be placed in 500 milliliter glass jars with tightly sealable caps.
- I.G.5.a.iii.4. The discharger shall label each soil sample with a unique identifier, the address or location of the site, the name of the person that collected the sample, and the collection date.
- I.G.5.a.iii.5. The Responsible Discharger shall maintain soil samples at a temperature of 4°Celsius until delivered to an ELAP-accredited analytical laboratory under chain-of-custody for analysis.

I.G.5.a.iv. Soil Sample Analysis

- I.G.5.a.iv.1. For total copper, total lead, and total zinc, the discharger shall use EPA method 6010D, 6020B, or a comparable method validated for the analysis of metals in soil samples. For chlordane, DDT, and dieldrin, the discharger shall use EPA method 8081B or a comparable method validated for the analysis of chlordane, DDT, and dieldrin in soil samples. For PCBs, the discharger shall use EPA method 8082A or a comparable method validated for the analysis of PCBs in soil samples.
- I.G.5.a.iv.2. The laboratory report must include the reporting limit for each analyte.

I.G.5.a.v. Soil Sample Reporting

The discharger shall submit soil sample analytical results via SMARTS prior to initiation of land disturbance activities.

I.G.5.a.vi. TSS Numeric Effluent Limitation

- I.G.5.a.vi.1. If all soil sample analysis results for each applicable TMDL analyte are below their respective analytical reporting limits, the discharger is not considered a Responsible Discharger and does not have to sample for the TMDL-specific pollutant(s) under the non-visible pollutant monitoring requirements in Attachments D or E Section III.D.3, of this General Permit.
- I.G.5.a.vi.2. If one or more of the specified TMDL analytes are measured above the respective analytical reporting limits, the discharger is considered a Responsible Discharger and shall:

- a. Implement sediment control BMPs that are effective at removing the applicable TMDL-specific pollutant, such as, but not limited to, media filter socks or fiber rolls, advanced silt fencing, and sedimentation

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basins. The BMPs shall be visually inspected, maintained, repaired, and updated in the SWPPP in accordance with this General Permit's requirements specified in the Order and applicable requirements in Attachments D or E for the site's Risk Level or Type.

- b. Comply with a TSS numeric effluent limitation of 100 mg/L, as follows:
 - i. Collect samples for TSS following the same procedure as non-visible pollutant monitoring, as required in Attachment D or E Section III.D.3, when the TMDL-specific pollutants may be discharged due to failure to implement BMPs, a container spill or leak, or a BMP breach, failure, or malfunction.
 - ii. Analyze the collected samples using the current version of Standard Method 2540 D.
 - iii. Compare the analytical results to a numeric effluent limitation of 100 mg/L of TSS¹⁸, as the applicable limitation for each of the applicable TMDL-specific pollutants identified in the soil screening investigation process described above.
 - iv. Certify and submit the analytical results in SMARTS within 30 days of receiving the results or within 10 days of receiving results above the numeric effluent limitation for TSS.

I.G.5.a.vi.3. A TMDL-related numeric effluent limitation exceedance occurs on the second, and each subsequent, analytical result for samples taken from any and all discharge location(s) within the same drainage area, during the same reporting year and taken in accordance with Attachment D or E Section III.D.3, that is above the concentration set forth in the numeric effluent limitation. For the second and each subsequent analytical result that is above the TSS numeric effluent limitation, the exceedance shall apply to every TMDL-specific pollutant identified in the soil screening investigation process, regardless of any results from the informational monitoring described in I.G.6 below. Upon exceedance of the numeric effluent limitation, the Responsible Discharger shall comply with the Water Quality Based Corrective Actions in Section VI.Q of this General Permit's Order. A

¹⁸ Nasrabadi T, Ruegner H, Schwientek M, Bennett J, Fazel Valipour S, Grathwohl P (2018) "Bulk metal concentrations versus total suspended solids in rivers: Time-invariant & catchment-specific relationships."

Washington Department of Ecology (2004) "A Total Maximum Daily Load Evaluation for Chlorinated Pesticides and PCBs in the Walla Walla River."

Angela Gorgoglione, Fabián A. Bombardelli, Bruno J. L. Pitton, Lorence R. Oki, Darren L. Haver and Thomas M. Young (2018), "Role of Sediments in Insecticide Runoff from Urban Surfaces: Analysis and Modeling."

numeric effluent limitation exceedance is a violation of this General Permit and is subject to mandatory minimum penalties.

- I.G.5.a.vi.4. The Regional Water Boards may require additional monitoring, reporting, and BMP requirements upon obtaining site-specific information, including information about exceedances of the numeric effluent limitation.
- I.G.6. Water Quality Sampling for Los Angeles and Long Beach Harbor Waters Metals TMDL starting March 23, 2032

This General Permit implements TSS numeric effluent limitations as a surrogate for limiting discharges of sediment-bound total copper, total lead, and total zinc. Starting March 23, 2032, to correlate and quantify actual discharges of copper, lead, and zinc concentrations in construction stormwater discharges with measured discharge concentrations of TSS, the Responsible Dischargers for the Los Angeles and Long Beach Harbor Waters Metals TMDL, as determined by Section I.G.5 above, shall:

- a. Collect effluent water quality samples following the same procedure as non-visible pollutant monitoring, as required in Attachment D or E Section III.D.3, when the pollutants may be discharged due to failure to implement BMPs, a container spill or leak, or a BMP breach, failure, or malfunction.
- b. Analyze the collected samples for total copper, total lead, and total zinc, using an ELAP-accredited laboratory for methods compliant with 40 Code of Federal Regulations Part 136.
- c. Certify and submit the analytical results in SMARTS within 30 days of receiving the results.
- d. The analytical results are informational only and will not be used to assess compliance with any limitation in this General Permit.

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ATTACHMENT I

**REQUIREMENTS FOR DISCHARGERS GRANTED A REGULATORY EXCEPTION
FOR DISCHARGES TO AREAS OF SPECIAL BIOLOGICAL SIGNIFICANCE**

**NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES)
GENERAL PERMIT FOR STORMWATER DISCHARGES ASSOCIATED
WITH CONSTRUCTION AND LAND DISTURBANCE ACTIVITIES
(GENERAL PERMIT)**

A. AREAS OF SPECIAL BIOLOGICAL SIGNIFICANCE

- A.1. Areas of Special Biological Significance (ASBS) are defined in the Water Quality Control Plan for Ocean Waters of California (California Ocean Plan) as “those areas designated by the State Water Resources Control Board (State Water Board) as ocean areas requiring protection of species or biological communities to the extent that alteration of natural water quality is undesirable.”
- A.2. The California Ocean Plan prohibits the discharge of waste to an ASBS.
- A.3. The California Ocean Plan authorizes the State Water Board to grant an exception to California Ocean Plan provisions where the Board determines that the exception will not compromise protection of ocean waters for beneficial uses and the public interest will be served.
- A.4. On March 20, 2012, the State Water Board adopted Resolution 2012-0012 (amended by Resolution 2012-0031) which contained a general exception to the California Ocean Plan for discharges of stormwater and non-point sources (ASBS Exception). This resolution also contains the Special Protections that are to be implemented for discharges directly to an ASBS. Resolution 2012-0012 (as amended by Resolution 2012-0031) is hereby incorporated by reference and construction stormwater dischargers discharging directly to an ASBS must comply with its requirements.
- A.5. This General Permit requires dischargers who have been granted a California Ocean Plan exception for discharges to an ASBS to comply with the requirements contained in the Special Protections. These requirements are contained below.

B. ASBS NON-STORMWATER DISCHARGES

- B.1. The term “ASBS Non-Stormwater Discharges” means any waste discharges from a municipal separate storm sewer system (MS4) or other NPDES permitted storm drain system to an ASBS that are not comprised entirely of stormwater.
- B.2. Only the following ASBS Non-Stormwater Discharges are allowed, provided that the discharges are essential for emergency response purposes, structural stability, slope stability, or occur naturally:
 - a. Discharges associated with emergency firefighting operations.
 - b. Foundation and footing drains.

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- c. Water from crawl space or basement pumps.
 - d. Hillside dewatering.
 - e. Naturally occurring groundwater seepage via a storm drain.
 - f. Non-anthropogenic flows from a naturally occurring stream via a culvert or storm drain, as long as there are no contributions of anthropogenic runoff.
- B.3. Authorized ASBS Non-Stormwater Discharges shall not cause or contribute to a violation of the water quality objectives in Chapter II of the California Ocean Plan nor alter natural ocean water quality in an ASBS.
- B.4. In the San Clemente Island ASBS, discharges incidental to military training and research, development, test, and evaluation operations are allowed. Discharges incidental to underwater demolition and other in-water explosions are not allowed in the two military closure areas in the vicinity of Wilson Cove and Castle Rock. Discharges must not result in a violation of the water quality objectives, including the protection of the marine aquatic life beneficial use, anywhere in the ASBS.
- B.5. In the San Nicolas Island and Begg Rock ASBS, discharges incidental to military research, development, testing, and evaluation of, and training with, guided missile and other weapons systems, fleet training exercises, small-scale amphibious warfare training, and special warfare training are allowed. Discharges incidental to underwater demolition and other in-water explosions are not allowed. Discharges must not result in a violation of the water quality objectives, including the protection of the marine aquatic life beneficial use, anywhere in the ASBS.

C. ASBS COMPLIANCE PLAN

- C.1. State Water Board Resolution 2012-0012 grants an exception to the California Ocean Plan's prohibition on discharges to an ASBS (ASBS Exception) to applicants who were identified as dischargers of construction stormwater to an ASBS (ASBS dischargers). Each ASBS discharger shall specifically address the prohibition of ASBS Non-Stormwater Discharges and the requirement to maintain natural water quality for construction stormwater discharges to an ASBS in an ASBS Compliance Plan to be included in the ASBS discharger's Stormwater Pollution Prevention Plan (SWPPP). The ASBS Compliance Plan is subject to approval by the Executive Director of the State Water Board. The ASBS Compliance Plan shall include:
- a. A map of surface drainage of stormwater runoff, showing areas of sheet runoff and priority discharges, and a description of any structural Best Management Practices (BMPs) already employed and/or BMPs to be employed in the future. Priority discharges are those that pose the greatest water quality threat, and which are identified as requiring installation of structural BMPs. The map shall also show the stormwater conveyances in relation to other features such as service areas, sewage conveyances and treatment facilities, landslides, areas prone to erosion, and waste and hazardous material storage areas, if applicable. The SWPPP shall also include a procedure for updating the map and plan when changes are made to the stormwater conveyance facilities.

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- b. A description of the measures by which all unauthorized ASBS Non-Stormwater Discharges (e.g., dry weather flows) has been eliminated, how these measures will be maintained over time, and how these measures are monitored and documented.
- c. A description of how pollutant reductions in stormwater runoff, that are necessary to comply with these special conditions, will be achieved through BMPs. Structural BMPs need not be installed if the discharger can document to the satisfaction of the Executive Director that such installation would pose a threat to health or safety. BMPs to control stormwater runoff discharges (at the end-of-pipe) during a design storm shall be designed to achieve on average the following target levels:
 - i. Instantaneous Maximum Water Quality Objectives in Table 1 (provided at the end of this Attachment); or
 - ii. A 90 percent reduction in pollutant loading during storm events, for the applicant's total discharges.
- d. A description of how the ASBS discharger will address erosion and the prevention of anthropogenic sedimentation in the ASBS. The natural habitat conditions in the ASBS shall not be altered as a result of anthropogenic sedimentation.
- e. A description of the non-structural BMPs currently employed and planned in the future (including those for construction activities), and an implementation schedule. The ASBS Compliance Plan shall also describe the structural BMPs, including any low impact development measures, currently employed and planned for higher threat discharges and include an implementation schedule. To control stormwater runoff discharges (at the end-of-pipe) during a design storm, ASBS dischargers must first consider using low impact development practices to infiltrate, use, or evapotranspiration stormwater runoff on-site. The BMPs and implementation schedule shall be designed to ensure that natural water quality conditions in the receiving water are achieved and maintained by either reducing flows from impervious surfaces or reducing pollutant loading, or some combination thereof.

D. REPORTING

If the results of the receiving water monitoring described in Section E below (Sampling and Analysis Requirements) indicate that the stormwater runoff is causing or contributing to an alteration of natural ocean water quality in the ASBS, the ASBS discharger shall submit a report to the State Water Board within 30 days of receiving the results.

- D.1. The report shall identify the constituents in stormwater runoff that alter natural ocean water quality and the sources of these constituents.
- D.2. The report shall describe BMPs that are currently being implemented, BMPs that are identified in the SWPPP for future implementation, and any additional BMPs

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that may be added to the SWPPP to address the alteration of natural water quality. The report shall include a new or modified implementation schedule for the BMPs.

- D.3. The ASBS discharger shall revise its ASBS Compliance Plan to incorporate any new or modified BMPs that have been or will be implemented, the implementation schedule, and any additional monitoring required within 30 days of the approval of the report by the Executive Director.
- D.4. The discharger does not have to repeat the same procedure for continuing or recurring exceedances of natural ocean water quality conditions due to the same constituent when the ASBS discharger is in compliance with the procedures described above and is implementing the revised SWPPP.
- D.5. Compliance with this Section does not excuse violations of any term, prohibition, or special condition contained in the Special Protections of the ASBS Exception.

E. SAMPLING AND ANALYSIS REQUIREMENTS

- E.1. Monitoring is mandatory for all ASBS dischargers to assure compliance with the California Ocean Plan. Monitoring requirements include both: (1) Core Discharge Monitoring and (2) Ocean Receiving Water Monitoring (see sections below). The State Water Board and Regional Water Quality Control Boards (Regional Water Boards) must approve sampling site locations and any adjustments to the monitoring programs. All ocean receiving water and reference area monitoring must be comparable with the Water Boards' Surface Water Ambient Monitoring Program (SWAMP).
- E.2. Sample locations and sampling periods must be determined considering safety issues. Sampling may be postponed upon notifying the State Water Board Executive Director or the appropriate Regional Water Board Executive Officer that hazardous conditions prevail.
- E.3. All constituents must be analyzed using the lowest minimum detection limits comparable to the California Ocean Plan water quality objectives and in compliance with U.S. EPA sufficiently sensitive method requirements in 40 Code of Federal Regulations Part 136. All samples being analyzed for metals (including stormwater effluent, reference samples, and ocean receiving water samples) must use an approved analytical method with the lowest minimum detection limits (currently Inductively Coupled Plasma/Mass Spectrometry) described in the California Ocean Plan.

F. CORE DISCHARGE MONITORING PROGRAM

- F.1. General Sampling Requirements for Timing and Storm Size

Runoff must be collected during a storm event that is greater than 0.1 inch and generates runoff, and at least 72 hours from the previously measurable storm event. Runoff samples shall be collected during the same storm and approximately at the same time as the post-storm receiving water and reference site samples being analyzed for the same constituents as described in Section G below.

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F.2. Runoff Samples – Storm Events

- F.2.a. For outfalls¹ equal to or greater than 18 inches (0.46 meter) in diameter or width, samples of stormwater runoff shall be:
- i. Collected during the same storm as receiving water samples and analyzed for oil and grease, total suspended solids, and, if within the range of the southern sea otter, indicator bacteria or some other measure of fecal contamination; and
 - ii. Collected and analyzed for critical life stage chronic toxicity (one invertebrate or algal species) at least once during each storm season when receiving water is sampled in the ASBS.
- F.2.b. For outfalls equal to or greater than 36 inches (0.91 meter) in diameter or width, samples of stormwater runoff shall be:
- i. Collected during the same storm as receiving water samples and analyzed for turbidity, pH, and, if within the range of the southern sea otter, indicator bacteria or some other measure of fecal contamination;
 - ii. Collected during the same storm as receiving water samples and analyzed for the metals in Table 1 (provided at the end of this Attachment) for protection of marine life, California Ocean Plan polynuclear aromatic hydrocarbons (PAHs), currently used pesticides (pyrethroids and organophosphate pesticides), and nutrients (ammonia, nitrate, and phosphates); and
 - iii. Collected and analyzed for critical life stage chronic toxicity (one invertebrate or algal species) at least once during each storm season when receiving water is sampled in the ASBS.
- F.2.c. If an ASBS discharger has no outfall greater than 36 inches, then stormwater runoff from the discharger's largest outfall shall be further collected during the same storm as receiving water samples and analyzed for the metals in Table 1 (provided at the end of this Attachment) for protection of marine life, California Ocean Plan polynuclear aromatic hydrocarbons (PAHs), current use pesticides (pyrethroids and organophosphate pesticides), and nutrients (ammonia, nitrate, and phosphates).
- F.2.d. For a General Permit applicant not participating in a regional integrated monitoring program (see below in Section G.3), in addition to the sampling requirements in Section F.2.a and b above, a minimum of the two largest outfalls or 20 percent of the larger outfalls, whichever is greater, shall be sampled (flow weighted composite samples) at least three times annually during wet weather (storm event) and analyzed for all Table 2 constituents, Table 1 constituents (Table 1 and 2 constituents are provided at the end of this Attachment) for marine aquatic life protection (except for toxicity, only chronic toxicity for three

¹ Outfalls mean a discharge location, including, but not limited to pipes, ditches, swales, and other points of concentrated flow.

species shall be required), dichlorodiphenyltrichloroethane (DDT), polychlorinated biphenyls (PCBs), California Ocean Plan PAHs, organophosphate pesticides, pyrethroids, nitrates, phosphates, and California Ocean Plan indicator bacteria. For parties discharging to an ASBS in more than one Regional Water Board region, at a minimum, one (the largest) such discharge shall be sampled annually in each region.

- F.2.e. The Executive Director may reduce or suspend core monitoring once the storm runoff is fully characterized. This determination may be made at any point after the discharge is fully characterized but is best made after the monitoring results from the first permit cycle are assessed.

G. OCEAN RECEIVING WATER AND REFERENCE AREA MONITORING PROGRAM

- G.1. All ASBS dischargers must perform ocean receiving water monitoring in addition to performing the Core Discharge Monitoring Program in Section F above. ASBS dischargers may choose either: (1) an individual monitoring program, or (2) participation in a regional integrated monitoring program to fulfill the requirements for monitoring the physical, chemical, and biological characteristics of the ocean receiving waters within their ASBS.

G.2. Individual Monitoring Program

- G.2.a. The requirements listed below are for those ASBS dischargers who elect to perform an individual monitoring program to fulfill the requirements for monitoring the physical, chemical, and biological characteristics of the ocean receiving waters within the affected ASBS. In addition to Core Discharge Monitoring, the following additional monitoring requirements shall be met.

- G.2.a.i. The receiving water at the point of discharge from the outfalls described in Section F.2 above shall be: sampled three times annually during wet weather (storm events); analyzed for Table 1 constituents and Table 2 constituents (provided at the end of this Attachment) for marine aquatic life, DDT, PCBs, California Ocean Plan PAHs, organophosphate pesticides, pyrethroids, nitrates, phosphates, salinity, chronic toxicity (three species), and California Ocean Plan indicator bacteria.

- G.2.a.ii. The sample location for the ocean receiving water shall be in the surf zone at the point of discharges; this must be at the same location where stormwater runoff is sampled. Receiving water shall be sampled prior to (pre-storm), and during (or immediately after) the same storm (post-storm). Post-storm sampling shall be representative of the same storm and at approximately the same time as when the runoff is sampled. Reference water quality shall also be sampled three times annually and analyzed for the same constituents as the pre-storm and post-storm sampling, during the same storm seasons when receiving water is sampled. Reference stations will be determined by the State Water Board, Division of Water Quality staff and applicable Regional Water Board(s) staff.

- G.2.a.iii. The sediment sampling shall occur at least three times during every five-year period. The subtidal sediment (sand or finer, if present) at the discharge shall be sampled and analyzed for Table 1 constituents (provided at the end of this Attachment) for marine aquatic life, DDT, PCBs, PAHs, pyrethroids, and organophosphate pesticides. Only an acute toxicity test using the amphipod *Eohaustorius estuarius* must be performed for sediment toxicity testing.
- G.2.a.iv. A quantitative survey of intertidal benthic marine life shall be performed at the discharge and reference site(s). The survey shall be performed at least once during every five-year period. The survey design is subject to approval by the Regional Water Board and the State Water Board's Division of Water Quality. The results of the survey shall be completed and submitted to the State Water Board and Regional Water Board at least six months prior to the end of the permit cycle.
- G.2.a.v. A bioaccumulation study shall be conducted to determine the concentrations of metals and synthetic organic pollutants at representative discharge and reference sites once during each five-year period. The study design is subject to approval by the Regional Water Board and the State Water Board's Division of Water Quality. The bioaccumulation study may include California mussels (*Mytilus californianus*) and/or sand crabs (*Emerita analoga* or *Blepharipoda occidentalis*). Based on the study results, the Regional Water Board and the State Water Board's Division of Water Quality, may adjust the study design in subsequent permits, add or modify additional test organisms (such as shore crabs or fish), or modify the study design appropriate for the area and best available sensitive measures of contaminant exposure.
- G.2.a.vi. Representative quantitative observations for debris/trash by type and source shall be performed along the coast of the ASBS within the influence of the ASBS discharger's outfall(s). The design, including locations and frequency, of the trash/debris observations is subject to approval by the Regional Water Board and State Water Board's Division of Water Quality.
- G.2.a.vii. The monitoring requirements of this section G.2. Individual Monitoring Program, are minimum requirements. After a minimum of one year of continuous water quality monitoring of the discharges and ocean receiving waters, the Executive Director of the State Water Board may require additional monitoring, or adjust, reduce, or suspend receiving water and reference station monitoring. This determination may be made at any point after the discharge and receiving water is fully characterized but is best made after the monitoring results from the first permit cycle are assessed.

G.3. Regional Integrated Monitoring Program

- G.3.a. An ASBS discharger may elect to participate in a regional integrated monitoring program, in lieu of an individual monitoring program, to fulfill the requirements for monitoring the physical, chemical, and biological characteristics of the ocean receiving waters within their ASBS. This regional approach shall characterize natural water quality, pre- and post-storm, in-ocean reference areas near the mouths of identified open space watersheds and the effects of the discharges on

natural water quality (physical, chemical, and toxicity) in the ASBS receiving waters, and should include benthic marine aquatic life and bioaccumulation components. The design of the ASBS stratum of a regional integrated monitoring program may deviate from the otherwise required individual monitoring program approach (Section G.2 of this Attachment) if approved by the State Water Board's Executive Director and/or the applicable Regional Water Board(s) Executive Officer(s).

- G.3.b. Ocean reference areas shall be located at the drainages of flowing watersheds with minimal development (in no instance more than 10 percent development) and shall not be located in Clean Water Act § 303(d) listed waterbodies or have tributaries that are 303(d) listed. Reference areas shall be free of wastewater discharges and anthropogenic non-stormwater runoff. A minimum of low threat stormwater runoff discharges (e.g., stream highway overpasses and campgrounds) may be approved by the Regional Water Board(s) Executive Officer(s) and the State Water Board Executive Director on a case-by-case basis. Reference areas shall be located in the same region as where the ASBS receiving water monitoring occurs. The reference areas for each region are subject to approval by the participants in the regional integrated monitoring program, the State Water Board Executive Director, and the applicable Regional Water Board(s) Executive Officer(s). A minimum of three ocean reference water samples must be collected from each station, each from a separate storm during the same storm season that receiving water is sampled. A minimum of one reference location shall be sampled for each ASBS receiving water site sampled per responsible party. For parties discharging to an ASBS in more than one Regional Water Board region, at a minimum, one reference station and one receiving water station shall be sampled in each region.
- G.3.c. The ASBS ocean receiving water must be sampled in the surf zone at the location where the runoff makes contact with ocean water (i.e., at "point zero"). Ocean receiving water stations must be representative of worst-case discharge conditions (i.e., co-located at a large drain greater than 36 inches, or if drains greater than 36 inches are not present in the ASBS then the largest drain greater than 18 inches.) Ocean receiving water stations are subject to approval by the participants in the regional monitoring program and the State Water Board Executive Director and the applicable Regional Water Board(s) Executive Officer(s). A minimum of three ocean receiving water samples must be collected during each storm season from each station, each from a separate storm. A minimum of one receiving water location shall be sampled in each ASBS per responsible party in that ASBS. For parties discharging to an ASBS in more than one Regional Water Board region, at a minimum, one reference station and one receiving water station shall be sampled in each region.

- G.3.d. Reference and receiving water sampling shall commence during the first full storm season following the adoption of these special conditions, and post-storm samples shall be collected during the same storm event when stormwater runoff is sampled. Sampling shall occur in a minimum of two storm seasons. Sampling may be limited to only one storm season for ASBS dischargers that have already

participated in the Southern California Bight 2008 ASBS regional monitoring effort.

- G.3.e. Receiving water and reference samples shall be analyzed for the same constituents as stormwater runoff samples. At a minimum, constituents to be sampled and analyzed in reference and discharge receiving waters must include turbidity, pH, Table 1 metals (provided at the end of this Attachment) for protection of marine life, California Ocean Plan PAHs, pyrethroids, organophosphate pesticides, ammonia, nitrate, phosphates, and critical life stage chronic toxicity for three species. In addition, within the range of the southern sea otter, indicator bacteria or some other measure of fecal contamination shall be analyzed. The following flowchart depicts how a discharger determines if their discharge is in compliance with natural water quality.

EXHIBIT "C" (Stormwater Pollution Prevention Plan)

Flowchart to Determine Compliance with Natural Water Quality

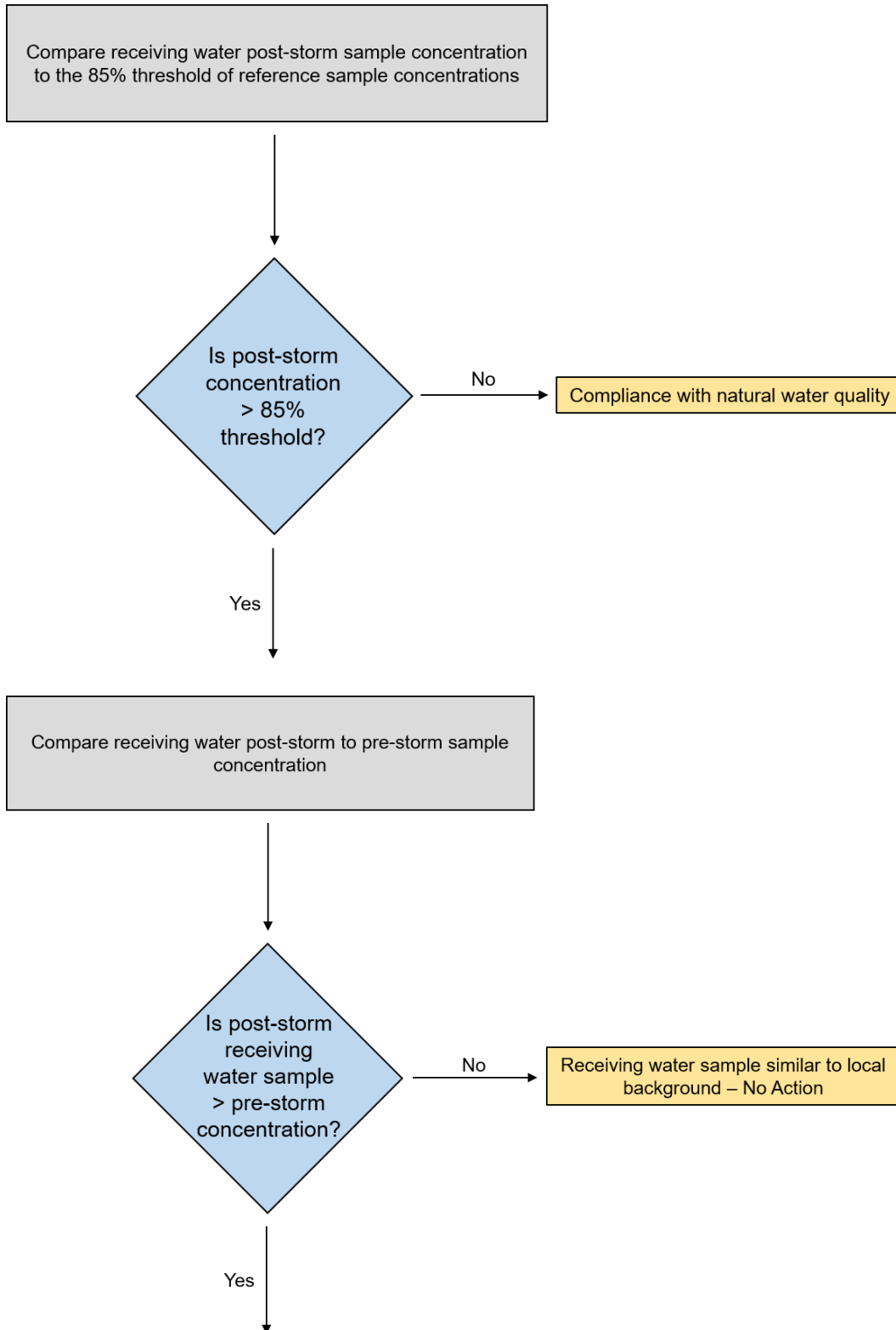


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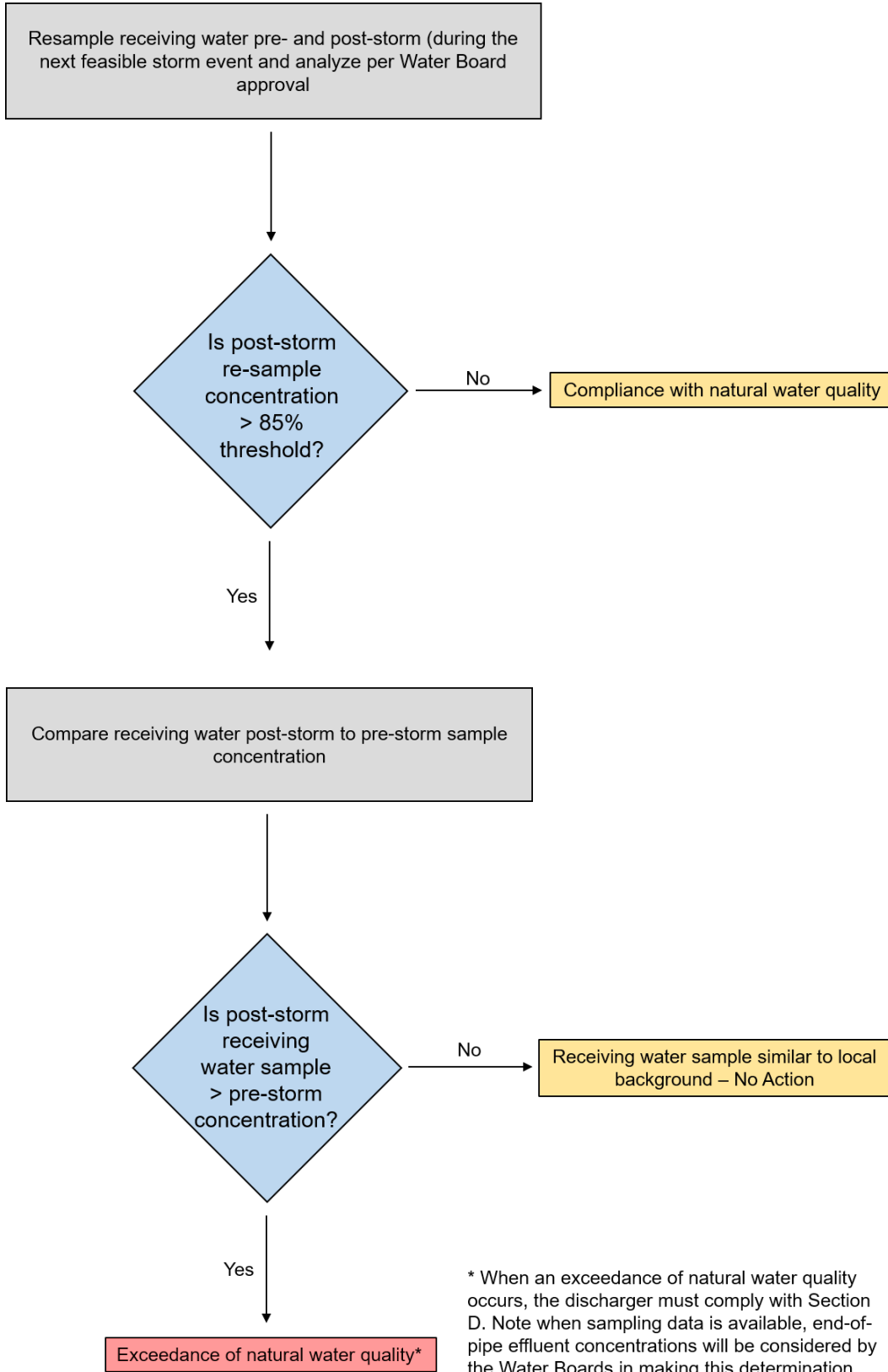


EXHIBIT "C" (Stormwater Pollution Prevention Plan)

**Table 1 - Monitoring Constituent List
 (Excerpted from the 2019 California Ocean Plan Table 3)**

Constituent	Units
Arsenic	µg/L
Cadmium	µg/L
Chromium (Hexavalent)	µg/L
Copper	µg/L
Lead	µg/L
Mercury	µg/L
Nickel	µg/L
Selenium	µg/L
Silver	µg/L
Zinc	µg/L
Cyanide	µg/L
Total Chlorine Residual	µg/L
Ammonia (as N)	µg/L
Acute Toxicity	TUa
Chronic Toxicity	TUc
Phenolic Compounds (non-chlorinated)	µg/L
Chlorinated Phenolics	µg/L
Endosulfan	µg/L
Endrin	µg/L
Hexachlorocyclohexane	µg/L
Radioactivity	

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Table 2 - Monitoring Constituent List
(Excerpted from the 2019 California Ocean Plan Table 4)

Constituent	Units
Grease and Oil	mg/L
Suspended Solids	mg/L
Settleable Solids	mL/L
Turbidity	NTU
pH	

EXHIBIT "C" (Stormwater Pollution Prevention Plan)

ATTACHMENT J

DEWATERING REQUIREMENTS

**NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES)
GENERAL PERMIT FOR STORMWATER DISCHARGES ASSOCIATED
WITH CONSTRUCTION AND LAND DISTURBANCE ACTIVITIES
(GENERAL PERMIT)**

A. AUTHORIZED CONSTRUCTION DEWATERING DISCHARGES

- A.1. Dischargers with dewatering activities subject to a separate NPDES permit for dewatering activities are not subject to the provisions in this Attachment, and shall obtain separate NPDES coverage as required by the State or Regional Water Board. Dischargers shall include in its Stormwater Pollution Prevention Plan (SWPPP), the separate NPDES permit coverage it holds for dewatering discharges.
- A.2. Dewatering discharges authorized by this General Permit include mechanical pumping or syphoning of non-potable water from sources including, but not limited to: excavations, trenches, foundations, vaults, groundwater removal specifically related to the construction activities, and/or water collected in impoundments (e.g., ponds, puddles, low points on the active site, or other similar accumulation points).
- A.3. This General Permit does not limit the State or Regional Water Boards' authority to modify dewatering discharge requirements upon providing written notice to the discharger, including but not limited to the following:
 - a. Adding constituents to be monitored;
 - b. Adding or modifying frequency of monitoring;
 - c. Adding or modifying sampling locations;
 - d. Requiring all or part of the discharge to be treated by an active treatment system (in accordance with Attachment F) prior to discharge; and/or
 - e. Revoking authorization of dewatering dischargers under this General Permit and requiring the discharger to obtain different NPDES permit coverage for dewatering discharges to waters of the United States.

B. GENERAL DEWATERING DISCHARGE REQUIREMENTS

- B.1. Dischargers shall comply with the following dewatering discharge requirements:
 - a. The discharge complies with receiving water limitations in Section IV.D of this General Permit's Order;

EXHIBIT "C" (Stormwater Pollution Prevention Plan)

- b. The discharge is absent of pollutants in quantities that threaten to cause pollution or a nuisance¹;
- c. The dewatering activity takes place in an area without known (including, but not limited to information from: Geotracker, local permitting authorities, Water Boards, etc.) soil and/or groundwater contamination where that contamination could cause an exceedance of receiving water limitations;
- d. The discharger shall utilize outlet structures that withdraw water from the surface when conducting dewatering activity from sediment basins or similar impoundments, unless infeasible; and
- e. The discharger shall cease discharge if necessary, as follows:
 - i. Through an automated sampling device capable of ceasing the discharge if a single sample concentration/level exceeds the numeric action level(s); or
 - ii. By a Qualified SWPPP Practitioner (QSP) or trained delegate who is present during the operation of the mechanical pumping and/or syphoning of the dewatering activity and is able to halt dewatering if a numeric action level is exceeded for a single sample.

C. DEWATERING DISCHARGE MONITORING REQUIREMENTS

- C.1. The discharge shall be analyzed for pH and turbidity at the discharge location within the first hour of discharge and daily for continuous dewatering discharges. Each sample must instantaneously comply with the numerical action levels for pH (within 6.5 – 8.5 standard pH units) and turbidity (250 nephelometric turbidity units);
- C.2. Dewatering discharge(s) exceeding the numeric action levels for pH and turbidity shall immediately cease until the dewatering discharge complies with the requirements in Sections B.1.a through e and D.5 and 6.

D. DEWATERING DISCHARGE REPORTING REQUIREMENTS

- D.1. At least 24 hours prior to the beginning of a dewatering discharge, the discharger shall notify the applicable Regional Water Board stormwater staff via email² of the anticipated dewatering discharge.
- D.2. The discharger shall notify the corresponding Regional Water Board and the applicable municipal separate storm sewer system within 24 hours of a discharge occurring if an exception to the requirement to cease discharge, as outlined in Section B.1.e, is necessary to protect human life and health or prevent severe property damage.

¹ 40 Code of Federal Regulations section 131.12, and State Water Board Resolution No. 68-16.

² Regional Water Board stormwater staff contacts listed in Attachment C of this General Permit.

- D.3. The Qualified SWPPP Developer (QSD) shall update the site-specific SWPPP on-site at least 24 hours prior to the beginning of a dewatering discharge and upload the amended SWPPP to SMARTS within 14 days with current information required in Section D.4 below, if necessary. The revised SWPPP shall be uploaded as part of a Change of Information through SMARTS.
- D.4. The QSD shall include the following site-specific SWPPP updates to address dewatering discharges:
- a. On-site BMPs that are selected and implemented:
 - i. To prevent the dewatering discharge from contacting construction materials or equipment;
 - ii. That do not use waters of the United States as part of the treatment area, at all areas or points where dewatering is discharged; and
 - iii. To decelerate the velocity of dewatering discharge (e.g., check dams, sediment traps, riprap, and grouted riprap at outlets);
 - b. Cleaning and maintenance plan for all dewatering devices and filter media when the pressure equals or exceeds the manufacturer's specifications (if applicable);
 - c. Site-specific dewatering sampling protocols used to comply with requirements in Section B.1; and
 - d. A site map depicting the dewatering activity discharge area location(s).
- D.5. The discharger shall enter results of all numeric action level (e.g., turbidity and pH) exceedances through SMARTS within 10 days of the field measurements demonstrating the exceedance.
- D.6. The QSD shall revise the SWPPP to incorporate immediate corrective actions to prevent further exceedances of the numeric action levels for pH and turbidity, within 10 days of the exceedance.

EXHIBIT "C" (Stormwater Pollution Prevention Plan)

APPENDIX B

Permit Registration Documents (PRDs)
Notice of Intent (NOI)
Notice of Receipt Letter
Vicinity Map
Erosion and Sediment Control Plan
Risk Level Determination Package
Signed Certification Statements
List of Regional Water Quality Control Boards

EXHIBIT "C" (Stormwater Pollution Prevention Plan)

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FILE PATH: G:\Drafting\PROJECTS\16300 to 17899\6370\1637000000\STORMWATER-MGMT-0922\1637000000_MIG-MAP_1-1023.dwg SAVE DATE: 10/25/2023 7:04:20 AM SAVED BY: Colleen



SITE

101

SOUTH LA PATERA LANE

LINDMAR DRIVE



0 300
FEET

BASE MAP SOURCE: NEARMAP MAPPING SERVICE



VICINITY MAP
GOLETA TRAIN DEPOT
GOLETA, CALIFORNIA

PROJECT NO.: 16370.000.000

SCALE: AS SHOWN

DRAWN BY: CC

CHECKED BY: JDB

FIGURE NO.

1

ORIGINAL FIGURE PRINTED IN COLOR

Sediment Risk Factor Worksheet		Entry
A) R Factor		
<p>Analyses of data indicated that when factors other than rainfall are held constant, soil loss is directly proportional to a rainfall factor composed of total storm kinetic energy (E) times the maximum 30-min intensity (I30) (Wischmeier and Smith, 1958). The numerical value of R is the average annual sum of EI30 for storm events during a rainfall record of at least 22 years. "Isoerodent" maps were developed based on R values calculated for more than 1000 locations in the Western U.S. Refer to the link below to determine the R factor for the project site.</p> <p>http://cfpub.epa.gov/npdes/stormwater/LEW/lewCalculator.cfm</p>		
R Factor Value		20.43
B) K Factor (weighted average, by area, for all site soils)		
<p>The soil-erodibility factor K represents: (1) susceptibility of soil or surface material to erosion, (2) transportability of the sediment, and (3) the amount and rate of runoff given a particular rainfall input, as measured under a standard condition. Fine-textured soils that are high in clay have low K values (about 0.05 to 0.15) because the particles are resistant to detachment. Coarse-textured soils, such as sandy soils, also have low K values (about 0.05 to 0.2) because of high infiltration resulting in low runoff even though these particles are easily detached. Medium-textured soils, such as a silt loam, have moderate K values (about 0.25 to 0.45) because they are moderately susceptible to particle detachment and they produce runoff at moderate rates. Soils having a high silt content are especially susceptible to erosion and have high K values, which can exceed 0.45 and can be as large as 0.65. Silt-size particles are easily detached and tend to crust, producing high rates and large volumes of runoff. Use Site-specific data must be submitted.</p> <p>Site-specific K factor guidance</p>		
K Factor Value		0.32
C) LS Factor (weighted average, by area, for all slopes)		
<p>The effect of topography on erosion is accounted for by the LS factor, which combines the effects of a hillslope-length factor, L, and a hillslope-gradient factor, S. Generally speaking, as hillslope length and/or hillslope gradient increase, soil loss increases. As hillslope length increases, total soil loss and soil loss per unit area increase due to the progressive accumulation of runoff in the downslope direction. As the hillslope gradient increases, the velocity and erosivity of runoff increases. Use the LS table located in separate tab of this spreadsheet to determine LS factors. Estimate the weighted LS for the site prior to construction.</p> <p>LS Table</p>		
LS Factor Value		0.6
Watershed Erosion Estimate (=RxKxLS) in tons/acre		3.92256
Site Sediment Risk Factor Low Sediment Risk: < 15 tons/acre Medium Sediment Risk: >=15 and <75 tons/acre High Sediment Risk: >= 75 tons/acre		Low

EXHIBIT "C" (Stormwater Pollution Prevention Plan)

Receiving Water (RW) Risk Factor Worksheet	Entry	Score
A. Watershed Characteristics	yes/no	
A.1. Does the disturbed area discharge (either directly or indirectly) to a 303(d)-listed waterbody impaired by sediment (For help with impaired waterbodies please visit the link below) or has a USEPA approved TMDL implementation plan for sediment ?:	yes	High
http://www.waterboards.ca.gov/water_issues/programs/tmdl/integrated2010.shtml OR		
A.2. Does the disturbed area discharge to a waterbody with designated beneficial uses of SPAWN & COLD & MIGRATORY? (For help please review the appropriate Regional Board Basin Plan)		
http://www.waterboards.ca.gov/waterboards_map.shtml		
Region 1 Basin Plan Region 2 Basin Plan Region 3 Basin Plan Region 4 Basin Plan Region 5 Basin Plan Region 6 Basin Plan Region 7 Basin Plan Region 8 Basin Plan Region 9 Basin Plan		

EXHIBIT "C" (Stormwater Pollution Prevention Plan)

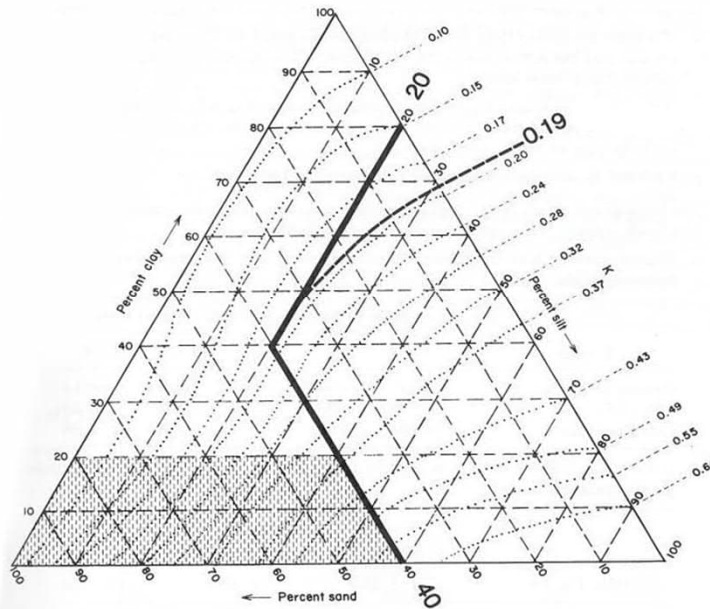
		Combined Risk Level Matrix		
		<u>Sediment Risk</u>		
<u>Receiving Water Risk</u>	Low	Low	Medium	High
	High	Level 2	Level 3	

Project Sediment Risk: **Low**
 Project RW Risk: **High**
 Project Combined Risk: **Level 2**

EXHIBIT "C" (Stormwater Pollution Prevention Plan)

Soil Erodibility Factor (K)

The K factor can be determined by using the nomograph method, which requires that a particle size analysis (ASTM D-422) be done to determine the percentages of sand, very fine sand, silt and clay. Use the figure below to determine appropriate K value.



Erickson triangular nomograph used to estimate soil erodibility (K) factor.

The figure above is the USDA nomograph used to determine the K factor for a soil, based on its texture (% silt plus very fine sand, % sand, % organic matter, soil structure, and permeability). *Nomograph from Erickson 1977 as referenced in Goldman et. al., 1986.*

EXHIBIT "C" (Stormwater Pollution Prevention Plan)

Sheet Flow Length (ft)	Average Watershed Slope (%)																		
	0.2	0.5	1.0	2.0	3.0	4.0	5.0	6.0	8.0	10.0	12.0	14.0	16.0	20.0	25.0	30.0	40.0	50.0	60.0
<3	0.05	0.07	0.09	0.13	0.17	0.20	0.23	0.26	0.32	0.35	0.36	0.38	0.39	0.41	0.45	0.48	0.53	0.58	0.63
6	0.05	0.07	0.09	0.13	0.17	0.20	0.23	0.26	0.32	0.37	0.41	0.45	0.49	0.56	0.64	0.72	0.85	0.97	1.07
9	0.05	0.07	0.09	0.13	0.17	0.20	0.23	0.26	0.32	0.38	0.45	0.51	0.56	0.67	0.80	0.91	1.13	1.31	1.47
12	0.05	0.07	0.09	0.13	0.17	0.20	0.23	0.26	0.32	0.39	0.47	0.55	0.62	0.76	0.93	1.08	1.37	1.62	1.84
15	0.05	0.07	0.09	0.13	0.17	0.20	0.23	0.26	0.32	0.40	0.49	0.58	0.67	0.84	1.04	1.24	1.59	1.91	2.19
25	0.05	0.07	0.10	0.16	0.21	0.26	0.31	0.36	0.45	0.57	0.71	0.85	0.98	1.24	1.56	1.86	2.41	2.91	3.36
50	0.05	0.08	0.13	0.21	0.30	0.38	0.46	0.54	0.70	0.91	1.15	1.40	1.64	2.10	2.67	3.22	4.24	5.16	5.97
75	0.05	0.08	0.14	0.25	0.36	0.47	0.58	0.69	0.91	1.20	1.54	1.87	2.21	2.86	3.67	4.44	5.89	7.20	8.37
100	0.05	0.09	0.15	0.28	0.41	0.55	0.68	0.82	1.10	1.46	1.88	2.31	2.73	3.57	4.59	5.58	7.44	9.13	10.63
150	0.05	0.09	0.17	0.33	0.50	0.68	0.86	1.05	1.43	1.92	2.51	3.09	3.68	4.85	6.30	7.70	10.35	12.75	14.89
200	0.06	0.10	0.18	0.37	0.57	0.79	1.02	1.25	1.72	2.34	3.07	3.81	4.56	6.04	7.88	9.67	13.07	16.16	18.92
250	0.06	0.10	0.19	0.40	0.64	0.89	1.16	1.43	1.99	2.72	3.60	4.48	5.37	7.16	9.38	11.55	15.67	19.42	22.78
300	0.06	0.10	0.20	0.43	0.69	0.98	1.28	1.60	2.24	3.09	4.09	5.11	6.15	8.23	10.81	13.35	18.17	22.57	26.51
400	0.06	0.11	0.22	0.48	0.80	1.14	1.51	1.90	2.70	3.75	5.01	6.30	7.60	10.24	13.53	16.77	22.95	28.60	33.67
600	0.06	0.12	0.24	0.56	0.96	1.42	1.91	2.43	3.52	4.95	6.67	8.45	10.26	13.94	18.57	23.14	31.89	39.95	47.18
800	0.06	0.12	0.26	0.63	1.10	1.65	2.25	2.89	4.24	6.03	8.17	10.40	12.69	17.35	23.24	29.07	40.29	50.63	59.93
1000	0.06	0.13	0.27	0.69	1.23	1.86	2.55	3.30	4.91	7.02	9.57	12.23	14.96	20.57	27.66	34.71	48.29	60.84	72.15

LS Factors for Construction Sites. *Table from Renard et. al., 1997.*

EXHIBIT "C" (Stormwater Pollution Prevention Plan)

National Pollutant Discharge Elimination System (NPDES)

[CONTACT US](#)

 SHARE    

Rainfall Erosivity Factor Calculator for Small Construction Sites

EPA's stormwater regulations allow NPDES permitting authorities to waive NPDES permitting requirements for stormwater discharges from small construction sites if:

- the construction site disturbs less than five acres, and
- the rainfall erosivity factor ("R" in the revised universal soil loss equation, or RUSLE) value is less than five during the period of construction activity.

If your small construction project is located in an area where EPA is the permitting authority and your R factor is less than five, you qualify for a low erosivity waiver (LEW) from NPDES stormwater permitting. If your small construction project does not qualify for a waiver, then NPDES stormwater permit coverage is required. Follow the steps below to calculate your R-Factor.

LEW certifications are submitted through the NPDES eReporting Tool or "CGP-NeT". Several states that are authorized to implement the NPDES permitting program also accept LEWs. Check with your state NPDES permitting authority for more information.

- [Submit your LEW through EPA's eReporting Tool](#)
- [List of states, Indian country, and territories where EPA is the permitting authority_\(pdf\)](#)
- [Construction Rainfall Erosivity Waiver Fact Sheet](#)
- [Small Construction Waivers and Instructions_\(pdf\)](#)

The R-factor calculation can also be integrated directly into custom applications using the [R-Factor web service](#).

For questions or comments, email EPA's CGP staff at cgp@epa.gov.

- Select the estimated start and end dates of construction by clicking the boxes and using the dropdown calendar.

The period of construction activity begins at initial earth disturbance and ends with final stabilization.

Start Date:

End Date:

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- Locate your small construction project using the search box below or by clicking on the map.

Location:

Search

+

-

Click the "Calculate R Factor" button below to calculate an R Factor for your small construction project.

Calculate R Factor

Facility Information

Start Date: 03/01/2024	Latitude: 34.4374
End Date: 11/01/2024	Longitude: -119.8433

Calculation Results

Rainfall erosivity factor (R Factor) = **20.43**

A rainfall erosivity factor of 5.0 or greater has been calculated for your site's period of construction.

You do NOT qualify for a waiver from NPDES permitting requirements and must seek Construction General Permit (CGP) coverage. If you are located in an [area where EPA is the permitting authority \(pdf\)](#), you must submit a Notice of Intent (NOI) through the [NPDES eReporting Tool \(NeT\)](#). Otherwise, you must seek coverage under your state's CGP.

EXHIBIT "C" (Stormwater Pollution Prevention Plan)

K Factor

0.2

Legend

0.32

27 S La Patera Ln

0.2

0.2

0.2

0.2

0.24

0.24

0.28

0.32

0.28

27 S La Patera Ln

0.24

0.32

0.32

101

217

101

0.32

0.32

0.32

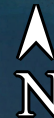
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Google Earth

Data SIO, NOAA, U.S. Navy, NGA, GEBCO

Data CSUMB SFML, CA OPC

3 mi



LS Factor

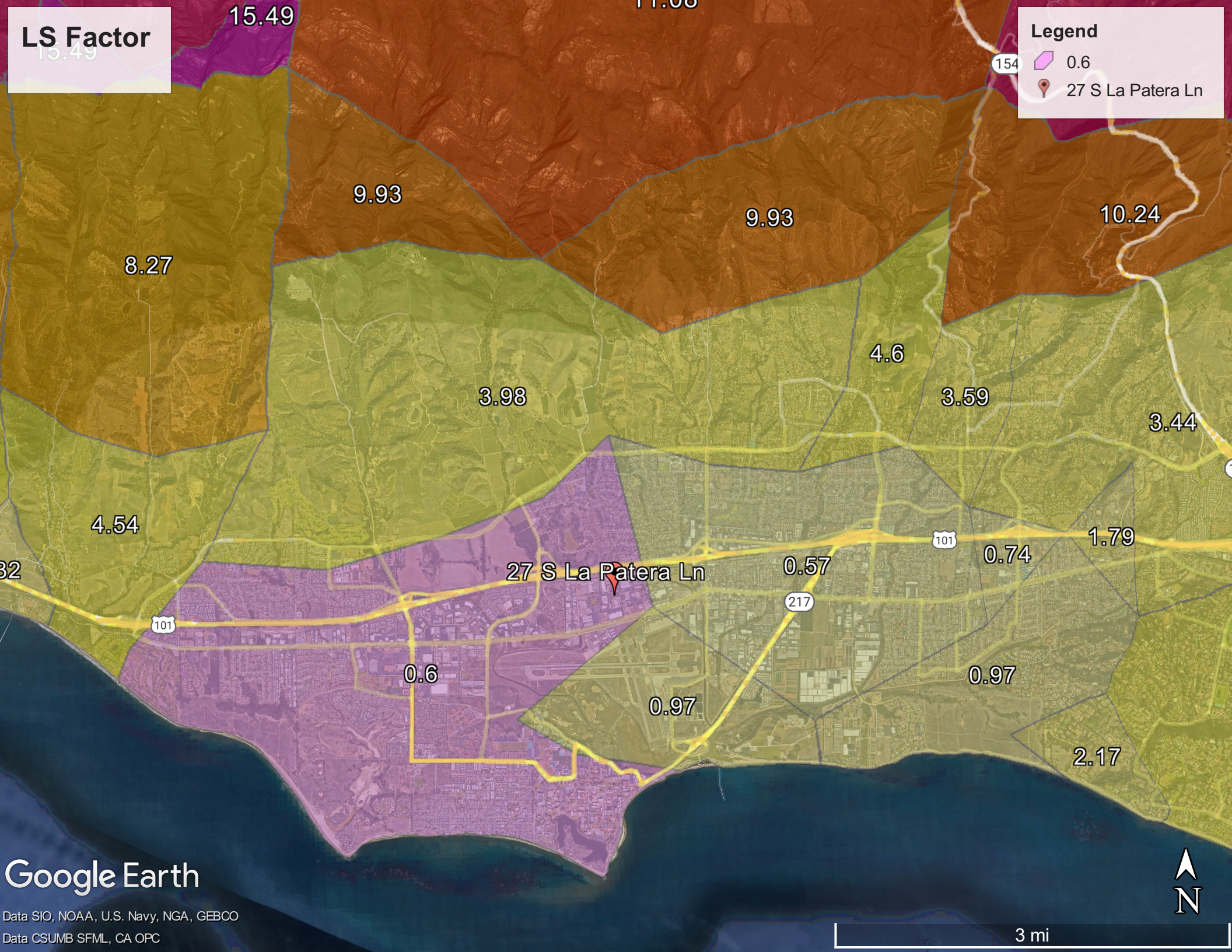
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11.08

Legend

0.6

27 S La Patera Ln



Google Earth

Data SIO, NOAA, U.S. Navy, NGA, GEBCO
Data CSUMB SFML, CA OPC

3 mi



High Receiving Water Risk Watershed GIS Methodology

Objective:

To provide guidance for the designation of watersheds as “high risk” with regards to the two part Risk Level Determination in the Construction Storm Water General Permit. The guidance enables a discharger to identify the Receiving Water Risk for a construction project. Highlighted watersheds on the map are considered High Receiving Water Risk.

Background:

High Receiving Water Risk Watersheds are Hydrologic Unit Code (HUC) Level 12 watersheds that drain to waterbodies that are either 1) 303(d) listed as being impaired for sediment/siltation, 2) have a US Environmental Protection Agency-approved, sediment-related Total Maximum Daily Load (TMDL), or 3) have the existing beneficial uses of SPAWN, MIG, **and** COLD according to the most recent applicable Regional Board Basin Plan. A combination of HUC Level 10 watershed boundaries and physical barriers (e.g. dams) were used to delineate the upstream extent of High Receiving Water Risk Watersheds. A project located within a High Receiving Water Risk Watersheds is considered to have a high receiving water risk. Identifying High Receiving Water Risk Watersheds reduces the confusion over direct vs. indirect discharges and questions regarding upstream extent. For more information on the Construction General Permit please visit:

http://www.waterboards.ca.gov/water_issues/programs/stormwater/construction.shtml

Data and Method:

High Receiving Water Risk Watersheds were created using the California waterbodies and HUC Level 12 watersheds included in the National Hydrography Dataset, (NHD) (available at: <http://datagateway.nrcs.usda.gov/>) in conjunction with waterbodies identified in the 303(d) lists and in the Regional Water Board Basin Plans. Information from the 303(d) lists and Basin Plans were georeferenced to the NHD data to create the High Receiving Water Risk Watersheds.

High Receiving Water Risk Watersheds are updated with changes to the 303(d) sediment listings or the Regional Board Basin Plans. An interactive map showing the current 303(d) - listed waterbodies can be found at:

http://www.waterboards.ca.gov/water_issues/programs/tmdl/integrated2010.shtml?wbid=CAR4033100020050918175233

Regional Board Basin Plans can be found at:

http://www.waterboards.ca.gov/plans_policies/

Contact:

Please contact the Storm Water help desk with any questions or comments: Phone: 916-341-5537 or Email: stormwater@waterboards.ca.gov

Geographic Information System (GIS) Data can be accessed at:

<https://ftp.waterboards.ca.gov/WebInterface/login.html>

Use the following User ID and password to log on:

User ID: GIS_Shared

Password: GIS_Download

Once logged in: Click on folders: 'swrcb' > 'dwq' > 'cgp' > 'risk'

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Last Updated Spring 2018



High Risk Watersheds California Construction Storm Water General Permit

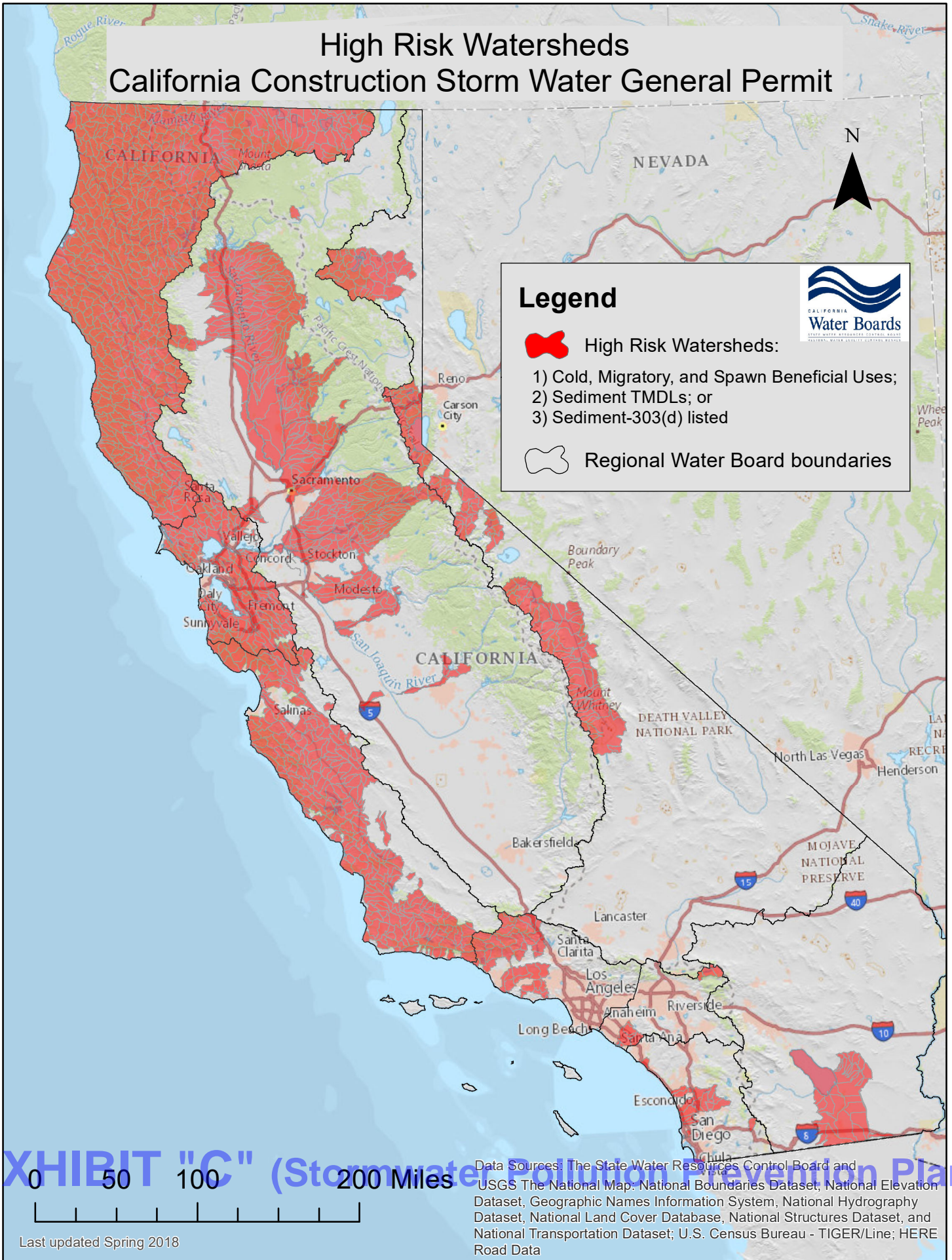


EXHIBIT "C" (Stormwater Pollution Prevention Plan)

Caltrans Water Quality Planning Tool

The Water Quality Planning Tool was created to help planners and designers comply with environmental permits. It uses a map interface to find information based on a project's location. This application is being updated for digital accessibility and will continue to function while updates are in progress.



EXHIBIT "C" (Stormwater Pollution Prevention Plan)

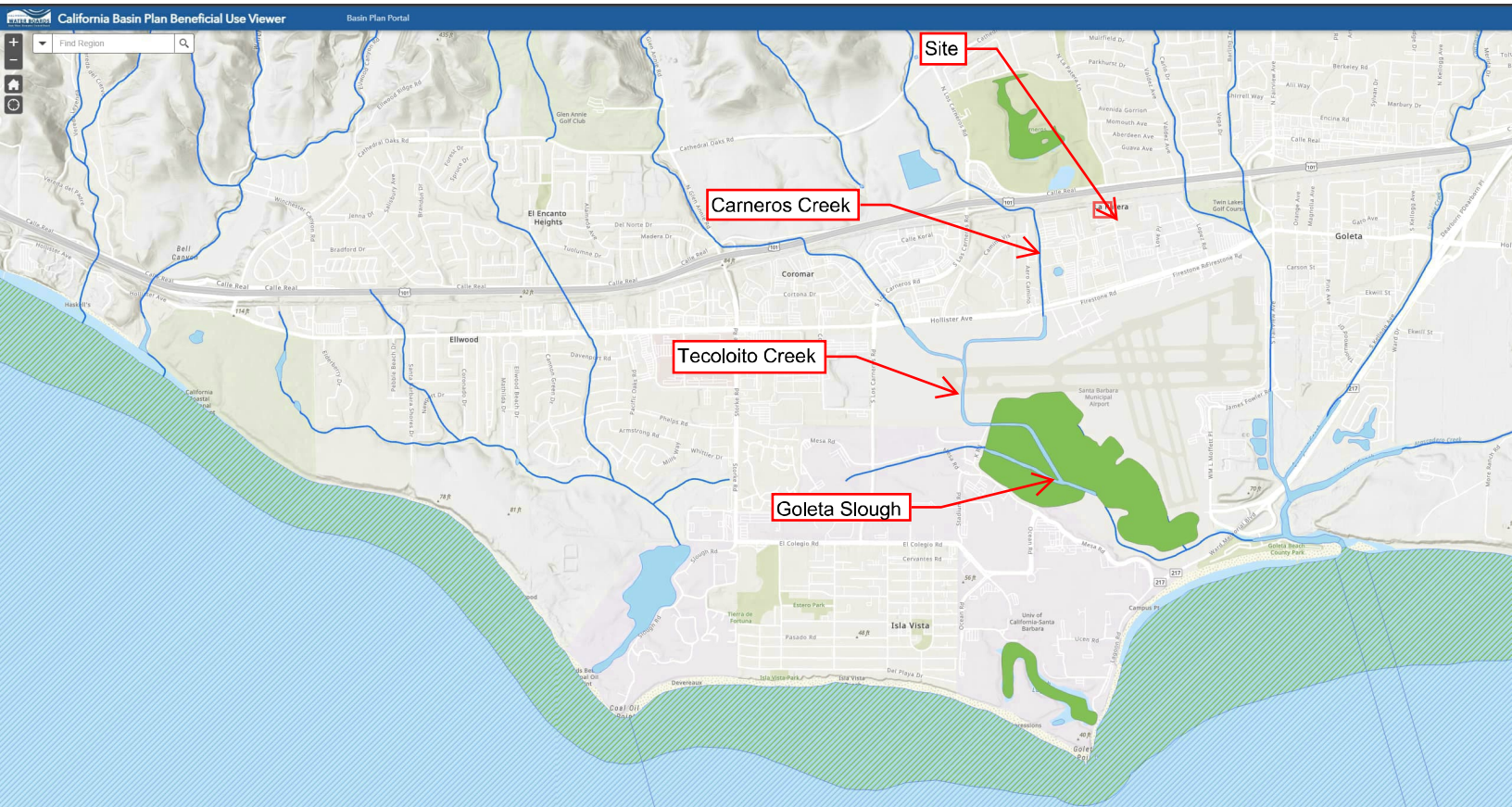


EXHIBIT "C" (Stormwater Pollution Prevention Plan)

Carneros Creek, Goleta, CA--Beneficial Uses

<https://gispublic.waterboards.ca.gov/portal/apps/webappviewer/index.html?id=116f7daa9c4d4103afda1257be82eb16>

COLD	Cold Freshwater Habitat	Uses of water that support cold water ecosystems including, but not limited to, preservation or enhancement of aquatic habitats, vegetation, fish or wildlife, including invertebrates.
MUN	Municipal and Domestic Supply	Uses of water for community, military, or individual water supply systems including, but not limited to, drinking water supply. According to State Board Resolution No. 88-63, "Sources of Drinking Water Policy" all surface waters are considered suitable, or potentially suitable, for municipal or domestic water supply except where: a. TDS exceeds 3000 mg/l (5000 uS/cm electrical conductivity); b. Contamination exists, that cannot reasonably be treated for domestic use; c. The source is not sufficient to supply an average sustained yield of 200 gallons per day; d. The water is in collection or treatment systems of municipal or industrial wastewaters, process waters, mining wastewaters, or storm water runoff; and e. The water is in systems for conveying or holding agricultural drainage waters.
REC1	Water Contact Recreation	Uses of water for recreational activities involving body contact with water, where ingestion of water is reasonably possible. These uses include, but are not limited to, swimming, wading, water-skiing, skin and scuba diving, surfing, white water activities, fishing, or use of natural hot springs.
REC2	Non-Contact Water Recreation	Uses of water for recreational activities involving proximity to water, but not normally involving body contact with water, where ingestion of water is reasonably possible. These uses include, but are not limited to, picnicking, sunbathing, hiking, beachcombing, camping, boating tidepool and marine life study, hunting, sightseeing, or aesthetic enjoyment in conjunction with the above activities.
SPWN	Spawning, Reproduction, and/or Early Development	Uses of water that support high quality aquatic habitats suitable for reproduction and early development of fish.
WARM	Warm Freshwater	Uses of water that support warm water ecosystems including, but not limited to, preservation or enhancement of aquatic habitats, vegetation, fish, or wildlife, including invertebrates.

Goleta Slough, Goleta, CA--Beneficial Uses

<https://gispublic.waterboards.ca.gov/portal/apps/webappviewer/index.html?id=116f7daa9c4d4103afda1257be82eb16>

BU Code	BU Name	BU Description
BIOL	Preservation of Biological Habitats of Special Significance	Uses of water that support designated areas or habitats, such as established refuges, parks, sanctuaries, ecological reserves, or Areas of Special Biological Significance (ASBS), where the preservation or enhancement of natural resources requires special protection.
COLD	Cold Freshwater Habitat	Uses of water that support cold water ecosystems including, but not limited to, preservation or enhancement of aquatic habitats, vegetation, fish or wildlife, including invertebrates.
COMM	Commercial and Sport Fishing	Uses of water for commercial or recreational collection of fish, shellfish, or other organisms including, but not limited to, uses involving organisms intended for human consumption or bait purposes.
EST	Estuarine Habitat	Uses of water that support estuarine ecosystems including, but not limited to, preservation or enhancement of estuarine habitats, vegetation, fish, shellfish, or wildlife (e.g., estuarine mammals, waterfowl, shorebirds). An estuary is generally described as a semi-enclosed body of water having a free connection with the open sea, at least part of the year and within which the seawater is diluted at least seasonally with fresh water drained from the land. Included are water bodies which would naturally fit the definition if not controlled by tidegates or other such devices.
MIGR	Migration of Aquatic Organisms	Uses of water that support habitats necessary for migration or other temporary activities by aquatic organisms, such as anadromous fish.

		Uses of water for community, military, or individual water supply systems including, but not limited to, drinking water supply. According to State Board Resolution No. 88-63, "Sources of Drinking Water Policy" all surface waters are considered suitable, or potentially suitable, for municipal or domestic water supply except where: a. TDS exceeds 3000 mg/l (5000 uS/cm electrical conductivity); b. Contamination exists, that cannot reasonably be treated for domestic use; c. The source is not sufficient to supply an average sustained yield of 200 gallons per day; d. The water is in collection or treatment systems of municipal or industrial wastewaters, process waters, mining wastewaters, or storm water runoff; and e. The water is in systems for conveying or holding agricultural drainage waters.
MUN	Municipal and Domestic Supply	
RARE	Rare, Threatened or Endangered Species	Uses of water that support habitats necessary, at least in part, for the survival and successful maintenance of plant or animal species established under state or federal law as rare, threatened, or endangered.
REC1	Water Contact Recreation	Uses of water for recreational activities involving body contact with water, where ingestion of water is reasonably possible. These uses include, but are not limited to, swimming, wading, water-skiing, skin and scuba diving, surfing, white water activities, fishing, or use of natural hot springs.
REC2	Non-Contact Water Recreation	Uses of water for recreational activities involving proximity to water, but not normally involving body contact with water, where ingestion of water is reasonably possible. These uses include, but are not limited to, picnicking, sunbathing, hiking, beachcombing, camping, boating tidepool and marine life study, hunting, sightseeing, or aesthetic enjoyment in conjunction with the above activities.
SHELL	Shellfish Harvesting	Uses of water that support habitats suitable for the collection of filterfeeding shellfish (e.g., clams, oysters, and mussels) for human consumption, commercial, or sport purposes. This includes waters that have in the past, or may in the future, contain significant shellfisheries.
SPWN	Spawning, Reproduction, and/or Early Development	Uses of water that support high quality aquatic habitats suitable for reproduction and early development of fish.
WARM	Warm Freshwater Habitat	Uses of water that support warm water ecosystems including, but not limited to, preservation or enhancement of aquatic habitats, vegetation, fish, or wildlife, including invertebrates.

WILD Wildlife Habitat

Uses of water that support terrestrial ecosystems including, but not limited to, preservation and enhancement of terrestrial habitats, vegetation, wildlife (e.g., mammals, birds, reptiles, amphibians, invertebrates), or wildlife water and food sources.

0.0 SWPPP CERTIFICATIONS

Certifications of the authorized representatives for this SWPPP are provided in Sections 0.1, 0.2, 0.3, and 0.4 below. A list of authorized representatives is also provided in Appendix J.

0.1 OWNER'S CERTIFICATION

The development of this SWPPP was guided by the requirements of Order No. 2022-0057 DWQ(General Permit). I certify under penalty of law that this document and the incorporated attachments were prepared under my direction or supervision in accordance with a system designed to allow qualified personnel to properly gather and evaluate the information submitted.

Based on my inquiry of the person(s) who manage the system, or those persons directly responsible for gathering the information, the information submitted is to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Mr. Jim Keenan
Anil Verna Associates
444 South Flower Street
Los Angeles, CA 90071

Signed: _____ Date: _____

0.2 SITE STORMWATER COMPLIANCE REPRESENTATIVE (SSWM) CERTIFICATION


The Site Stormwater Manager's (SSWM) role was guided by the requirements of Order No. 2009-0009-DWQ, Amendments 2010-0014-DWQ and 2012-0006-DWQ (General Permit). I certify under penalty of law that this SWPPP will be implemented under my direction or supervision in accordance with the General Permit. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Signed: _____

Date: _____

0.3 QUALIFIED SWPPP DEVELOPER'S (QSD) CERTIFICATION

I have prepared the enclosed Storm Water Pollution Prevention Plan (SWPPP) using the best available information regarding the Order No. 2009-0009-DWQ, Amendments 2010-0014-DWQ and 2012-0006-DWQ (General Permit). I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.


QSD's Signature



Jonathan Buck, PE, QSD/P 00230
Print Name

October 26, 2023
Date

ENGEO / Associate
Company and QSD Title

EXHIBIT "C" (Stormwater Pollution Prevention Plan)

0.4 QUALIFIED SWPPP PRACTITIONER'S (QSP) CERTIFICATION

I will implement the enclosed Storm Water Pollution Prevention Plan (SWPPP) in accordance with the monitoring and sampling requirements of Order No. 2009-0009-DWQ, Amendments 2010-0014-DWQ and 2012-0006-DWQ (General Permit). I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

QSP's Signature

Date

Print Name

Company and QSP Title



Water Boards

Office of Public Affairs: (916) 341-5254
Office of Legislative Affairs: (916) 341-5251
Office of the Ombudsman: (916) 341-5925
Office of Public Participation (916) 341-5254

P.O. Box 100, Sacramento, CA 95812-0100
www.waterboards.ca.gov

Regional Water Quality Controls Boards
(PDF Version - Updated 08/2016)

Drinking Water information: (916) 449-5577
Water Quality information: (916) 341-5455
Water Rights information: (916) 341-5300
Financial Assistance information: (916) 341-5700

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARDS

NORTH COAST REGION (1)

www.waterboards.ca.gov/northcoast
5550 Skylane Blvd., Suite A
Santa Rosa, CA 95403
E-mail: NorthCoast@waterboards.ca.gov
Tel: (707)576-2220
Fax: (707)523-0135

SAN FRANCISCO BAY REGION (2)

www.waterboards.ca.gov/sanfranciscobay
1515 Clay Street, Suite 1400
Oakland, CA 94612
E-mail: info2@waterboards.ca.gov
Tel: (510)622-2300
Fax: (510)622-2460



(click map for specific locations)

CENTRAL COAST REGION (3)

www.waterboards.ca.gov/centralcoast
895 Aerovista Place, Suite 101
San Luis Obispo, CA 93401
E-mail: info3@waterboards.ca.gov
Tel: (805)549-3147
Fax: (805)543-0397

LOS ANGELES REGION (4)

www.waterboards.ca.gov/losangeles
320 W. 4th Street, Suite 200
Los Angeles, CA 90013
E-mail: info4@waterboards.ca.gov
Tel: (213)576-6600
Fax: (213)576-6640

CENTRAL VALLEY REGION (5)

www.waterboards.ca.gov/centralvalley
11020 Sun Center Drive, Suite 200
Rancho Cordova, CA 95670
E-mail: info5@waterboards.ca.gov
Tel: (916)464-3291
Fax: (916)464-4645

Fresno Branch

1685 E Street
Fresno, CA 93706
Tel: (559)445-5116
Fax: (559)445-5910

Redding Branch

364 Knollcrest Drive, Suite 205
Redding, CA 96002
Tel: (530)224-4845
Fax: (530)224-4857

LAHONTAN REGION (6)

www.waterboards.ca.gov/lahontan
2501 Lake Tahoe Blvd.
South Lake Tahoe, CA 96150
E-mail: info6@waterboards.ca.gov
Tel: (530)542-5400
Fax: (530)544-2271

Victorville Branch

15095 Amargosa Road - Bldg 2, Ste 210
Victorville Ca 92394
Tel: (760)241-6583
Fax: (760)241-7308

COLORADO RIVER BASIN REGION (7)

www.waterboards.ca.gov/coloradoriver
73-720 Fred Waring Dr., Suite 100
Palm Desert, CA 92260
E-mail: info7@waterboards.ca.gov
Tel: (760)346-7491
Fax: (760)341-6820

SANTA ANA REGION (8)

www.waterboards.a.gov/santaana
3737 Main Street, Suite 500
Riverside, CA 92501-3348
E-mail: info8@waterboards.ca.gov
Tel: (951)782-4130
Fax: (951)781-6288

SAN DIEGO REGION (9)

www.waterboards.ca.gov/sandiego
2375 Northside Drive, Suite 100
San Diego, CA 92108
E-mail: info9@waterboards.ca.gov
Tel: (619)516-1990
Fax: (619)516-1994

State Water Resources Control Board

E. Joaquin Esquivel, Chair
1001 I Street
Sacramento, CA 95814

State of California

Gavin Newsom, Governor

California Environmental Protection Agency

Yana Garcia, Secretary

EXHIBIT "C" (Stormwater Pollution Prevention Plan)

APPENDIX C

SWPPP Amendments

EXHIBIT "C" (Stormwater Pollution Prevention Plan)

SWPPP Amendment Log

AMENDMENT NO.	DATE	DESCRIBE CHANGE	PREPARED BY

EXHIBIT "C" (Stormwater Pollution Prevention Plan)

APPENDIX D

Submitted Changes to PRDs

EXHIBIT "C" (Stormwater Pollution Prevention Plan)

APPENDIX E

Construction Schedule

EXHIBIT "C" (Stormwater Pollution Prevention Plan)

CONSTRUCTION SCHEDULE

Below is the preliminary construction schedule, summarized in the following timeline for expected construction, and SWPPP implementation:

1. Project Start: March 1, 2024.
2. File Annual Report: September 1 annually.
3. Project Completion: November 1, 2024.
4. File NOT when construction is complete and site is stabilized: November 2024.

Implement BMP, stormwater and non-stormwater monitoring per CGP requirements.

APPENDIX F

Construction Activities, Materials Used, and Associated Pollutants

EXHIBIT "C" (Stormwater Pollution Prevention Plan)

Best Management Practices and Procedures

POLLUTANT	SOURCES
Petroleum Products	<ul style="list-style-type: none"> • Oil and grease from machinery, heavy equipment • Hydraulic fluid • Paving operations, asphalt emulsion • Tar and gravel roofing
Lime Products	<ul style="list-style-type: none"> • Concrete: application and finishing • Drywall • Masonry • Plaster
Metal Products	<ul style="list-style-type: none"> • Some paints • Drywall • Galvanized metal • Grinding and polishing of metal surfaces • Colored finishing compounds
Chlorinated solvents	<ul style="list-style-type: none"> • Thinners and strippers • Degreasing agents • Solvents, cleaners
Fertilizers, pesticides, herbicides	<ul style="list-style-type: none"> • Landscaping
Other	<ul style="list-style-type: none"> • Epoxy, silicone
Trash	<ul style="list-style-type: none"> • From all phases of construction

EXHIBIT "C" (Stormwater Pollution Prevention Plan)

Construction Non-Sediment Control Best Management Practices and Procedures

CONSTRUCTION ACTIVITY	PRACTICES AND PROCEDURES
1. Pre-Construction	<ul style="list-style-type: none"> • Construction entrances and exits should be installed to accommodate transitions from dirt surfaces to paved surfaces. • Perimeter control BMPs, such as silt fence and straw wattles, should be installed to indicate the limits of disturbance. • All existing onsite and nearby offsite drain inlets will be protected as directed by the Erosion and Sediment Control Plan
2. Concrete, Stucco and Masonry	<ul style="list-style-type: none"> • Locate washout area at least 50 feet from storm drains inlets, open ditches, or water bodies if site conditions permit. Contain wash water in a temporary area on the building pad adjacent to the construction site where the waste can harden for later removal. Pump washout materials and excess into another truck if possible. Do not dispose of excess or washout into the storm drain system. Discuss concrete waste management with the concrete supplier before delivery. See also Appendix G, WM-8.
3. Building Construction	<ul style="list-style-type: none"> • Designate areas of the construction site for material delivery and storage. • Store dry chemicals and bagged materials on covered pallets. • Designated trash/debris disposal containers should be used. Containers should be emptied by the local disposal company on an as needed basis. • Cover any scrap material that may contain water-soluble pollutants when rain is forecast. Store petroleum products out of the rain. • Store plasters, powders, sheetrock and other construction raw materials inside a shelter, garage or under a temporary roof or tarp, away from creek channels and stormwater conveyance facilities, during the rainy season or if rain is forecast. All material storage must also comply with local fire codes. • Potentially toxic liquid waste and chemicals must not be disposed of in dumpsters designated for construction debris. Store waste materials in secured containers for removal from site and disposal at designated disposal facilities at appropriate intervals. See also Appendix G, WM-1. • Keep metal shavings and filings out of storm runoff by containing on the pad and/or disposing of in construction dumpster. • Apply BMPs for all building materials stored onsite and during the application and storage of tar and gravel roofing materials.
4. Painting and Drywall	<ul style="list-style-type: none"> • Store all paints, solvents, enamels, sealers, bonding agents, and other chemicals inside or in a covered area and protect from vandalism. See also Appendix G, WM-2. • Use a designated washout area to clean all equipment. Do not clean brushes or paint containers on dirt or into streets, gutters, storm drains, or streams. "Paint out" brushes as much as possible. Recycle oil or water-based paint if feasible. If not, dispose of excess oil-based paints and sludge as hazardous waste.

EXHIBIT "C" (Stormwater Pollution Prevention Plan)

CONSTRUCTION ACTIVITY	PRACTICES AND PROCEDURES
5. Chemical Toilets, and Equipment Storage, Cleaning and Maintenance	<ul style="list-style-type: none"> • Locate chemical toilets and equipment storage, cleaning, and maintenance area(s) at least 50 feet from storm drains inlets, open ditches, or water bodies if site conditions permit. • Perform maintenance and repairs and store equipment at a designated area away from storm drains or other stormwater conveyance facilities. Prevent leaks of machinery fluids; routinely inspect equipment. • Employ drip pans and properly dispose of fluids. Use EVAC equipment to capture oils and store for removal from site. • If repairs need to be made on the project or in the field, use appropriate BMPs to protect the release of contaminants to surface runoff. Use drip pans or absorbent drop cloths to capture spills. • Do not wash equipment where effluent can flow into storm drains. • Recycle spent fluids whenever possible; store fluids in separate containers. Note that some spent fluids may be considered hazardous; recycling may avoid the disposal expenses and administrative difficulties associated with hazardous materials disposal. • Conduct vehicle fueling at equipment storage areas. Locate onsite petroleum fuel tanks in protected areas, with earth berms constructed to contain spills and absorbent materials available to clean up spills.
6. Paving	<ul style="list-style-type: none"> • Apply any pre-treatments such as lime, finish concrete, finish asphalt and seal coats during dry weather. Storm drain inlets must be covered when applying seal coat, tack, slurry seal, or other asphalt materials. Residue must be shoveled or vacuumed for removal from the project. Pavers must be parked, cleaned and maintained over drip pans or absorbent materials. Collect and properly dispose of excess materials. • Avoid paving during wet weather. See also Appendix G, NS-3.
7. Landscaping	<ul style="list-style-type: none"> • Minimize use of fertilizers, pesticides and herbicides. The use of excessive amounts of fertilizer can create a nutrient overdose for natural aquatic systems and lead to oxygen depletion in the water. • Do not use pesticides, herbicides and fertilizers in streambank and riparian areas. • Carefully follow manufacturer's procedures when using all herbicides, pesticides and fertilizers.

EXHIBIT "C" (Stormwater Pollution Prevention Plan)

Potential Pollutant Sources Potential Pollutant Sources

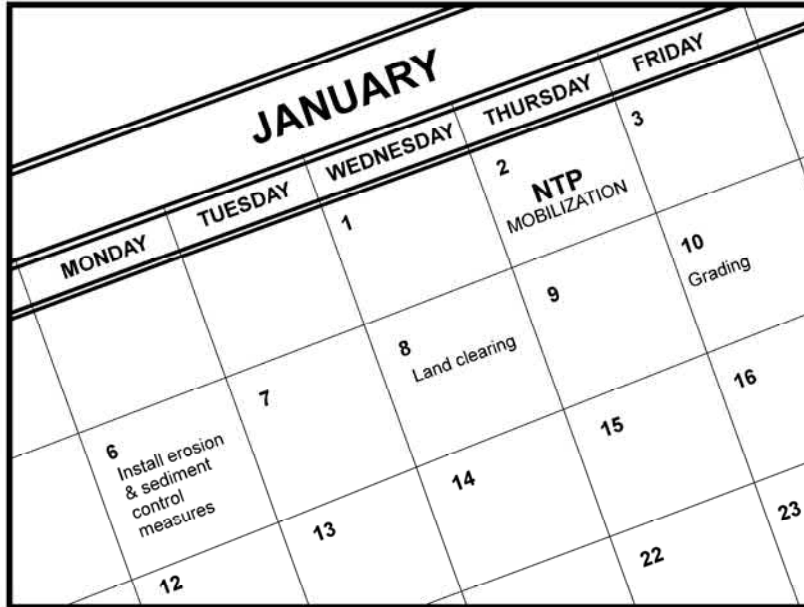
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Metal Products	<ul style="list-style-type: none"> • Some paints • Drywall • Galvanized metal • Grinding and polishing of metal surfaces • Colored finishing compounds
Chlorinated solvents	<ul style="list-style-type: none"> • Thinners and strippers • Degreasing agents • Solvents, cleaners
Fertilizers, pesticides, herbicides	<ul style="list-style-type: none"> • Landscaping
Other	<ul style="list-style-type: none"> • Epoxy, silicone
Trash	<ul style="list-style-type: none"> • From all phases of construction

EXHIBIT "C" (Stormwater Pollution Prevention Plan)

APPENDIX G

Project Available BMPs

EXHIBIT "C" (Stormwater Pollution Prevention Plan)



Description and Purpose

Scheduling is the development of a written plan that includes sequencing of construction activities and the implementation of BMPs such as erosion control and sediment control while taking local climate (rainfall, wind, etc.) into consideration. The purpose is to reduce the amount and duration of soil exposed to erosion by wind, rain, runoff, and vehicle tracking, and to perform the construction activities and control practices in accordance with the planned schedule.

Suitable Applications

Proper sequencing of construction activities to reduce erosion potential should be incorporated into the schedule of every construction project especially during rainy season. Use of other, more costly yet less effective, erosion and sediment control BMPs may often be reduced through proper construction sequencing.

Limitations

- Environmental constraints such as nesting season prohibitions reduce the full capabilities of this BMP.

Implementation

- Avoid rainy periods. Schedule major grading operations during dry months when practical. Allow enough time before rainfall begins to stabilize the soil with vegetation or physical means or to install sediment trapping devices.
- Plan the project and develop a schedule showing each phase of construction. Clearly show how the rainy season relates

Categories

EC	Erosion Control	<input checked="" type="checkbox"/>
SE	Sediment Control	<input checked="" type="checkbox"/>
TC	Tracking Control	<input checked="" type="checkbox"/>
WE	Wind Erosion Control	<input checked="" type="checkbox"/>
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	

Legend:

- Primary Objective
- Secondary Objective

Targeted Constituents

Sediment	<input checked="" type="checkbox"/>
Nutrients	
Trash	
Metals	
Bacteria	
Oil and Grease	
Organics	

Potential Alternatives

None

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to soil disturbing and re-stabilization activities. Incorporate the construction schedule into the SWPPP.

- Include on the schedule, details on the rainy season implementation and deployment of:
 - Erosion control BMPs
 - Sediment control BMPs
 - Tracking control BMPs
 - Wind erosion control BMPs
 - Non-stormwater BMPs
 - Waste management and materials pollution control BMPs
- Include dates for activities that may require non-stormwater discharges such as dewatering, sawcutting, grinding, drilling, boring, crushing, blasting, painting, hydro-demolition, mortar mixing, pavement cleaning, etc.
- Work out the sequencing and timetable for the start and completion of each item such as site clearing and grubbing, grading, excavation, paving, foundation pouring utilities installation, etc., to minimize the active construction area during the rainy season.
 - Sequence trenching activities so that most open portions are closed before new trenching begins.
 - Incorporate staged seeding and re-vegetation of graded slopes as work progresses.
 - Schedule establishment of permanent vegetation during appropriate planting time for specified vegetation.
- Non-active areas should be stabilized as soon as practical after the cessation of soil disturbing activities or one day prior to the onset of precipitation.
- Monitor the weather forecast for rainfall.
- When rainfall is predicted, adjust the construction schedule to allow the implementation of soil stabilization and sediment treatment controls on all disturbed areas prior to the onset of rain.
- Be prepared year-round to deploy erosion control and sediment control BMPs. Erosion may be caused during dry seasons by un-seasonal rainfall, wind, and vehicle tracking. Keep the site stabilized year-round and retain and maintain rainy season sediment trapping devices in operational condition.
- Apply permanent erosion control to areas deemed substantially complete during the project's defined seeding window.
- Avoid soil disturbance during periods with high wind velocities.

Costs

Construction scheduling to reduce erosion may increase other construction costs due to reduced economies of scale in performing site grading. The cost effectiveness of scheduling techniques

should be compared with the other less effective erosion and sedimentation controls to achieve a cost-effective balance.

Inspection and Maintenance

- Verify that work is progressing in accordance with the schedule. If progress deviates, take corrective actions.
- Amend the schedule when changes are warranted.
- Amend the schedule prior to the rainy season to show updated information on the deployment and implementation of construction site BMPs.

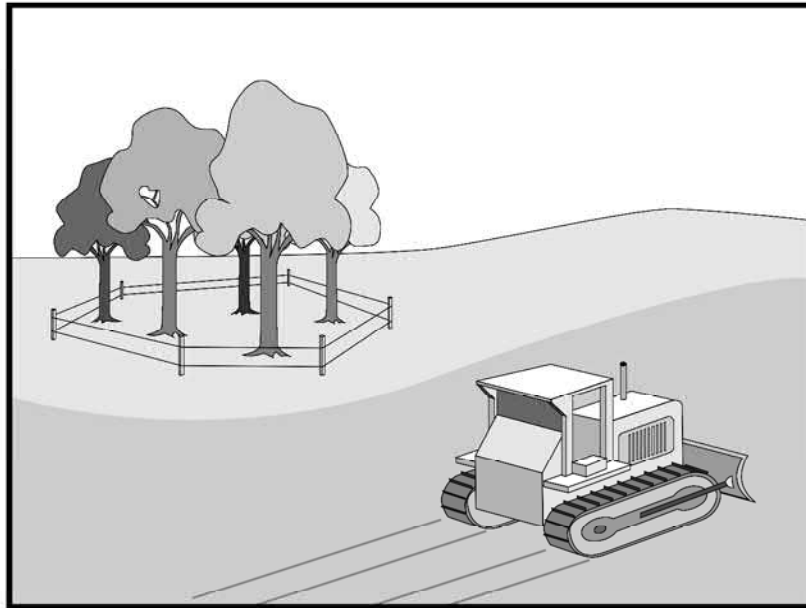
References

Stormwater Quality Handbooks Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.

Stormwater Management for Construction Activities Developing Pollution Prevention Plans and Best Management Practices (EPA 832-R-92-005), U.S. Environmental Protection Agency, Office of Water, September 1992.

EXHIBIT "C" (Stormwater Pollution Prevention Plan)

Preservation of Existing Vegetation EC-2



Description and Purpose

Carefully planned preservation of existing vegetation minimizes the potential of removing or injuring existing trees, vines, shrubs, and grasses that protect soil from erosion.

Suitable Applications

Preservation of existing vegetation is suitable for use on most projects. Large project sites often provide the greatest opportunity for use of this BMP. Suitable applications include the following:

- Areas within the site where no construction activity occurs or occurs at a later date. This BMP is especially suitable to multi year projects where grading can be phased.
- Areas where natural vegetation exists and is designated for preservation. Such areas often include steep slopes, watercourse, and building sites in wooded areas.
- Areas where local, state, and federal government require preservation, such as vernal pools, wetlands, marshes, certain oak trees, etc. These areas are usually designated on the plans, or in the specifications, permits, or environmental documents.
- Where vegetation designated for ultimate removal can be temporarily preserved and be utilized for erosion control and sediment control.
- Protecting existing vegetation buffers and swales.

Categories

EC	Erosion Control	<input checked="" type="checkbox"/>
SE	Sediment Control	<input type="checkbox"/>
TC	Tracking Control	<input type="checkbox"/>
WE	Wind Erosion Control	<input type="checkbox"/>
NS	Non-Stormwater Management Control	<input type="checkbox"/>
WM	Waste Management and Materials Pollution Control	<input type="checkbox"/>

Legend:

- Primary Objective
- Secondary Objective

Targeted Constituents

Sediment	<input checked="" type="checkbox"/>
Nutrients	<input type="checkbox"/>
Trash	<input type="checkbox"/>
Metals	<input type="checkbox"/>
Bacteria	<input type="checkbox"/>
Oil and Grease	<input type="checkbox"/>
Organics	<input type="checkbox"/>

Potential Alternatives

None

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Preservation of Existing Vegetation EC-2

Limitations

- Requires forward planning by the owner/developer, contractor, and design staff.
- Limited opportunities for use when project plans do not incorporate existing vegetation into the site design.
- For sites with diverse topography, it is often difficult and expensive to save existing trees while grading the site satisfactory for the planned development.

Implementation

The best way to prevent erosion is to not disturb the land. In order to reduce the impacts of new development and redevelopment, projects may be designed to avoid disturbing land in sensitive areas of the site (e.g., natural watercourses, steep slopes), and to incorporate unique or desirable existing vegetation into the site's landscaping plan. Clearly marking and leaving a buffer area around these unique areas during construction will help to preserve these areas as well as take advantage of natural erosion prevention and sediment trapping.

Existing vegetation to be preserved on the site must be protected from mechanical and other injury while the land is being developed. The purpose of protecting existing vegetation is to ensure the survival of desirable vegetation for shade, beautification, and erosion control. Mature vegetation has extensive root systems that help to hold soil in place, thus reducing erosion. In addition, vegetation helps keep soil from drying rapidly and becoming susceptible to erosion. To effectively save existing vegetation, no disturbances of any kind should be allowed within a defined area around the vegetation. For trees, no construction activity should occur within the drip line of the tree.

Timing

- Provide for preservation of existing vegetation prior to the commencement of clearing and grubbing operations or other soil disturbing activities in areas where no construction activity is planned or will occur at a later date.

Design and Layout

- Mark areas to be preserved with temporary fencing. Include sufficient setback to protect roots.
 - Orange colored plastic mesh fencing works well.
 - Use appropriate fence posts and adequate post spacing and depth to completely support the fence in an upright position.
- Locate temporary roadways, stockpiles, and layout areas to avoid stands of trees, shrubs, and grass.
- Consider the impact of grade changes to existing vegetation and the root zone.
- Maintain existing irrigation systems where feasible. Temporary irrigation may be required.
- Instruct employees and subcontractors to honor protective devices. Prohibit heavy equipment, vehicular traffic, or storage of construction materials within the protected area.

EXHIBIT "C" (Stormwater Pollution Prevention Plan)

Preservation of Existing Vegetation EC-2

- Consider pruning or mowing vegetation instead of removing it to allow for regrowth.
- If possible, retain vegetation buffer around the site and adjacent waterways.

Costs

There is little cost associated with preserving existing vegetation if properly planned during the project design, and these costs may be offset by aesthetic benefits that enhance property values. During construction, the cost for preserving existing vegetation will likely be less than the cost of applying erosion and sediment controls to the disturbed area. Replacing vegetation inadvertently destroyed during construction can be extremely expensive, sometimes in excess of \$10,000 per tree.

Inspection and Maintenance

During construction, the limits of disturbance should remain clearly marked at all times. Irrigation or maintenance of existing vegetation should be described in the landscaping plan. If damage to protected trees still occurs, maintenance guidelines described below should be followed:

- Verify that protective measures remain in place. Restore damaged protection measures immediately.
- Serious tree injuries shall be attended to by an arborist.
- Damage to the crown, trunk, or root system of a retained tree shall be repaired immediately.
- Trench as far from tree trunks as possible, usually outside of the tree drip line or canopy. Curve trenches around trees to avoid large roots or root concentrations. If roots are encountered, consider tunneling under them. When trenching or tunneling near or under trees to be retained, place tunnels at least 18 in. below the ground surface, and not below the tree center to minimize impact on the roots.
- Do not leave tree roots exposed to air. Cover exposed roots with soil as soon as possible. If soil covering is not practical, protect exposed roots with wet burlap or peat moss until the tunnel or trench is ready for backfill.
- Cleanly remove the ends of damaged roots with a smooth cut.
- Fill trenches and tunnels as soon as possible. Careful filling and tamping will eliminate air spaces in the soil, which can damage roots.
- If bark damage occurs, cut back all loosened bark into the undamaged area, with the cut tapered at the top and bottom and drainage provided at the base of the wood. Limit cutting the undamaged area as much as possible.
- Aerate soil that has been compacted over a trees root zone by punching holes 12 in. deep with an iron bar and moving the bar back and forth until the soil is loosened. Place holes 18 in. apart throughout the area of compacted soil under the tree crown.

- Fertilization:

EXHIBIT "C" (Stormwater Pollution Prevention Plan)

Preservation of Existing Vegetation EC-2

- Fertilize trees in the late fall or early spring. Although to note, many native species do not require fertilization.
- Apply fertilizer to the soil over the feeder roots and in accordance with label instructions, but never closer than 3 ft to the trunk. Increase the fertilized area by one-fourth of the crown area for conifers that have extended root systems.
- Retain protective measures until all other construction activity is complete to avoid damage during site cleanup and stabilization.

References

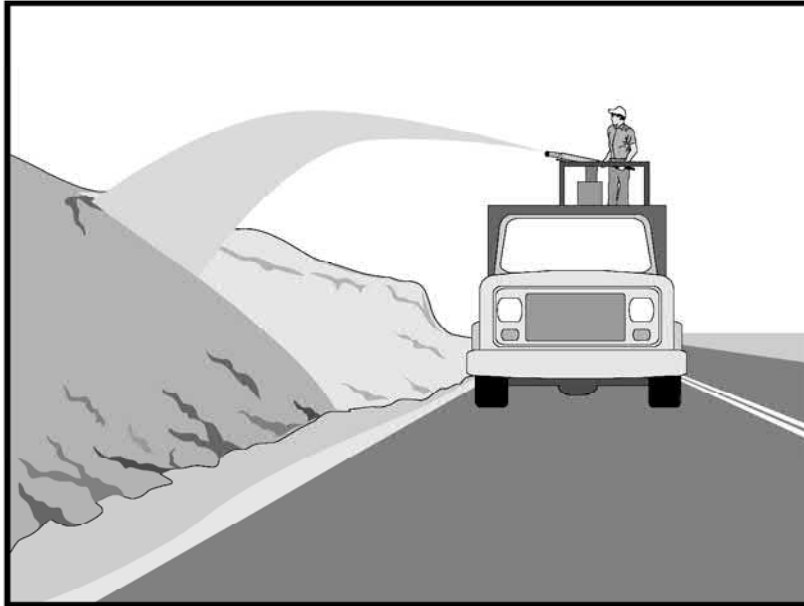
County of Sacramento Tree Preservation Ordinance, September 1981.

Stormwater Quality Handbooks Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.

Stormwater Management of the Puget Sound Basin, Technical Manual, Publication #91-75, Washington State Department of Ecology, February 1992.

Water Quality Management Plan for The Lake Tahoe Region, Volume II, Handbook of Management Practices, Tahoe Regional Planning Agency, November 1988.

EXHIBIT "C" (Stormwater Pollution Prevention Plan)



Description and Purpose

Hydraulic Mulch consists of various types of fibrous materials mixed with water and sprayed onto the soil surface in slurry form to provide a layer of temporary protection from wind and water erosion.

Suitable Applications

Hydraulic mulch as a temporary, stand alone, erosion control BMP is suitable for disturbed areas that require temporary protection from wind and water erosion until permanent soil stabilization activities commence. Examples include:

- Rough-graded areas that will remain inactive for longer than permit-required thresholds (e.g., 14 days) or otherwise require stabilization to minimize erosion or prevent sediment discharges.
- Soil stockpiles.
- Slopes with exposed soil between existing vegetation such as trees or shrubs.
- Slopes planted with live, container-grown vegetation or plugs.
- Slopes burned by wildfire.
- To stabilize earthen berms
- Areas seeded by broadcasting or drilling

Categories

EC	Erosion Control	<input checked="" type="checkbox"/>
SE	Sediment Control	<input type="checkbox"/>
TC	Tracking Control	<input type="checkbox"/>
WE	Wind Erosion Control	<input checked="" type="checkbox"/>
NS	Non-Stormwater Management Control	<input type="checkbox"/>
WM	Waste Management and Materials Pollution Control	<input type="checkbox"/>

Legend:

- Primary Category
- Secondary Category

Targeted Constituents

Sediment	<input checked="" type="checkbox"/>
Nutrients	<input type="checkbox"/>
Trash	<input type="checkbox"/>
Metals	<input type="checkbox"/>
Bacteria	<input type="checkbox"/>
Oil and Grease	<input type="checkbox"/>
Organics	<input type="checkbox"/>

Potential Alternatives

- EC-4 Hydroseeding
- EC-5 Soil Binders
- EC-6 Straw Mulch
- EC-7 Geotextiles and Mats
- EC-8 Wood Mulching
- EC-14 Compost Blanket
- EC-16 Non-Vegetative Stabilization

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- Temporary stabilization during high wind conditions

Hydraulic mulch can also be applied to augment other erosion control BMPs such as:

- In conjunction with straw mulch (see EC-6 Straw Mulch) where the rate of hydraulic mulch is reduced to 100-500 lbs per acre and the slurry is applied over the straw as a tackifying agent to hold the straw in place.
- Supplemental application of soil amendments, such as fertilizer, lime, gypsum, soil bio-stimulants or compost.

Limitations

In general, hydraulic mulch is not limited by slope length, gradient or soil type. However, the following limitations typically apply:

- Most hydraulic mulch applications, particularly bonded fiber matrices (BFMs), require at least 24 hours to dry before rainfall occurs.
- Temporary applications (i.e., without a vegetative component) may require a second application in order to remain effective for an entire rainy season.
- Treatment areas must be accessible to hydraulic mulching equipment.
- Availability of water sources in remote areas for mixing and application.
- As a stand-alone temporary BMP, hydraulic mulches may need to be re-applied to maintain their erosion control effectiveness, typically after 6-12 months depending on the type of mulch used.
- Availability of hydraulic mulching equipment may be limited just prior to the rainy season and prior to storms due to high demand.
- Cellulose fiber mulches alone may not perform well on steep slopes or in course soils.
- This BMP consists of a mixture of several constituents (e.g., fibers/mulches, compost, tackifiers, and other chemical constituents), some of which may be proprietary and may come pre-mixed by the manufacturer. The water quality impacts of these constituents are relatively unknown, and some may have water quality impacts due to their chemical makeup. Refer to specific chemical properties identified in the product Safety Data Sheet (may not include ecological information); products should be evaluated for project-specific implementation by the SWPPP Preparer. Refer to factsheet EC-05 for further guidance on selecting soil binders.
- A water supply is needed to refill hydro mulch equipment tank.
- Cannot be disturbed by walking or driving on the surface after application.
- Recommend using in conjunction with other BMPs (i.e., fiber rolls, etc.).

EXHIBIT "C" (Stormwater Pollution Prevention Plan)

Implementation

- Where feasible, it is preferable to prepare soil surfaces prior to application by roughening embankments and fill areas with a crimping or punching type roller or by track walking.
- The majority of hydraulic mulch applications do not necessarily require surface/soil preparation (See EC-15 Soil Preparation) although in almost every case where re-vegetation is included as part of the practice, soil preparation can be beneficial. One of the advantages of hydraulic mulch over other erosion control methods is that it can be applied in areas where soil preparation is precluded by site conditions, such as steep slopes, rocky soils, or inaccessibility.
- Avoid mulch over spray onto roads, sidewalks, drainage channels, existing vegetation, etc.
- Hydraulic mulching is generally performed utilizing specialized machines that have a large water-holding/mixing tank and some form of mechanical agitation or other recirculation method to keep water, mulch and soil amendments in suspension. The mixed hydraulic slurry can be applied from a tower sprayer on top of the machine or by extending a hose to areas remote from the machine.
- Where possible apply hydraulic mulch from multiple directions to adequately cover the soil. Application from a single direction can result in shadowing, uneven coverage and failure of the BMP.
- Hydraulic mulch can also include a vegetative component, such as seed, rhizomes, or stolons (see EC-4 Hydraulic Seed).
- Typical hydraulic mulch application rates range from 2,000 pounds per acre for standard mulches (SMs) to 3,500 lbs. per acre for BFMs. However, the required amount of hydraulic mulch to provide adequate coverage of exposed topsoil may appear to exceed the standard rates when the roughness of the soil surface is changed due to soil preparation methods (see EC-15 Soil Preparation) or by slope gradient.
- Other factors such as existing soil moisture and soil texture can have a profound effect on the amount of hydraulic mulch required (i.e. application rate) applied to achieve an erosion-resistant covering.
- Avoid use of mulch without a tackifier component, especially on slopes.
- Mulches used in the hydraulic mulch slurry can include:
 - Cellulose fiber (paper- or corn-based)
 - Wood fibers
 - Cotton
 - Synthetics
 - Compost (see EC-14, Compost Blanket)
 - Straw

- Additional guidance on the comparison and selection of temporary slope stabilization methods is provided in Appendix F of the Handbook.

Categories of Hydraulic Mulches

Standard Hydraulic Mulch (SM)

Standard hydraulic mulches are generally applied at a rate of 2,000 lbs. per acre and are manufactured containing around 5% tackifier (i.e. soil binder), usually a plant-derived guar or psyllium type. Most standard mulches are green in color derived from food-color based dyes.

Hydraulic Matrices (HM) and Stabilized Fiber Matrices (SFM)

Hydraulic matrices and stabilized fiber matrices are slurries which contain increased levels of tackifiers/soil binders; usually 10% or more by weight. HMs and SFMs have improved performance compared to a standard hydraulic mulch (SM) because of the additional percentage of tackifier and because of their higher application rates, typically 2,500 – 4,000 lbs. per acre. Hydraulic matrices can include a mixture of fibers, for example, a 50/50 blend of paper and wood fiber. In the case of an SFM, the tackifier/soil binder is specified as a polyacrylamide (PAM).

Bonded Fiber Matrix (BFM)

Bonded fiber matrices (BFMs) are hydraulically-applied systems of fibers, adhesives (typically guar- or polymer-based) and chemical cross-links. Upon drying, the slurry forms an erosion-resistant blanket that prevents soil erosion and promotes vegetation establishment. The cross-linked adhesive in the BFM should be biodegradable and should not dissolve or disperse upon re-wetting. BFMs are typically applied at rates from 3,000 to 4,000 lbs. per acre based on the manufacturer's recommendation. BFMs should not be applied immediately before, during or immediately after rainfall or if the soil is saturated. Depending on the product, BFMs typically require 12 to 24 hours to dry and become effective.

Hydraulic Compost Matrix (HCM)

Hydraulic compost matrix (HCM) is a field-derived practice whereby finely graded or sifted compost is introduced into the hydraulic mulch slurry. A guar-type tackifier can be added for steeper slope applications as well as any specified seed mixtures. An HCM can help to accelerate seed germination and growth. HCMs are particularly useful as an in-fill for three-dimensional re-vegetation geocomposites, such as turf reinforcement mats (TRM) (see EC-7 Geotextiles and Mats).

Costs

Average installed costs for hydraulic mulch categories are provided in Table 1, below.

EXHIBIT "C" (Stormwater Pollution Prevention Plan)

**Table
HYDRAULIC MULCH BMPs
INSTALLED COSTS**

BMP	Installed Cost/Acre
Standard Hydraulic Mulching (SM)	\$2,100 - \$4,700 per acre
Hydraulic Matrices (HM) and Stabilized Fiber Matrices	
Guar-based	\$2,600 - \$5,200 per acre
PAM-based	\$3,200 - \$7,200 per acre
Bonded Fiber Matrix (BFM)	\$5,000 - \$8,800 per acre
Hydraulic Compost Matrix (HCM)	\$3,800 - \$4,500 per acre

Source: Cost information received from individual product manufacturers solicited by Geosyntec Consultants (2004). Adjusted for inflation (2016 dollars) by Tetra Tech, Inc.

Inspection and Maintenance

- Maintain an unbroken, temporary mulched ground cover throughout the period of construction when the soils are not being reworked.
- BMPs must be inspected in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- Areas where erosion is evident should be repaired and BMPs re-applied as soon as possible. Care should be exercised to minimize the damage to protected areas while making repairs, as any area damaged will require re-application of BMPs.
- Compare the number of bags or weight of applied mulch to the area treated to determine actual application rates and compliance with specifications.

References

Soil Stabilization BMP Research for Erosion and Sediment Controls: Cost Survey Technical Memorandum, State of California Department of Transportation (Caltrans), July 2007.

Controlling Erosion of Construction Sites, Agricultural Information #347, U.S. Department of Agriculture (USDA), Natural Resources Conservation Service (NRCS) (formerly Soil Conservation Service – SCS).

Guides for Erosion and Sediment Control in California, USDA Soils Conservation Service, January 1991.

Manual of Standards of Erosion and Sediment Control Measures, Association of Bay Area Governments, May 1995.

Sedimentation and Erosion Control, an Inventory of Current Practices Draft, US EPA, April 1990.

EXHIBIT "C" (Stormwater Pollution Prevention Plan)

Soil Erosion by Water, Agriculture Information Bulletin #513, U.S. Department of Agriculture, Soil Conservation Service.

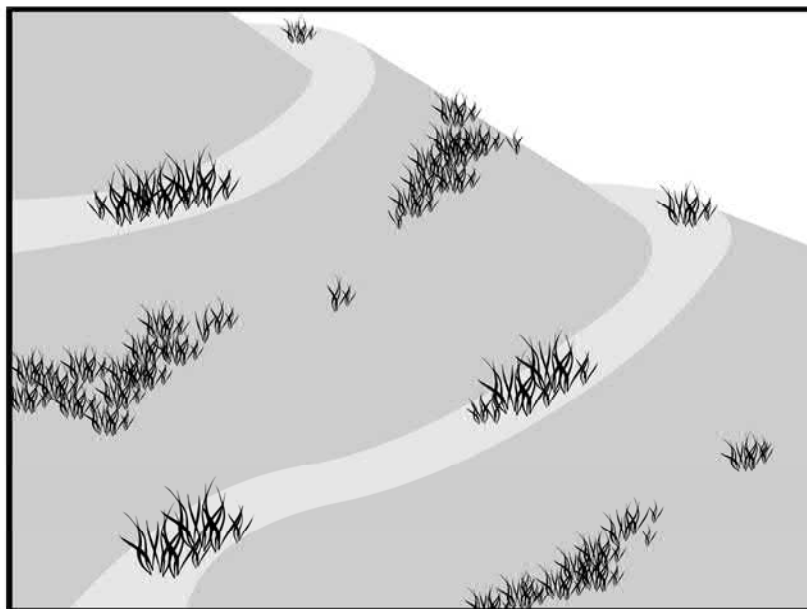
Stormwater Quality Handbooks Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), March 2003.

Guidance Document: Soil Stabilization for Temporary Slopes, State of California Department of Transportation (Caltrans), November 1999

Stormwater Management of the Puget Sound Basin, Technical Manual, Publication #91-75, Washington State Department of Ecology, February 1992.

Water Quality Management Plan for the Lake Tahoe Region, Volume II, Handbook of Management Practices, Tahoe Regional Planning Agency, November 1988.

EXHIBIT "C" (Stormwater Pollution Prevention Plan)



Description and Purpose

Hydroseeding typically consists of applying a mixture of a hydraulic mulch, seed, and water with the possible addition of tackifier, compost, mycorrhizae inoculant, fertilizer, and/or soil conditioner, to temporarily protect exposed soils from erosion by water and wind. Hydraulic seeding, or hydroseeding, is simply the method by which temporary or permanent seed is applied to the soil surface and temporary erosion control is established by means of the mulch component.

Suitable Applications

Hydroseeding is suitable for disturbed areas requiring temporary protection until permanent stabilization is established, for disturbed areas that will be re-disturbed following an extended period of inactivity, or to apply permanent stabilization measures. Hydroseeding without mulch or other cover (e.g., EC-7, Geotextiles and Mats) is not a stand-alone erosion control BMP and should be combined with additional measures until vegetation establishment.

Typical applications for hydroseeding include:

- Disturbed soil/graded areas where permanent stabilization or continued earthwork is not anticipated prior to seed germination.
- Cleared and graded areas exposed to seasonal rains or temporary irrigation.
- To vegetate swales and earthen berms.

Categories

EC	Erosion Control	<input checked="" type="checkbox"/>
SE	Sediment Control	
TC	Tracking Control	
WE	Wind Erosion Control	<input checked="" type="checkbox"/>
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	

Legend:

- Primary Category
- Secondary Category

Targeted Constituents

Sediment	<input checked="" type="checkbox"/>
Nutrients	
Trash	
Metals	
Bacteria	
Oil and Grease	
Organics	

Potential Alternatives

- EC-3 Hydraulic Mulch
- EC-5 Soil Binders
- EC-6 Straw Mulch
- EC-7 Geotextiles and Mats
- EC-8 Wood Mulching
- EC-14 Compost Blanket
- EC-16 Non-Vegetative Stabilization

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- Areas not subject to heavy wear by construction equipment or high traffic.

Limitations

- Availability of hydroseeding equipment may be limited just prior to the rainy season and prior to storms due to high demand.
- Hydraulic seed should be applied with hydraulic mulch or a stand-alone hydroseed application should be followed by one of the following:
 - Straw mulch (see Straw Mulch EC-6)
 - Rolled erosion control products (see Geotextiles and Mats EC-7)
 - Application of Compost Blanket (see Compost Blanket EC-14)

Hydraulic seed may be used alone only on small flat surfaces when there is sufficient time in the season to ensure adequate vegetation establishment and coverage to provide adequate erosion control.

- Hydraulic seed without mulch does not provide immediate erosion control.
- Temporary seeding may not be appropriate for steep slopes (i.e., slopes readily prone to rill erosion or without sufficient topsoil).
- Temporary seeding may not be appropriate in dry periods without supplemental irrigation.
- Temporary vegetation may have to be removed before permanent vegetation is applied.
- Temporary vegetation may not be appropriate for short term inactivity (i.e., less than 3-6 months).
- Vegetation may not establish when hydroseed is applied to very compact soils.
- Mulch may inhibit germination when applied at high rates.
- This BMP consists of a mixture of several constituents (e.g., fibers/mulches, tackifiers, and other chemical constituents), some of which may be proprietary and may come pre-mixed by the manufacturer. The water quality impacts of these constituents are relatively unknown, and some may have water quality impacts due to their chemical makeup. Additionally, these constituents may require non-visible pollutant monitoring. Refer to specific chemical properties identified in the product's Safety Data Sheet (SDS), although, note that not all SDS's provide ecological information; products should be evaluated for project-specific implementation by the QSD. Refer to fact sheet EC-05, Soil Binders, for further guidance on selecting soil binders.

Implementation

In order to select appropriate hydraulic seed mixtures, an evaluation of site conditions should be performed with respect to:

- Soil conditions
- Site topography and exposure (sun/wind)
- Season and climate
- Vegetation types
- Maintenance requirements
- Sensitive adjacent areas
- Water availability
- Plans for permanent vegetation

The local office of the U.S.D.A. Natural Resources Conservation Service (NRCS), Resource Conservation Districts and Agricultural Extension Service can provide information on appropriate seed mixes.

The following steps should be followed for implementation:

- Where appropriate or feasible, soil should be prepared to receive the seed by disking or otherwise scarifying (See EC-15, Soil Preparation) the surface to eliminate crust, improve air and water infiltration and create a more favorable environment for germination and growth.
- Avoid use of hydraulic seed in areas where the BMP would be incompatible with future earthwork activities.
- Hydraulic seed can be applied using a multiple step or one step process.
 - In a multiple step process, hydraulic seed is applied first, followed by mulch or a Rolled Erosion Control Product (RECP).
 - In the one step process, hydraulic seed is applied with hydraulic mulch in a hydraulic matrix. When the one step process is used to apply the mixture of fiber, seed, etc., the seed rate should be increased to compensate for all seeds not having direct contact with the soil.
- All hydraulically seeded areas should have mulch, or alternate erosion control cover to keep seeds in place and to moderate soil moisture and temperature until the seeds germinate and grow.
- All seeds should be in conformance with the California State Seed Law of the Department of Agriculture. Each seed bag should be delivered to the site sealed and clearly marked as to species, purity, percent germination, dealer's guarantee, and dates of test. The container should be labeled to clearly reflect the amount of Pure Live Seed (PLS) contained. All legume seed should be pellet inoculated. Inoculant sources should be species specific and should be applied at a rate of 2 lb of inoculant per 100 lb seed.
- Commercial fertilizer should conform to the requirements of the California Food and Agricultural Code, which can be found at: http://www.leginfo.ca.gov/.html/fac_table_of_contents.html. Fertilizer should be pelleted or granular form.
- Follow up applications should be made as needed to cover areas of poor coverage or germination/vegetation establishment and to maintain adequate soil protection.
- Avoid over spray onto roads, sidewalks, drainage channels, existing vegetation, etc.

- Additional guidance on the comparison and selection of temporary slope stabilization methods is provided in Appendix F of the Handbook.

Costs

Average cost for installation and maintenance may vary from as low as \$2,400 per acre for flat slopes and stable soils, to \$5,200 per acre for moderate to steep slopes and/or erosive soils. Cost of seed mixtures vary based on types of required vegetation.

BMP	Installed Cost per Acre
Hydraulic Seed	\$2,400-\$5,200

Source: Cost information received from individual product manufacturers solicited by Geosyntec Consultants (2004). Adjusted for inflation (2016 dollars) by Tetra Tech, Inc.

Inspection and Maintenance

- BMPs must be inspected in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- Areas where erosion is evident should be repaired and BMPs re-applied as soon as possible. Care should be exercised to minimize the damage to protected areas while making repairs, as any area damaged will require re-application of BMPs.
- Where seeds fail to germinate, or they germinate and die, the area must be re-seeded, fertilized, and mulched within the planting season, using not less than half the original application rates.
- Irrigation systems, if applicable, should be inspected daily while in use to identify system malfunctions and line breaks. When line breaks are detected, the system must be shut down immediately and breaks repaired before the system is put back into operation.
- Irrigation systems should be inspected for complete coverage and adjusted as needed to maintain complete coverage.

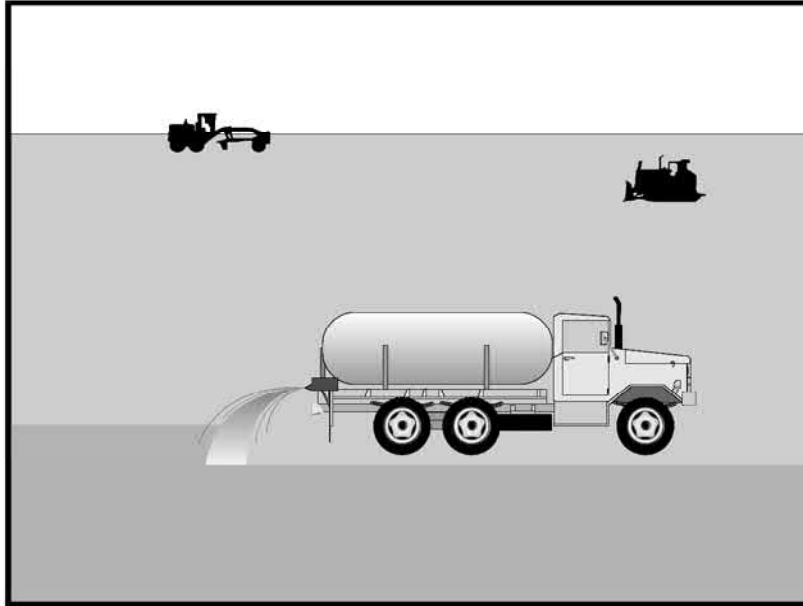
References

Soil Stabilization BMP Research for Erosion and Sediment Controls: Cost Survey Technical Memorandum, State of California Department of Transportation (Caltrans), July 2007.

Stormwater Quality Handbooks Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), March 2003.

Guidance Document: Soil Stabilization for Temporary Slopes, State of California Department of Transportation (Caltrans), November 1999.

EXHIBIT "C" (Stormwater Pollution Prevention Plan)



Description and Purpose

Soil binding consists of application and maintenance of a soil stabilizer to exposed soil surfaces. Soil binders are materials applied to the soil surface to temporarily prevent water and wind induced erosion of exposed soils on construction sites.

Suitable Applications

Soil binders are typically applied to disturbed areas requiring temporary protection. Because soil binders, when used as a stand-alone practice, can often be incorporated into the soil, they are a good alternative to mulches in areas where grading activities will soon resume. Soil binders are commonly used in the following areas:

- Rough graded soils that will be inactive for a short period of time.
- Soil stockpiles.
- Temporary haul roads prior to placement of crushed rock.
- Compacted soil road base.
- Construction staging, materials storage, and layout areas.
- Slopes and areas requiring stabilization prior to rain.
- Disturbed areas subject to high winds.

Categories

EC	Erosion Control	<input checked="" type="checkbox"/>
SE	Sediment Control	
TC	Tracking Control	
WE	Wind Erosion Control	<input checked="" type="checkbox"/>
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	

Legend:

- Primary Category
- Secondary Category

Targeted Constituents

Sediment	<input checked="" type="checkbox"/>
Nutrients	
Trash	
Metals	
Bacteria	
Oil and Grease	
Organics	

Potential Alternatives

- EC-3 Hydraulic Mulch
- EC-4 Hydroseeding
- EC-6 Straw Mulch
- EC-7 Geotextiles and Mats
- EC-8 Wood Mulching

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Limitations

- Soil binders are temporary in nature and may need reapplication.
- Soil binders require a minimum curing time until fully effective, as prescribed by the manufacturer. Curing time may be 24 hours or longer. Soil binders may need reapplication after a storm event.
- Soil binders will generally experience spot failures during heavy rainfall events. If runoff penetrates the soil at the top of a slope treated with a soil binder, it is likely that the runoff will undercut the stabilized soil layer and discharge at a point further down slope.
- Plant-material-based soil binders do not generally hold up to pedestrian or vehicular traffic across treated areas as well as polymeric emulsion blends or cementitious-based binders.
- Soil binders may not sufficiently penetrate compacted soils.
- Some soil binders are soil texture specific in terms of their effectiveness. For example, polyacrylamides (PAMs) work very well on silt and clayey soils but their performance decreases dramatically in sandy soils.
- Some soil binders may not perform well with low relative humidity. Under rainy conditions, some agents may become slippery or leach out of the soil.
- Soil binders may not cure if low temperatures occur within 24 hours of application.
- The water quality impacts of some chemical soil binders are relatively unknown, and some may have water quality impacts due to their chemical makeup. Additionally, these chemicals may require non-visible pollutant monitoring. Products should be evaluated for project-specific implementation by the SWPPP Preparer. Refer to the product Material Safety Data Sheet for chemical properties.

Implementation

General Considerations

- Soil binders should conform to local municipality specifications and requirements.
- Site soil types will dictate appropriate soil binders to be used.
- A soil binder must be environmentally benign (non-toxic to plant and animal life), easy to apply, easy to maintain, economical, and should not stain paved or painted surfaces. Soil binders should not pollute stormwater when cured. Obtain a Safety Data Sheet (SDS) from the manufacturer to ensure non-toxicity (note however, the SDS may not include ecological information).
- Stormwater runoff from PAM treated soils should pass through one of the following sediment control BMP prior to discharging to surface waters.
 - When the total drainage area is greater than or equal to 5 acres, PAM treated areas should drain to a sediment basin.

- Areas less than 5 acres should drain to sediment control BMPs, such as a sediment trap, or a series of check dams. The total number of check dams used should be maximized to achieve the greatest amount of settlement of sediment prior to discharging from the site. Each check dam should be spaced evenly in the drainage channel through which stormwater flows are discharged off site.
- Performance of soil binders depends on temperature, humidity, and traffic across treated areas.
- Avoid over spray onto roads, sidewalks, drainage channels, existing vegetation, etc.
- Some soil binders are designed for application to roads.
- Additional guidance on the comparison and selection of temporary slope stabilization methods is provided in Appendix F of the Handbook.

Selecting a Soil Binder

Properties of common soil binders used for erosion control are provided on Table 1 at the end of this Fact Sheet. Use Table 1 to select an appropriate soil binder. Refer to WE-1, Wind Erosion Control, for dust control soil binders.

Factors to consider when selecting a soil binder include the following:

- Suitability to situation - Consider where the soil binder will be applied, if it needs a high resistance to leaching or abrasion, and whether it needs to be compatible with any existing vegetation. Determine the length of time soil stabilization will be needed, and if the soil binder will be placed in an area where it will degrade rapidly. In general, slope steepness is not a discriminating factor for the listed soil binders.
- Soil types and surface materials - Fines and moisture content are key properties of surface materials. Consider a soil binder's ability to penetrate, likelihood of leaching, and ability to form a surface crust on the surface materials.
- Frequency of application - The frequency of application is related to the functional longevity of the binder, which can be affected by subgrade conditions, surface type, climate, and maintenance schedule.
- Frequent applications could lead to high costs. Application frequency may be minimized if the soil binder has good penetration, low evaporation, and good longevity. Consider also that frequent application will require frequent equipment clean up.

Plant-Material-Based (Short Lived, <6 months) Binders

Guar: Guar is a non-toxic, biodegradable, natural galactomannan-based hydrocolloid treated with dispersant agents for easy field mixing. It should be mixed with water at the rate of 11 to 15 lb per 1,000 gallons. Recommended minimum application rates are as follows:

Application Rates for Guar Soil Stabilizer

Slope (H:V):	Flat	4:1	3:1	2:1	1:1
lb/acre:	40	45	50	60	70

Psyllium: Psyllium is composed of the finely ground muciloid coating of plantago seeds that is applied as a dry powder or in a wet slurry to the surface of the soil. It dries to form a firm but rewettable membrane that binds soil particles together but permits germination and growth of seed. Psyllium requires 12 to 18 hours drying time. Application rates should be from 80 to 200 lb/acre, with enough water in solution to allow for a uniform slurry flow.

Starch: Starch is non-ionic, cold water soluble (pre-gelatinized) granular cornstarch. The material is mixed with water and applied at the rate of 150 lb/acre. Approximate drying time is 9 to 12 hours.

Plant-Material-Based (Long Lived, 6-12 months) Binders

Pitch and Rosin Emulsion: Generally, a non-ionic pitch and rosin emulsion has a minimum solids content of 48%. The rosin should be a minimum of 26% of the total solids content. The soil stabilizer should be non-corrosive, water dilutable emulsion that upon application cures to a water insoluble binding and cementing agent. For soil erosion control applications, the emulsion is diluted and should be applied as follows:

- For clayey soil: 5 parts water to 1-part emulsion
- For sandy soil: 10 parts water to 1-part emulsion

Application can be by water truck or hydraulic seeder with the emulsion and product mixture applied at the rate specified by the manufacturer.

Polymeric Emulsion Blend Binders

Acrylic Copolymers and Polymers: Polymeric soil stabilizers should consist of a liquid or solid polymer or copolymer with an acrylic base that contains a minimum of 55% solids. The polymeric compound should be handled and mixed in a manner that will not cause foaming or should contain an anti-foaming agent. The polymeric emulsion should not exceed its shelf life or expiration date; manufacturers should provide the expiration date. Polymeric soil stabilizer should be readily miscible in water, non-injurious to seed or animal life, non-flammable, should provide surface soil stabilization for various soil types without totally inhibiting water infiltration, and should not re-emulsify when cured. The applied compound typically requires 12 to 24 hours drying time. Liquid copolymer should be diluted at a rate of 10 parts water to 1-part polymer and the mixture applied to soil at a rate of 1,175 gallons/acre.

Liquid Polymers of Methacrylates and Acrylates: This material consists of a tackifier/sealer that is a liquid polymer of methacrylates and acrylates. It is an aqueous 100% acrylic emulsion blend of 40% solids by volume that is free from styrene, acetate, vinyl, ethoxylated surfactants or silicates. For soil stabilization applications, it is diluted with water in accordance with the manufacturer's recommendations and applied with a hydraulic seeder at the rate of 20 gallons/acre. Drying time is 12 to 18 hours after application.

EXHIBIT "C" (Stormwater Pollution Prevention Plan)

Copolymers of Sodium Acrylates and Acrylamides: These materials are non-toxic, dry powders that are copolymers of sodium acrylate and acrylamide. They are mixed with water and applied to the soil surface for erosion control at rates that are determined by slope gradient:

Slope Gradient (H:V)	lb/acre
Flat to 5:1	3.0 – 5.0
5:1 to 3:1	5.0 – 10.0
2:1 to 1:1	10.0 – 20.0

EXHIBIT "C" (Stormwater Pollution Prevention Plan)

Poly-Acrylamide (PAM) and Copolymer of Acrylamide: Linear copolymer polyacrylamide for use as a soil binder is packaged as a dry flowable solid, as a liquid. Refer to the manufacturer's recommendation for dilution and application rates as they vary based on liquid or dry form, site conditions and climate.

- Limitations specific to PAM are as follows:
 - Do not use PAM on a slope that flows into a water body without passing through a sediment trap or sediment basin.
 - The specific PAM copolymer formulation must be anionic. Cationic PAM should not be used in any application because of known aquatic toxicity problems. Only the highest drinking water grade PAM, certified for compliance with ANSI/NSF Standard 60 for drinking water treatment, should be used for soil applications.
 - PAM designated for erosion and sediment control should be "water soluble" or "linear" or "non-cross linked".
 - PAM should not be used as a stand-alone BMP to protect against water-based erosion. When combined with mulch, its effectiveness increases dramatically.

Hydro-Colloid Polymers: Hydro-Colloid Polymers are various combinations of dry flowable poly-acrylamides, copolymers and hydro-colloid polymers that are mixed with water and applied to the soil surface at rates of 55 to 60 lb/acre. Drying times are 0 to 4 hours.

Cementitious-Based Binders

Gypsum: This is a formulated gypsum-based product that readily mixes with water and mulch to form a thin protective crust on the soil surface. It is composed of high purity gypsum that is ground, calcined and processed into calcium sulfate hemihydrate with a minimum purity of 86%. It is mixed in a hydraulic seeder and applied at rates 4,000 to 12,000 lb/acre. Drying time is 4 to 8 hours.

Applying Soil Binders

After selecting an appropriate soil binder, the untreated soil surface must be prepared before applying the soil binder. The untreated soil surface must contain sufficient moisture to assist the agent in achieving uniform distribution. In general, the following steps should be followed:

- Follow manufacturer's written recommendations for application rates, pre-wetting of application area, and cleaning of equipment after use.
- Prior to application, roughen embankment and fill areas.
- Consider the drying time for the selected soil binder and apply with sufficient time before anticipated rainfall. Soil binders should not be applied during or immediately before rainfall.
- Avoid over spray onto roads, sidewalks, drainage channels, sound walls, existing vegetation, etc.

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- Soil binders should not be applied to frozen soil, areas with standing water, under freezing or rainy conditions, or when the temperature is below 40°F during the curing period.
- More than one treatment is often necessary, although the second treatment may be diluted or have a lower application rate.
- Generally, soil binders require a minimum curing time of 24 hours before they are fully effective. Refer to manufacturer's instructions for specific cure time.
- For liquid agents:
 - Crown or slope ground to avoid ponding.
 - Uniformly pre-wet ground at 0.03 to 0.3 gal/yd² or according to manufacturer's recommendations.
 - Apply solution under pressure. Overlap solution 6 to 12 in.
 - Allow treated area to cure for the time recommended by the manufacturer; typically, at least 24 hours.
 - Apply second treatment before first treatment becomes ineffective, using 50% application rate.
 - In low humidities, reactivate chemicals by re-wetting with water at 0.1 to 0.2 gal/yd².

Costs

Costs vary according to the soil stabilizer selected for implementation. The following are approximate installed costs:

Soil Binder	Cost per Acre
Plant-Material-Based (Short Lived) Binders	\$900-\$1,200
Plant-Material-Based (Long Lived) Binders	\$1,500-\$1,900
Polymeric Emulsion Blend Binders	\$900-\$1,900
Cementitious-Based Binders	\$1,000-\$1,500

Source: Cost information received from individual product manufacturers solicited by Geosyntec Consultants (2004). Adjusted for inflation (2016 dollars) by Tetra Tech Inc.

Inspection and Maintenance

- BMPs must be inspected in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- Areas where erosion is evident should be repaired and BMPs re-applied as soon as possible. Care should be exercised to minimize the damage to protected areas while making repairs, as any area damaged will require re-application of BMPs.

- Reapply the selected soil binder as needed to maintain effectiveness.

Table 1 Properties of Soil Binders for Erosion Control

Evaluation Criteria	Binder Type			
	Plant Material Based (Short Lived)	Plant Material Based (Long Lived)	Polymeric Emulsion Blends	Cementitious-Based Binders
Relative Cost	Low	Moderate to High	Low to High	Low to Moderate
Resistance to Leaching	High	High	Low to Moderate	Moderate
Resistance to Abrasion	Moderate	Low	Moderate to High	Moderate to High
Longevity	Short to Medium	Medium	Medium to Long	Medium
Minimum Curing Time before Rain	9 to 18 hours	19 to 24 hours	0 to 24 hours	4 to 8 hours
Compatibility with Existing Vegetation	Good	Poor	Poor	Poor
Mode of Degradation	Biodegradable	Biodegradable	Photodegradable/ Chemically Degradable	Photodegradable/ Chemically Degradable
Labor Intensive	No	No	No	No
Specialized Application Equipment	Water Truck or Hydraulic Mulcher	Water Truck or Hydraulic Mulcher	Water Truck or Hydraulic Mulcher	Water Truck or Hydraulic Mulcher
Liquid/Powder	Powder	Liquid	Liquid/Powder	Powder
Surface Crusting	Yes, but dissolves on rewetting	Yes	Yes, but dissolves on rewetting	Yes
Clean Up	Water	Water	Water	Water
Erosion Control Application Rate	Varies ⁽¹⁾	Varies ⁽¹⁾	Varies ⁽¹⁾	4,000 to 12,000 lbs/acre

(1) See Implementation for specific rates.

EXHIBIT "C" (Stormwater Pollution Prevention Plan)

References

Erosion Control Pilot Study Report, State of California Department of Transportation (Caltrans), June 2000.

Manual of Standards of Erosion and Sediment Control Measures, Association of Bay Area Governments, May 1995.

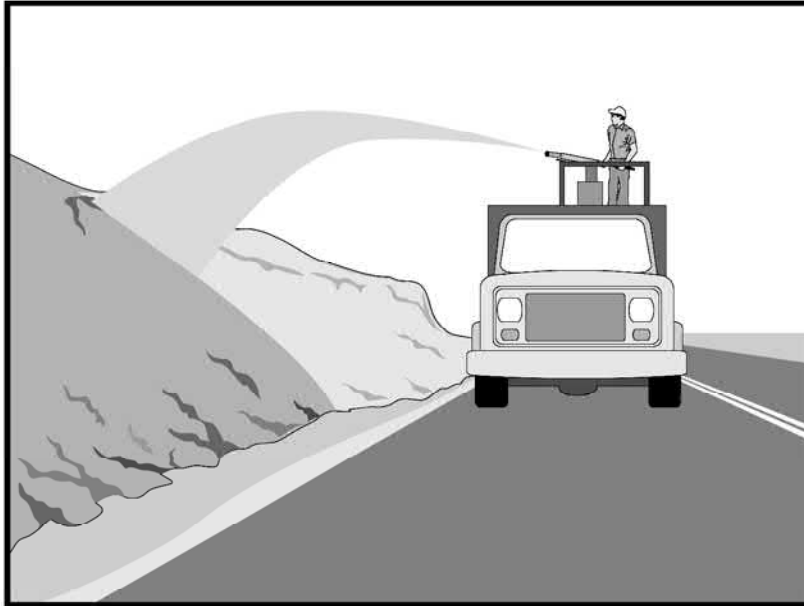
Sedimentation and Erosion Control, An Inventory of Current Practices Draft, US EPA, April 1990.

Stormwater Quality Handbooks Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), March 2003.

Guidance Document: Soil Stabilization for Temporary Slopes, State of California Department of Transportation (Caltrans), November 1999.

Stormwater Management for Construction Activities, Developing Pollution Prevention Plans and Best Management Practices, EPA 832-R-92005; USEPA, April 1992.

EXHIBIT "C" (Stormwater Pollution Prevention Plan)



Description and Purpose

Straw mulch consists of placing a uniform layer of straw and incorporating it into the soil with a studded roller or crimper or anchoring it with a tackifier or stabilizing emulsion. Straw mulch protects the soil surface from the impact of rain drops, preventing soil particles from becoming dislodged.

Suitable Applications

Straw mulch is suitable for disturbed areas requiring temporary protection until permanent stabilization is established. Straw mulch can be specified for the following applications:

- As a stand-alone BMP on disturbed areas until soils can be prepared for permanent vegetation. The longevity of straw mulch is typically less than six months.
- Applied in combination with temporary seeding strategies
- Applied in combination with permanent seeding strategies to enhance plant establishment and final soil stabilization
- Applied around containerized plantings to control erosion until the plants become established to provide permanent stabilization

Limitations

Availability of straw and straw blowing equipment may be limited just prior to the rainy season and prior to storms due to high demand.

Categories

EC	Erosion Control	<input checked="" type="checkbox"/>
SE	Sediment Control	
TC	Tracking Control	
WE	Wind Erosion Control	<input checked="" type="checkbox"/>
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	

Legend:

- Primary Category
- Secondary Category

Targeted Constituents

Sediment	<input checked="" type="checkbox"/>
Nutrients	
Trash	
Metals	
Bacteria	
Oil and Grease	
Organics	

Potential Alternatives

- EC-3 Hydraulic Mulch
- EC-4 Hydroseeding
- EC-5 Soil Binders
- EC-7 Geotextiles and Mats
- EC-8 Wood Mulching
- EC-14 Compost Blanket

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- There is a potential for introduction of weed seed and unwanted plant material if weed-free agricultural straw is not specified.
- Straw mulch applied by hand is more time intensive and potentially costly.
- Wind may limit application of straw and blow straw into undesired locations.
- May have to be removed prior to permanent seeding or prior to further earthwork.
- “Punching” of straw does not work in sandy soils, necessitating the use of tackifiers.
- Potential fugitive dust control issues associated with straw applications can occur. Application of a stabilizing emulsion or a water stream at the same time straw is being blown can reduce this problem.
- Use of plastic netting should be avoided in areas where wildlife may be entrapped and may be prohibited for projects in certain areas with sensitive wildlife species, especially reptiles and amphibians.

Implementation

- Straw should be derived from weed-free wheat, rice, or barley. Where required by the plans, specifications, permits, or environmental documents, native grass straw should be used.
- Use tackifier to anchor straw mulch to the soil on slopes.
- Crimping, punch roller-type rollers, or track walking may also be used to incorporate straw mulch into the soil on slopes. Track walking can be used where other methods are impractical.
- Avoid placing straw onto roads, sidewalks, drainage channels, sound walls, existing vegetation, etc.
- Straw mulch with tackifier should not be applied during or immediately before rainfall.
- Additional guidance on the comparison and selection of temporary slope stabilization methods is provided in Appendix F of the Handbook.

Application Procedures

- When using a tackifier to anchor the straw mulch, roughen embankment or fill areas by rolling with a crimping or punching-type roller or by track walking before placing the straw mulch. Track walking should only be used where rolling is impractical.
- Apply straw at a rate of between 3,000 and 4,000 lb./acre, either by machine or by hand distribution and provide 100% ground cover. A lighter application is used for flat surfaces and a heavier application is used for slopes.
- Evenly distribute straw mulch on the soil surface.
- Anchoring straw mulch to the soil surface by "punching" it into the soil mechanically (incorporating) can be used in lieu of a tackifier.

EXHIBIT "C" (Stormwater Pollution Prevention Plan)

- Methods for holding the straw mulch in place depend upon the slope steepness, accessibility, soil conditions, and longevity.
 - A tackifier acts to glue the straw fibers together and to the soil surface. The tackifier should be selected based on longevity and ability to hold the fibers in place. A tackifier is typically applied at a rate of 125 lb./acre. In windy conditions, the rates are typically 180 lb./acre.
 - On very small areas, a spade or shovel can be used to punch in straw mulch.
 - On slopes with soils that are stable enough and of sufficient gradient to safely support construction equipment without contributing to compaction and instability problems, straw can be "punched" into the ground using a knife blade roller or a straight bladed coultter, known commercially as a "crimper."

Costs

Average annual cost for installation and maintenance is included in the table below. Application by hand is more time intensive and potentially more costly.

BMP	Unit Cost per Acre
Straw mulch, crimped or punched	\$3,150-\$6,900
Straw mulch with tackifier	\$2,300-\$6,200

Source: Cost information received from individual product suppliers solicited by Geosyntec Consultants (2004). Adjusted for inflation (2016 dollars) by Tetra Tech, Inc.

Inspection and Maintenance

- BMPs must be inspected in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- Areas where erosion is evident should be repaired and BMPs re-applied as soon as possible. Care should be exercised to minimize the damage to protected areas while making repairs, as any area damaged will require re-application of BMPs.
- The key consideration in inspection and maintenance is that the straw needs to last long enough to achieve erosion control objectives. Straw mulch as a stand-alone BMP is temporary and is not suited for long-term erosion control.
- Maintain an unbroken, temporary mulched ground cover while disturbed soil areas are inactive. Repair any damaged ground cover and re-mulch exposed areas.
- Reapplication of straw mulch and tackifier may be required to maintain effective soil stabilization over disturbed areas and slopes.

EXHIBIT "C" (Stormwater Pollution Prevention Plan)

References

Soil Stabilization BMP Research for Erosion and Sediment Controls: Cost Survey Technical Memorandum, State of California Department of Transportation (Caltrans), July 2007.

Erosion and Sediment Control Manual, Oregon Department of Environmental Quality, February 2005.

Controlling Erosion of Construction Sites, Agricultural Information Bulletin #347, U.S. Department of Agriculture (USDA), Natural Resources Conservation Service (NRCS) (formerly Soil Conservation Service – SCS).

Guides for Erosion and Sediment Control in California, USDA Soils Conservation Service, January 1991.

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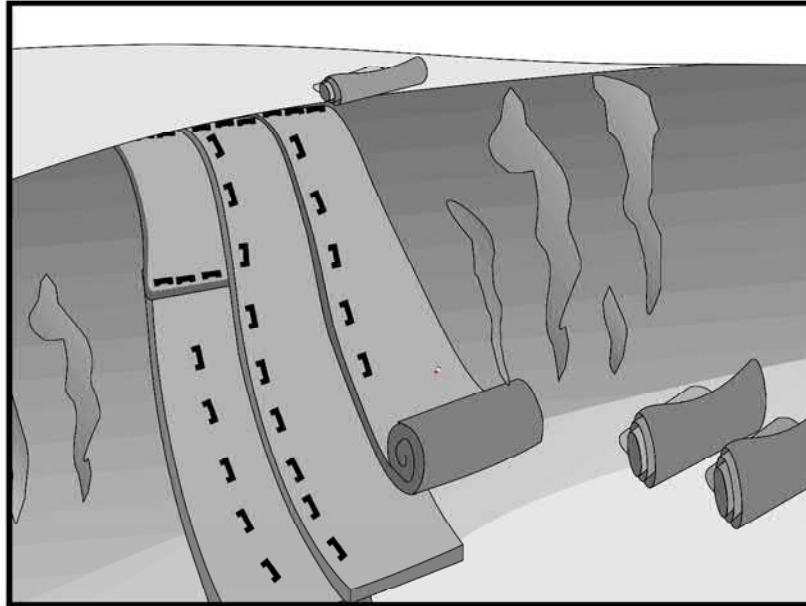
Soil Erosion by Water, Agricultural Information Bulletin #513, U.S. Department of Agriculture, Soil Conservation Service.

Stormwater Quality Handbooks Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), March 2003.

Stormwater Management of the Puget Sound Basin, Technical Manual, Publication #91-75, Washington State Department of Ecology, February 1992.

Water Quality Management Plan for the Lake Tahoe Region, Volume II, Handbook of Management Practices, Tahoe Regional Planning Agency, November 1988.

EXHIBIT "C" (Stormwater Pollution Prevention Plan)



Description and Purpose

Rolled Erosion Control Products (RECPs), also known as erosion control matting or blankets, can be made of natural or synthetic materials or a combination of the two. RECPs are used to cover the soil surface to reduce erosion from rainfall impact, hold soil in place, and absorb and hold moisture near the soil surface. Additionally, RECPs may be used to stabilize soils until vegetation is established or to reinforce non-woody surface vegetation.

Suitable Applications

RECPs are typically applied on slopes where erosion hazard is high, and vegetation will be slow to establish. Matting is also used on stream banks, swales and other drainage channels where moving water at velocities between 3 ft/s and 6 ft/s are likely to cause scour and wash out new vegetation and in areas where the soil surface is disturbed and where existing vegetation has been removed. RECPs may also be used when seeding cannot occur (e.g., late season construction and/or the arrival of an early rain season). RECPs should be considered when the soils are fine grained and potentially erosive. RECPs should be considered in the following situations:

- Steep slopes, generally steeper than 3:1 (H:V).
- Long slopes.
- Slopes where the erosion potential is high.
- Slopes and disturbed soils where mulch must be anchored.

Categories

EC	Erosion Control	<input checked="" type="checkbox"/>
SE	Sediment Control	<input type="checkbox"/>
TC	Tracking Control	<input type="checkbox"/>
WE	Wind Erosion Control	<input checked="" type="checkbox"/>
NS	Non-Stormwater Management Control	<input type="checkbox"/>
WM	Waste Management and Materials Pollution Control	<input type="checkbox"/>

Legend:

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- Secondary Category

Targeted Constituents

Sediment	<input checked="" type="checkbox"/>
Nutrients	<input type="checkbox"/>
Trash	<input type="checkbox"/>
Metals	<input type="checkbox"/>
Bacteria	<input type="checkbox"/>
Oil and Grease	<input type="checkbox"/>
Organics	<input type="checkbox"/>

Potential Alternatives

- EC-3 Hydraulic Mulch
- EC-4 Hydroseeding

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- Disturbed areas where temporary cover is needed, or plants are slow to establish or will not establish.
- Channels with flows exceeding 3.3 ft/s.
- Channels to be vegetated.
- Stockpiles.
- Slopes adjacent to water bodies.

Limitations

- RECP installed costs are generally higher than other erosion control BMPs, limiting their use to areas where other BMPs are ineffective (e.g., channels, steep slopes).
- RECPs may delay seed germination, due to reduction in soil temperature and/or sunlight.
- RECPs are generally not suitable for excessively rocky sites or areas where the final vegetation will be mowed (since staples and netting can catch in mowers). If a staple or pin cannot be driven into the soil because the underlying soil is too hard or rocky, then an alternative BMP should be selected.
- If used for temporary erosion control, RECPs should be removed and disposed of prior to application of permanent soil stabilization measures.
- The use of plastic sheeting should be limited to covering stockpiles or very small graded areas for short periods of time (such as through one imminent storm event) until other measures, such as seeding and mulching, may be installed.
 - Plastic sheeting is easily vandalized, easily torn, photodegradable, and must be disposed of at a landfill.
 - Plastic sheeting results in 100% runoff, which may cause serious erosion problems in the areas receiving the increased flow.
- According to the State Water Board's *CGP Review, Issue #2*, only RECPs that either do not contain plastic netting or contain netting manufactured from 100% biodegradable non-plastic materials, such as jute, sisal, or coir fiber should be used due to plastic pollution and wildlife concerns. If a plastic-netted product is used for temporary stabilization, it must be promptly removed when no longer needed and removed or replaced with non-plastic netted RECPs for final stabilization.
- RECPs may have limitations based on soil type, slope gradient, or channel flow rate; consult the manufacturer for proper selection.
- Not suitable for areas that have foot traffic (tripping hazard) – e.g., pad areas around buildings under construction.
- RECPs that incorporate a plastic netting (e.g. straw blanket typically uses a plastic netting to hold the straw in place) may not be suitable near known wildlife habitat. Wildlife can become trapped in the plastic netting. As per State Water Board guidance, RECPs that

contain plastic netting are discouraged for temporary controls and are not acceptable alternatives for permanent controls. RECPs that do not contain plastic netting or contain netting manufactured from 100% biodegradable non-plastic materials such as jute, sisal, or coir fiber should be used.

- RECPs may have limitations in extremely windy climates; they are susceptible to wind damage and displacement. However, when RECPs are properly trenched at the top and bottom and stapled in accordance with the manufacturer's recommendations, problems with wind can be minimized.

Implementation

Material Selection

- Natural RECPs have been found to be effective where re-vegetation will be provided by re-seeding. The choice of material should be based on the size of area, side slopes, surface conditions such as hardness, moisture, weed growth, and availability of materials.
- Additional guidance on the comparison and selection of temporary slope stabilization methods is provided in Appendix F of the Handbook.
- The following natural and synthetic RECPs are commonly used:

Geotextiles

- Material can be a woven or a non-woven polypropylene fabric with minimum thickness of 0.06 in., minimum width of 12 ft and should have minimum tensile strength of 150 lbs (warp), 80 lbs (fill) in conformance with the requirements in ASTM Designation: D 4632. The permittivity of the fabric should be approximately 0.07 sec^{-1} in conformance with the requirements in ASTM Designation: D4491. The fabric should have an ultraviolet (UV) stability of 70 percent in conformance with the requirements in ASTM designation: D4355. Geotextile blankets must be secured in place with wire staples or sandbags and by keying into tops of slopes to prevent infiltration of surface waters under geotextile. Staples should be made of minimum 11-gauge steel wire and should be U-shaped with 8 in. legs and 2 in. crown.
- Geotextiles may be reused if they are suitable for the use intended.

Plastic Covers

- Generally plastic sheeting should only be used as stockpile covering or for very small graded areas for short periods of time (such as through one imminent storm event). If plastic sheeting must be used, choose a plastic that will withstand photo degradation.
- Plastic sheeting should have a minimum thickness of 6 mils and must be keyed in at the top of slope (when used as a temporary slope protection) and firmly held in place with sandbags or other weights placed no more than 10 ft apart. Seams are typically taped or weighted down their entire length, and there should be at least a 12 in. to 24 in. overlap of all seams. Edges should be embedded a minimum of 6 in. in soil (when used as a temporary slope protection).
- All sheeting must be inspected periodically after installation and after significant rainstorms to check for erosion, undermining, and anchorage failure. Any failures must be repaired.

immediately. If washout or breakages occur, the material should be re-installed after repairing the damage to the slope.

Erosion Control Blankets/Mats

- Biodegradable RECPs are typically composed of jute fibers, curled wood fibers, straw, coconut fiber, or a combination of these materials. In order for an RECP to be considered 100% biodegradable, the netting, sewing or adhesive system that holds the biodegradable mulch fibers together must also be biodegradable. See typical installation details at the end of this fact sheet.
 - **Jute** is a natural fiber that is made into a yarn that is loosely woven into a biodegradable mesh. The performance of jute as a stand-alone RECP is low. Most other RECPs outperform jute as a temporary erosion control product and therefore jute is not commonly used. It is designed to be used in conjunction with vegetation. The material is supplied in rolled strips, which should be secured to the soil with U-shaped staples or stakes in accordance with manufacturers' recommendations.
 - **Excelsior** (curled wood fiber) blanket material should consist of machine produced mats of curled wood excelsior with 80 percent of the fiber 6 in. or longer. The excelsior blanket should be of consistent thickness. The wood fiber must be evenly distributed over the entire area of the blanket. The top surface of the blanket should be covered with a photodegradable extruded plastic mesh. The blanket should be smolder resistant without the use of chemical additives and should be non-toxic and non-injurious to plant and animal life. Excelsior blankets should be furnished in rolled strips, a minimum of 48 in. wide, and should have an average weight of 0.8 lb/yd², ±10 percent, at the time of manufacture. Excelsior blankets must be secured in place with wire staples. Staples should be made of minimum 11-gauge steel wire and should be U-shaped with 8 in. legs and 2 in. crown.
 - **Straw blanket** should be machine produced mats of straw with a lightweight biodegradable netting top layer. The straw should be attached to the netting with biodegradable thread or glue strips. The straw blanket should be of consistent thickness. The straw should be evenly distributed over the entire area of the blanket. Straw blanket should be furnished in rolled strips a minimum of 6.5 ft wide, a minimum of 80 ft long and a minimum of 0.5 lb/yd². Straw blankets must be secured in place with wire staples. Staples should be made of minimum 11-gauge steel wire and should be U-shaped with 8 in. legs and 2 in. crown.
 - **Wood fiber blanket** is composed of biodegradable fiber mulch with extruded plastic netting held together with adhesives. The material is designed to enhance re-vegetation. The material is furnished in rolled strips, which must be secured to the ground with U-shaped staples or stakes in accordance with manufacturers' recommendations.
 - **Coconut fiber blanket** should be a machine produced mat of 100 percent coconut fiber with biodegradable netting on the top and bottom. The coconut fiber should be attached to the netting with biodegradable thread or glue strips. The coconut fiber blanket should be of consistent thickness. The coconut fiber should be evenly distributed over the entire area of the blanket. Coconut fiber blanket should be furnished in rolled strips with a minimum of 6.5 ft wide, a minimum of 80 ft. long and a minimum of 0.5

EXHIBIT "C" (Stormwater Pollution Prevention Plan)

lb/yd². Coconut fiber blankets must be secured in place with wire staples. Staples should be made of minimum 11-gauge steel wire and should be U-shaped with 8 in. legs and 2 in. crown.

- **Coconut fiber mesh** is a thin permeable membrane made from coconut or corn fiber that is spun into a yarn and woven into a biodegradable mat. It is designed to be used in conjunction with vegetation and typically has longevity of several years. The material is supplied in rolled strips, which must be secured to the soil with U-shaped staples or stakes in accordance with manufacturers' recommendations.
- **Straw coconut fiber blanket** should be machine produced mats of 70 percent straw and 30 percent coconut fiber with a biodegradable netting top layer and a biodegradable bottom net. The straw and coconut fiber should be attached to the netting with biodegradable thread or glue strips. The straw coconut fiber blanket should be of consistent thickness. The straw and coconut fiber should be evenly distributed over the entire area of the blanket. Straw coconut fiber blanket should be furnished in rolled strips a minimum of 6.5 ft wide, a minimum of 80 ft long and a minimum of 0.5 lb/yd². Straw coconut fiber blankets must be secured in place with wire staples. Staples should be made of minimum 11-gauge steel wire and should be U-shaped with 8 in. legs and 2 in. crown.
- Non-biodegradable RECPs are typically composed of polypropylene, polyethylene, nylon or other synthetic fibers. In some cases, a combination of biodegradable and synthetic fibers is used to construct the RECP. Netting used to hold these fibers together is typically non-biodegradable as well. Only biodegradable RECPs can remain on a site applying for a Notice of Termination due to plastic pollution and wild life concerns (State Waterboard, 2016). RECPs containing plastic that are used on a site must be disposed of for final stabilization.
 - **Plastic netting** is a lightweight biaxially oriented netting designed for securing loose mulches like straw or paper to soil surfaces to establish vegetation. The netting is photodegradable. The netting is supplied in rolled strips, which must be secured with U-shaped staples or stakes in accordance with manufacturers' recommendations.
 - **Plastic mesh** is an open weave geotextile that is composed of an extruded synthetic fiber woven into a mesh with an opening size of less than 1/4 in. It is used with re-vegetation or may be used to secure loose fiber such as straw to the ground. The material is supplied in rolled strips, which must be secured to the soil with U-shaped staples or stakes in accordance with manufacturers' recommendations.
 - **Synthetic fiber with netting** is a mat that is composed of durable synthetic fibers treated to resist chemicals and ultraviolet light. The mat is a dense, three-dimensional mesh of synthetic (typically polyolefin) fibers stitched between two polypropylene nets. The mats are designed to be re-vegetated and provide a permanent composite system of soil, roots, and geomatrix. The material is furnished in rolled strips, which must be secured with U-shaped staples or stakes in accordance with manufacturers' recommendations.
 - **Bonded synthetic fibers** consist of a three-dimensional geometric nylon (or other synthetic) matting. Typically, it has more than 90 percent open area, which facilitates

root growth. It's tough root reinforcing system anchors vegetation and protects against hydraulic lift and shear forces created by high volume discharges. It can be installed over prepared soil, followed by seeding into the mat. Once vegetated, it becomes an invisible composite system of soil, roots, and geomatrix. The material is furnished in rolled strips that must be secured with U-shaped staples or stakes in accordance with manufacturers' recommendations.

- **Combination synthetic and biodegradable RECPs** consist of biodegradable fibers, such as wood fiber or coconut fiber, with a heavy polypropylene net stitched to the top and a high strength continuous filament geomatrix or net stitched to the bottom. The material is designed to enhance re-vegetation. The material is furnished in rolled strips, which must be secured with U-shaped staples or stakes in accordance with manufacturers' recommendations.

Site Preparation

- Proper soil preparation is essential to ensure complete contact of the RECP with the soil. Soil Roughening is not recommended in areas where RECPs will be installed.
- Grade and shape the area of installation.
- Remove all rocks, clods, vegetation or other obstructions so that the installed blankets or mats will have complete, direct contact with the soil.
- Prepare seedbed by loosening 2 to 3 in. of topsoil.

Seeding/Planting

Seed the area before blanket installation for erosion control and re-vegetation. Seeding after mat installation is often specified for turf reinforcement application. When seeding prior to blanket installation, all areas disturbed during blanket installation must be re-seeded. Where soil filling is specified for turf reinforcement mats (TRMs), seed the matting and the entire disturbed area after installation and prior to filling the mat with soil.

Fertilize and seed in accordance with seeding specifications or other types of landscaping plans. The protective matting can be laid over areas where grass has been planted and the seedlings have emerged. Where vines or other ground covers are to be planted, lay the protective matting first and then plant through matting according to design of planting.

Check Slots

Check slots shall be installed as required by the manufacturer.

Laying and Securing Matting

- Before laying the matting, all check slots should be installed and the seedbed should be friable, made free from clods, rocks, and roots. The surface should be compacted and finished according to the requirements of the manufacturer's recommendations.
- Mechanical or manual lay down equipment should be capable of handling full rolls of fabric and laying the fabric smoothly without wrinkles or folds. The equipment should meet the fabric manufacturer's recommendations or equivalent standards.

Anchoring

- U-shaped wire staples, metal geotextile stake pins, or triangular wooden stakes can be used to anchor mats and blankets to the ground surface.
- Wire staples should be made of minimum 11-gauge steel wire and should be U-shaped with 8 in. legs and 2 in. crown.
- Metal stake pins should be 0.188 in. diameter steel with a 1.5 in. steel washer at the head of the pin, and 8 in. in length.
- Wire staples and metal stakes should be driven flush to the soil surface.

Installation on Slopes

Installation should be in accordance with the manufacturer's recommendations. In general, these will be as follows:

- Begin at the top of the slope and anchor the blanket in a 6 in. deep by 6 in. wide trench. Backfill trench and tamp earth firmly.
- Unroll blanket down slope in the direction of water flow.
- Overlap the edges of adjacent parallel rolls 2 to 3 in. and staple every 3 ft (or greater, per manufacturer's specifications).
- When blankets must be spliced, place blankets end over end (shingle style) with 6 in. overlap. Staple through overlapped area, approximately 12 in. apart.
- Lay blankets loosely and maintain direct contact with the soil. Do not stretch.
- Staple blankets sufficiently to anchor blanket and maintain contact with the soil. Staples should be placed down the center and staggered with the staples placed along the edges. Steep slopes, 1:1 (H:V) to 2:1 (H:V), require a minimum of 2 staples/yd². Moderate slopes, 2:1 (H:V) to 3:1 (H:V), require a minimum of 1 1/2 staples/yd². Check manufacturer's specifications to determine if a higher density staple pattern is required.

Installation in Channels

Installation should be in accordance with the manufacturer's recommendations. In general, these will be as follows:

- Dig initial anchor trench 12 in. deep and 6 in. wide across the channel at the lower end of the project area.
- Excavate intermittent check slots, 6 in. deep and 6 in. wide across the channel at 25 to 30 ft intervals along the channels.
- Cut longitudinal channel anchor trenches 4 in. deep and 4 in. wide along each side of the installation to bury edges of matting, whenever possible extend matting 2 to 3 in. above the crest of the channel side slopes.

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- Beginning at the downstream end and in the center of the channel, place the initial end of the first roll in the anchor trench and secure with fastening devices at 12 in. intervals. Note: matting will initially be upside down in anchor trench.
- In the same manner, position adjacent rolls in anchor trench, overlapping the preceding roll a minimum of 3 in.
- Secure these initial ends of mats with anchors at 12 in. intervals, backfill and compact soil.
- Unroll center strip of matting upstream. Stop at next check slot or terminal anchor trench. Unroll adjacent mats upstream in similar fashion, maintaining a 3 in. overlap.
- Fold and secure all rolls of matting snugly into all transverse check slots. Lay mat in the bottom of the slot then fold back against itself. Anchor through both layers of mat at 12 in. intervals, then backfill and compact soil. Continue rolling all mat widths upstream to the next check slot or terminal anchor trench.
- Alternate method for non-critical installations: Place two rows of anchors on 6 in. centers at 25 to 30 ft. intervals in lieu of excavated check slots.
- Staple shingled lap spliced ends a minimum of 12 in. apart on 12 in. intervals.
- Place edges of outside mats in previously excavated longitudinal slots; anchor using prescribed staple pattern, backfill, and compact soil.
- Anchor, fill, and compact upstream end of mat in a 12 in. by 6 in. terminal trench.
- Secure mat to ground surface using U-shaped wire staples, geotextile pins, or wooden stakes.
- Seed and fill turf reinforcement matting with soil, if specified.

Soil Filling (if specified for turf reinforcement mat (TRM))

Installation should be in accordance with the manufacturer's recommendations. Typical installation guidelines are as follows:

- After seeding, spread and lightly rake 1/2-3/4 inches of fine topsoil into the TRM apertures to completely fill TRM thickness. Use backside of rake or other flat implement.
- Alternatively, if allowed by product specifications, spread topsoil using lightweight loader, backhoe, or other power equipment. Avoid sharp turns with equipment.
- Always consult the manufacturer's recommendations for installation.
- Do not drive tracked or heavy equipment over mat.
- Avoid any traffic over matting if loose or wet soil conditions exist.
- Use shovels, rakes, or brooms for fine grading and touch up.
- Smooth out soil filling just exposing top netting of mat.

Temporary Soil Stabilization Removal

- Temporary soil stabilization removed from the site of the work must be disposed of if necessary.

Costs

Installed costs can be relatively high compared to other BMPs. Approximate costs for installed materials are shown below:

Rolled Erosion Control Products		Installed Cost per Acre
Biodegradable	Jute Mesh	\$7,700-\$9,000
	Curled Wood Fiber	\$10,200-\$13,400
	Straw	\$10,200-\$13,400
	Wood Fiber	\$10,200-\$13,400
	Coconut Fiber	\$16,600-\$18,000
	Coconut Fiber Mesh	\$38,400-\$42,200
	Straw Coconut Fiber	\$12,800-\$15,400
Non-Biodegradable	Plastic Netting	\$2,600-\$2,800
	Plastic Mesh	\$3,800-\$4,500
	Synthetic Fiber with Netting	\$43,500-\$51,200
	Bonded Synthetic Fibers	\$57,600-\$70,400
	Combination with Biodegradable	\$38,400-\$46,100

Source: Cost information received from individual product manufacturers solicited by Geosyntec Consultants (2004). Adjusted for inflation (2016 dollars) by Tetra Tech, Inc.

Inspection and Maintenance

- RECPs must be inspected in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- Areas where erosion is evident shall be repaired and BMPs reapplied as soon as possible. Care should be exercised to minimize the damage to protected areas while making repairs, as any area damaged will require reapplication of BMPs.
- If washout or breakage occurs, re-install the material after repairing the damage to the slope or channel.
- Make sure matting is uniformly in contact with the soil.
- Check that all the lap joints are secure.
- Check that staples are flush with the ground.

EXHIBIT "C" (Stormwater Pollution Prevention Plan)

References

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Erosion Control Pilot Study Report, State of California Department of Transportation (Caltrans), June 2000.

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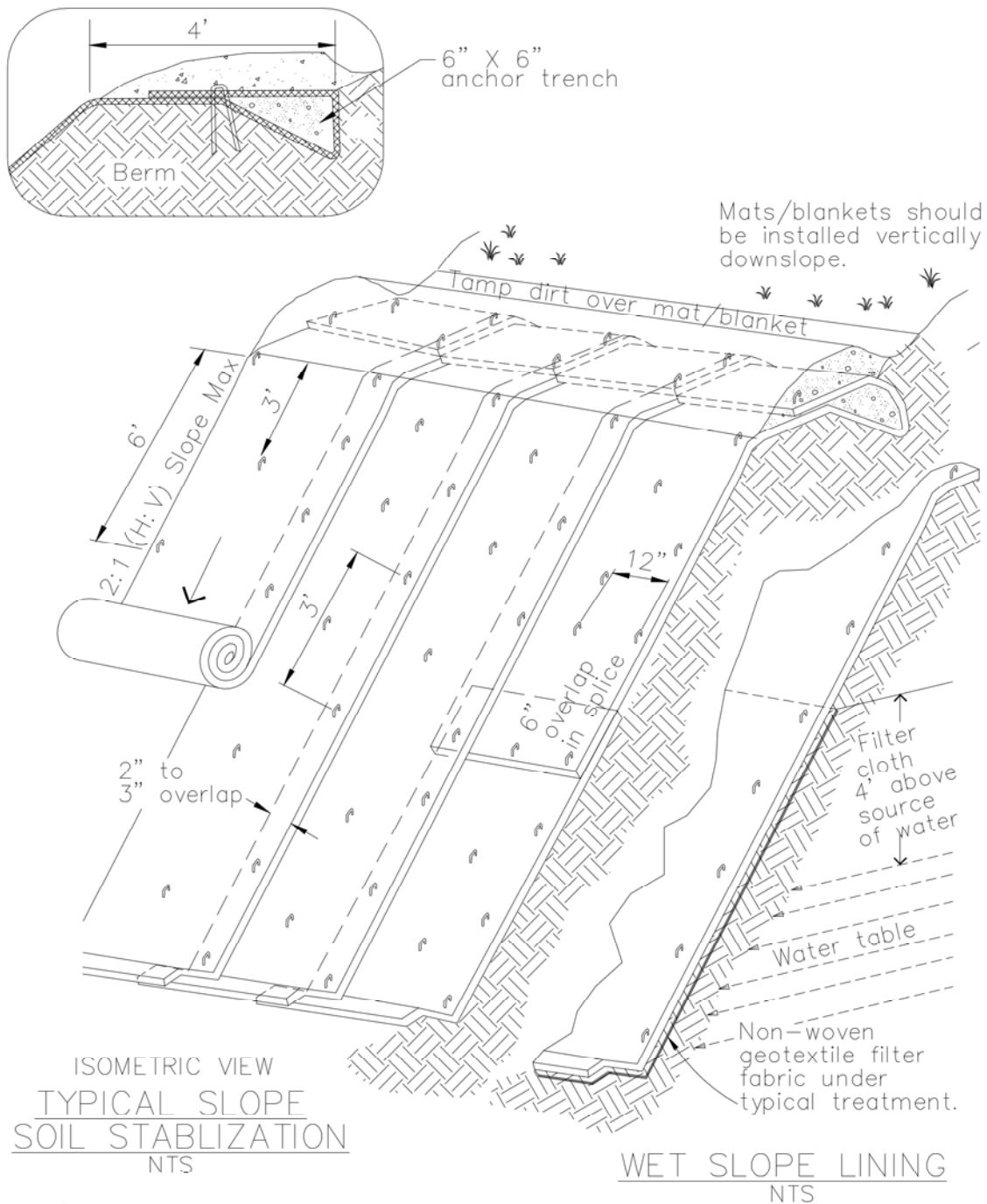
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Guidance Document: Soil Stabilization for Temporary Slopes, State of California Department of Transportation (Caltrans), November 1999.

Stormwater Management of the Puget Sound Basin, Technical Manual, Publication #91-75, Washington State Department of Ecology, February 1992.

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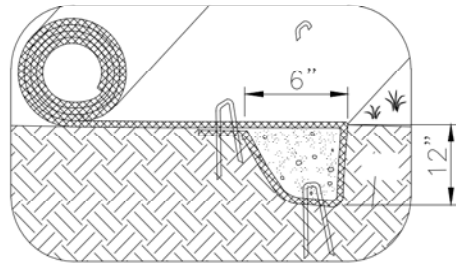
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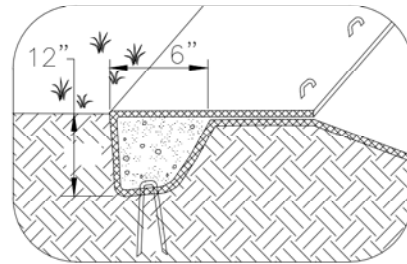
NOTES:

1. Slope surface shall be free of rocks, clods, sticks and grass. Mats/blankets shall have good soil contact.
2. Lay blankets loosely and stake or staple to maintain direct contact with the soil. Do not stretch.
3. Install per manufacturer's recommendations

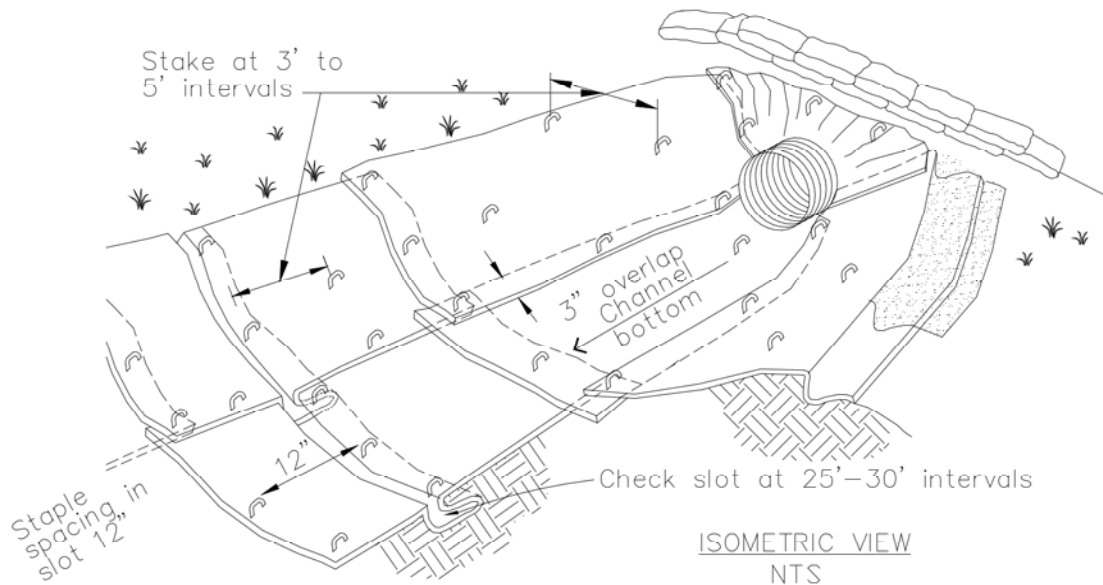
EXHIBIT "C" (Stormwater Pollution Prevention Plan)



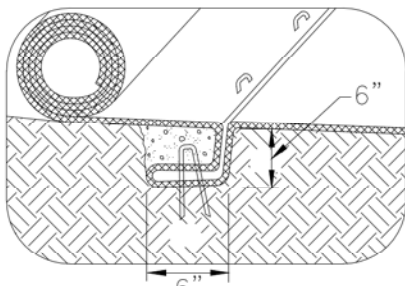
INITIAL CHANNEL ANCHOR TRENCH
NTS



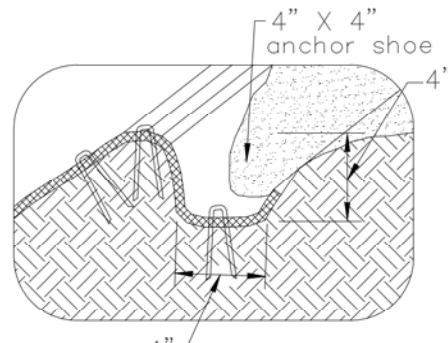
TERMINAL SLOPE AND CHANNEL
ANCHOR TRENCH
NTS



ISOMETRIC VIEW
NTS



INTERMITTENT CHECK SLOT
NTS



LONGITUDINAL ANCHOR TRENCH
NTS

NOTES:

1. Check slots to be constructed per manufacturers specifications.
2. Staking or stapling layout per manufacturers specifications.
3. Install per manufacturer's recommendations

EXHIBIT "C" (Stormwater Pollution Prevention Plan)



Description and Purpose

Wood mulching consists of applying a mixture of shredded wood mulch or bark to disturbed soils. The primary function of wood mulching is to reduce erosion by protecting bare soil from rainfall impact, increasing infiltration, and reducing runoff.

Suitable Applications

Wood mulching is suitable for disturbed soil areas requiring temporary protection until permanent stabilization is established. Wood mulch may also be used for final stabilization; generally, used in a landscape setting or areas that will have pedestrian traffic.

Limitations

- Best suited to flat areas or gentle slopes or 5:1 (H:V) or flatter. Not suitable for use on slopes steeper than 3:1 (H:V). For slopes steeper than 3:1, consider the use of Compost Blankets (EC-14).
- Wood mulch may introduce unwanted species if it contains seed, although it may also be used to prevent weed growth if it is seed-free.
- Not suitable for areas exposed to concentrated flows.
- If used for temporary stabilization, wood mulch may need to be removed prior to further earthwork.

Categories

EC	Erosion Control	<input checked="" type="checkbox"/>
SE	Sediment Control	<input type="checkbox"/>
TC	Tracking Control	<input type="checkbox"/>
WE	Wind Erosion Control	<input checked="" type="checkbox"/>
NS	Non-Stormwater Management Control	<input type="checkbox"/>
WM	Waste Management and Materials Pollution Control	<input type="checkbox"/>

Legend:

- Primary Objective
- Secondary Objective

Targeted Constituents

Sediment	<input checked="" type="checkbox"/>
Nutrients	<input type="checkbox"/>
Trash	<input type="checkbox"/>
Metals	<input type="checkbox"/>
Bacteria	<input type="checkbox"/>
Oil and Grease	<input type="checkbox"/>
Organics	<input type="checkbox"/>

Potential Alternatives

- EC-3 Hydraulic Mulch
- EC-4 Hydroseeding
- EC-5 Soil Binders
- EC-6 Straw Mulch
- EC-7 Geotextiles and Mats

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Implementation

Mulch Selection

There are many types of mulches. Selection of the appropriate type of mulch should be based on the type of application, site conditions, and compatibility with planned or future uses.

Application Procedures

Prior to application, after existing vegetation has been removed, roughen embankment and fill areas by rolling with a device such as a punching type roller or by track walking. The construction application procedures for mulches vary significantly depending upon the type of mulching method specified. Two methods are highlighted here:

- **Green Material:** This type of mulch is produced by the recycling of vegetation trimmings such as grass, shredded shrubs, and trees. Chipped brush from on-site vegetation clearing activities may be used (this may require stockpiling and reapplying after earthwork is complete). Methods of application are generally by hand although pneumatic methods are available.
 - Green material can be used as a temporary ground cover with or without seeding.
 - The green material should be evenly distributed on site to a depth of not more than 2 in.
- **Shredded Wood:** Suitable for ground cover in ornamental or revegetated plantings.
 - Shredded wood/bark is conditionally suitable. See note under limitations.
 - Distribute by hand or use pneumatic methods.
 - Evenly distribute the mulch across the soil surface to a depth of 2 to 3 in.
- Avoid mulch placement onto roads, sidewalks, drainage channels, existing vegetation, etc.

Costs

Assuming a 2-in. layer of wholesale landscaping-grade wood mulch, the average one-time cost for installation may range from \$15,000 – \$23,000 per acre¹. Costs can increase if the source is not close to the project site.

Inspection and Maintenance

- Inspect BMPs in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- Areas where erosion is evident shall be repaired and BMPs reapplied as soon as possible. Care should be exercised to minimize the damage to protected areas while making repairs, as any area damaged will require reapplication of BMPs.

¹ Costs based on estimates provided by the California Department of Transportation's *Soil Stabilization BMP Research for Erosion and Sediment Controls Cost Survey Technical Memorandum*, CTSW-TM-07-172.35.1, July 2007 (available at: http://www.dot.ca.gov/hq/LandArchives/la_design_guidance_estimating_Soil_Stabilization_Pricing.pdf) and adjusted for inflation from 1997 to 2016.

- Regardless of the mulching technique selected, the key consideration in inspection and maintenance is that the mulch needs to last long enough to achieve erosion control objectives. If the mulch is applied as a stand-alone erosion control method over disturbed areas (without seed), it should last the length of time the site will remain barren or until final re-grading and revegetation.
- Where vegetation is not the ultimate cover, such as ornamental and landscape applications of bark or wood chips, inspection and maintenance should focus on longevity and integrity of the mulch.
- Reapply mulch when bare earth becomes visible.

References

Controlling Erosion of Construction Sites Agriculture Information Bulletin #347, U.S. Department of Agriculture (USDA), Natural Resources Conservation Service (NRCS) (formerly Soil Conservation Service – SCS).

Guides for Erosion and Sediment Control in California, USDA Soils Conservation Service, January 1991.

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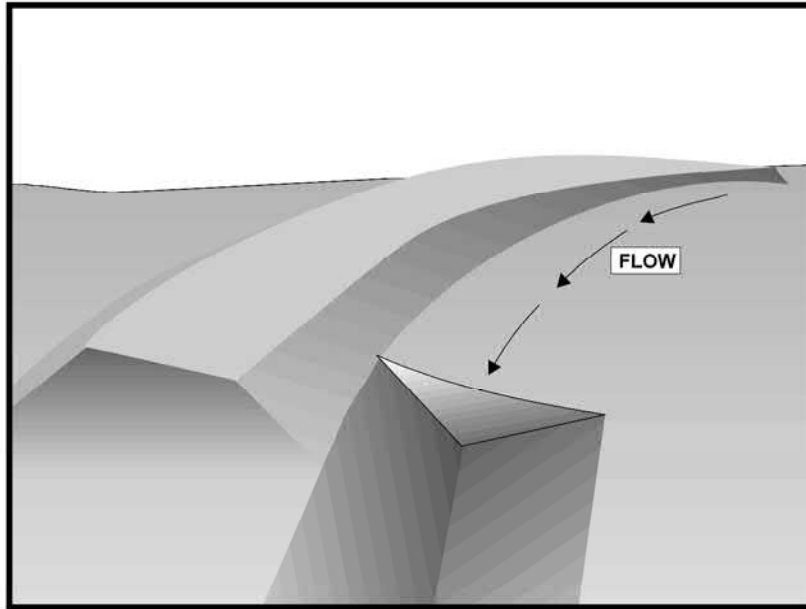
Soil Erosion by Water Agricultural Information Bulletin #513, U.S. Department of Agriculture, Soil Conservation Service.

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EXHIBIT "C" (Stormwater Pollution Prevention Plan)



Description and Purpose

An earth dike is a temporary berm or ridge of compacted soil used to divert runoff or channel water to a desired location. A drainage swale is a shaped and sloped depression in the soil surface used to convey runoff to a desired location. Earth dikes and drainage swales are used to divert off site runoff around the construction site, divert runoff from stabilized areas and disturbed areas, and direct runoff into sediment basins or traps.

Suitable Applications

Earth dikes and drainage swales are suitable for use, individually or together, where runoff needs to be diverted from one area and conveyed to another.

- Earth dikes and drainage swales may be used:
 - To convey surface runoff down sloping land
 - To intercept and divert runoff to avoid sheet flow over sloped surfaces
 - To divert and direct runoff towards a stabilized watercourse, drainage pipe or channel
 - To intercept runoff from paved surfaces
 - To intercept and divert run-on
 - Below steep grades where runoff begins to concentrate

Categories

EC	Erosion Control	<input checked="" type="checkbox"/>
SE	Sediment Control	<input type="checkbox"/>
TC	Tracking Control	<input type="checkbox"/>
WE	Wind Erosion Control	<input type="checkbox"/>
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WM	Waste Management and Materials Pollution Control	<input type="checkbox"/>

Legend:

- Primary Objective
- Secondary Objective

Targeted Constituents

Sediment	<input checked="" type="checkbox"/>
Nutrients	<input type="checkbox"/>
Trash	<input type="checkbox"/>
Metals	<input type="checkbox"/>
Bacteria	<input type="checkbox"/>
Oil and Grease	<input type="checkbox"/>
Organics	<input type="checkbox"/>

Potential Alternatives

None

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- Along roadways and facility improvements subject to flood drainage
- At the top of slopes to divert runoff from adjacent or undisturbed slopes
- At bottom and mid slope locations to intercept sheet flow and convey concentrated flows
- Divert sediment laden runoff into sediment basins or traps

Limitations

Dikes should not be used for drainage areas greater than 10 acres or along slopes greater than 10 percent. For larger areas more permanent drainage structures should be built. All drainage structures should be built in compliance with local municipal requirements.

- Earth dikes may create more disturbed area on site and become barriers to construction equipment.
- Earth dikes must be stabilized immediately, which adds cost and maintenance concerns.
- Diverted stormwater may cause downstream flood damage.
- Dikes should not be constructed of soils that may be easily eroded.
- Regrading the site to remove the dike may add additional cost.
- Temporary drains and swales or any other diversion of runoff should not adversely impact upstream or downstream properties.
- Temporary drains and swales must conform to local floodplain management requirements.
- Earth dikes/drainage swales are not suitable as sediment trapping devices.
- It may be necessary to use other soil stabilization and sediment controls such as check dams, plastics, and blankets, to prevent scour and erosion in newly graded dikes, swales, and ditches.
- Sediment accumulation, scour depressions, and/or persistent non-stormwater discharges can result in areas of standing water suitable for mosquito production in drainage swales.

Implementation

The temporary earth dike is a berm or ridge of compacted soil, located in such a manner as to divert stormwater to a sediment trapping device or a stabilized outlet, thereby reducing the potential for erosion and offsite sedimentation. Earth dikes can also be used to divert runoff from off site and from undisturbed areas away from disturbed areas and to divert sheet flows away from unprotected slopes.

An earth dike does not itself control erosion or remove sediment from runoff. A dike prevents erosion by directing runoff to an erosion control device such as a sediment trap or directing runoff away from an erodible area. Temporary diversion dikes should not adversely impact adjacent properties and must conform to local floodplain management regulations and should not be used in areas with slopes steeper than 10%.

EXHIBIT "C" (Stormwater Pollution Prevention Plan)

Slopes that are formed during cut and fill operations should be protected from erosion by runoff. A combination of a temporary drainage swale and an earth dike at the top of a slope can divert runoff to a location where it can be brought to the bottom of the slope (see EC-11, Slope Drains). A combination dike and swale is easily constructed by a single pass of a bulldozer or grader and compacted by a second pass of the tracks or wheels over the ridge. Diversion structures should be installed when the site is initially graded and remain in place until post construction BMPs are installed and the slopes are stabilized.

Diversion practices concentrate surface runoff, increasing its velocity and erosive force. Thus, the flow out of the drain or swale must be directed onto a stabilized area or into a grade stabilization structure. If significant erosion will occur, a swale should be stabilized using vegetation, chemical treatment, rock rip-rap, matting, or other physical means of stabilization. Any drain or swale that conveys sediment laden runoff must be diverted into a sediment basin or trap before it is discharged from the site.

General

- Care must be applied to correctly size and locate earth dikes, drainage swales. Excessively steep, unlined dikes, and swales are subject to erosion and gully formation.
- Conveyances should be stabilized.
- Use a lined ditch for high flow velocities.
- Select flow velocity based on careful evaluation of the risks due to erosion of the measure, soil types, overtopping, flow backups, washout, and drainage flow patterns for each project site.
- Compact any fills to prevent unequal settlement.
- Do not divert runoff onto other property without securing written authorization from the property owner.
- When possible, install and utilize permanent dikes, swales, and ditches early in the construction process.
- Provide stabilized outlets.

Earth Dikes

Temporary earth dikes are a practical, inexpensive BMP used to divert stormwater runoff. Temporary diversion dikes should be installed in the following manner:

- All dikes should be compacted by earth moving equipment.
- All dikes should have positive drainage to an outlet.
- All dikes should have 2:1 or flatter side slopes, 18 in. minimum height, and a minimum top width of 24 in. Wide top widths and flat slopes are usually needed at crossings for construction traffic.

EXHIBIT "C" (Stormwater Pollution Prevention Plan)

- May be covered with hydro mulch, hydroseed, wood mulch, compost blanket, or RECP for stabilization.
- The outlet from the earth dike must function with a minimum of erosion. Runoff should be conveyed to a sediment trapping device such as a Sediment Trap (SE-3) or Sediment Basin (SE-2) when either the dike channel or the drainage area above the dike are not adequately stabilized.
- Temporary stabilization may be achieved using seed and mulching for slopes less than 5% and either rip-rap or sod for slopes in excess of 5%. In either case, stabilization of the earth dike should be completed immediately after construction or prior to the first rain.
- If riprap is used to stabilize the channel formed along the toe of the dike, the following typical specifications apply:

Channel Grade	Riprap Stabilization
0.5-1.0%	4 in. Rock
1.1-2.0%	6 in. Rock
2.1-4.0%	8 in. Rock
4.1-5.0%	8 in. -12 in. Riprap

- The stone riprap, recycled concrete, etc. used for stabilization should be pressed into the soil with construction equipment.
- Filter cloth may be used to cover dikes in use for long periods.
- Construction activity on the earth dike should be kept to a minimum.

Drainage Swales

Drainage swales are only effective if they are properly installed. Swales are more effective than dikes because they tend to be more stable. The combination of a swale with a dike on the downhill side is the most cost-effective diversion.

Standard engineering design criteria for small open channel and closed conveyance systems should be used (see the local drainage design manual). Unless local drainage design criteria state otherwise, drainage swales should be designed as follows:

- No more than 5 acres may drain to a temporary drainage swale.
- Place drainage swales above or below, not on, a cut or fill slope.
- Swale bottom width should be at least 2 ft.
- Depth of the swale should be at least 18 in.
- Side slopes should be 2:1 or flatter.

- Drainage or swales should be laid at a grade of at least 1%, but not more than 15%.

- The swale must not be overtopped by the peak discharge from a 10-year storm, irrespective of the design criteria stated above.
- Remove all trees, stumps, obstructions, and other objectionable material from the swale when it is built.
- Compact any fill material along the path of the swale.
- Stabilize all swales immediately. Seed and mulch swales at a slope of less than 5 % and use rip-rap or sod for swales with a slope between 5 and 15 %. For temporary swales, geotextiles and mats (EC-7) may provide immediate stabilization.
- Irrigation may be required to establish sufficient vegetation to prevent erosion.
- Do not operate construction vehicles across a swale unless a stabilized crossing is provided.
- Permanent drainage facilities must be designed by a professional engineer (see the local drainage design criteria for proper design).
- At a minimum, the drainage swale should conform to predevelopment drainage patterns and capacities.
- Construct the drainage swale with a positive grade to a stabilized outlet.
- Provide erosion protection or energy dissipation measures if the flow out of the drainage swale can reach an erosive velocity.

Costs

- Cost ranges from \$19 to \$70 per ft. for both earthwork and stabilization and depends on availability of material, site location, and access (Adjusted for inflation (2016 dollars) by Tetra Tech, Inc.).
- Small dikes: \$3 - \$8/linear ft.; Large dikes: \$3/yd³ (Adjusted for inflation (2016 dollars) by Tetra Tech, Inc.).
- The cost of a drainage swale increases with drainage area and slope. Typical swales for controlling internal erosion are inexpensive, as they are quickly formed during routine earthwork.

Inspection and Maintenance

- Inspect BMPs prior to forecast rain, daily during extended rain events, after rain events, weekly during the rainy season, and at two-week intervals during the non-rainy season.
- Inspect BMPs subject to non-stormwater discharges daily while non-stormwater discharges occur.
- Inspect ditches and berms for washouts. Replace lost riprap, damaged linings or soil stabilizers as needed.

EXHIBIT "C" (Stormwater Pollution Prevention Plan)

- Inspect channel linings, embankments, and beds of ditches and berms for erosion and accumulation of debris and sediment. Remove debris and sediment and repair linings and embankments as needed.
- Temporary conveyances should be completely removed as soon as the surrounding drainage area has been stabilized or at the completion of construction

References

Erosion and Sediment Control Handbook, S.J. Goldman, K. Jackson, T.A. Bursetynsky, P.E., McGraw Hill Book Company, 1986.

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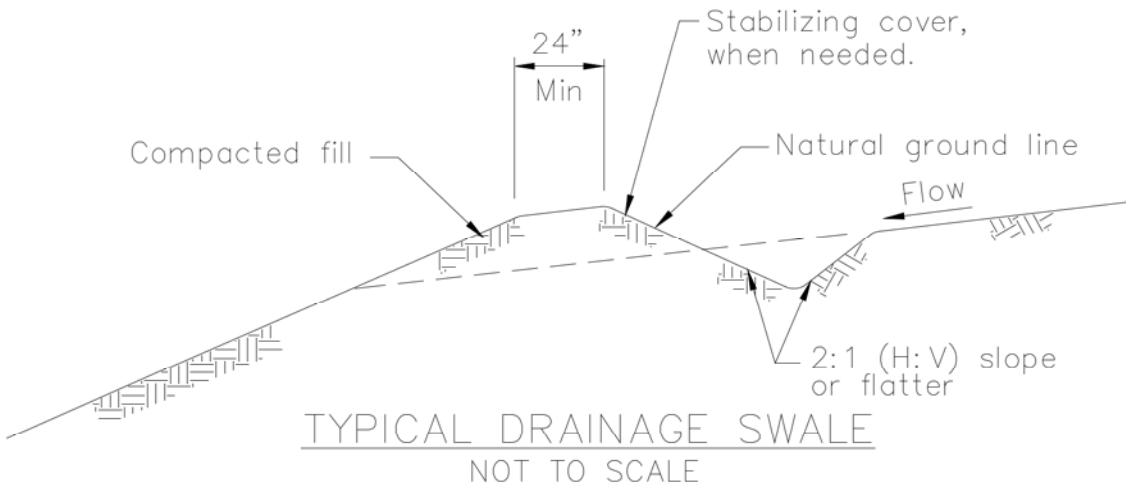
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Stormwater Management of the Puget Sound Basin, Technical Manual, Publication #91-75, Washington State Department of Ecology, February 1992.

Water Quality Management Plan for the Lake Tahoe Region, Volume II, Handbook of Management Practices, Tahoe Regional Planning Agency, November 1988.

EXHIBIT "C" (Stormwater Pollution Prevention Plan)



NOTES:

1. Stabilize inlet, outlets and slopes.
2. Properly compact the subgrade.

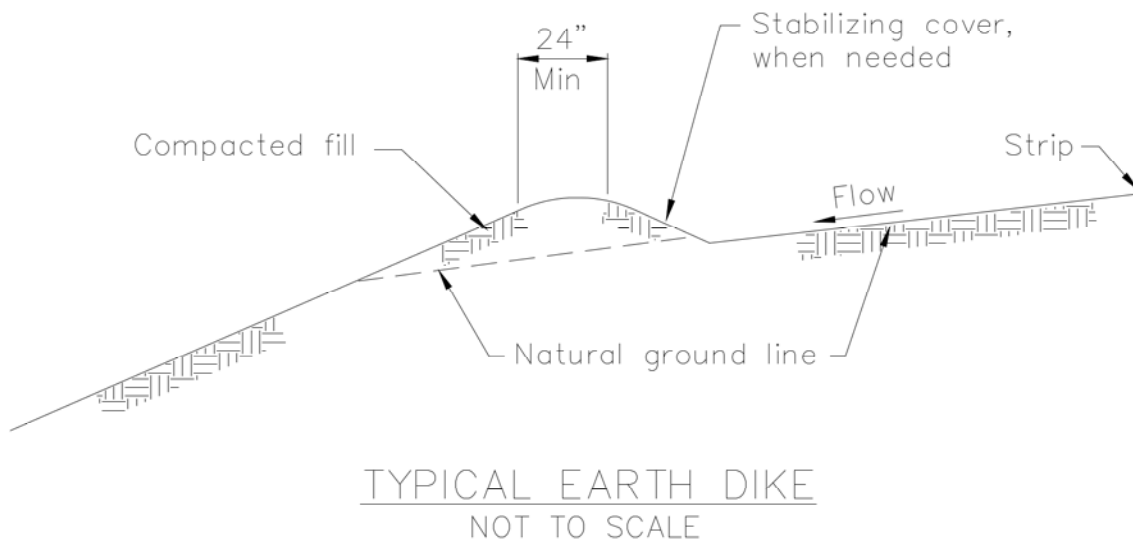
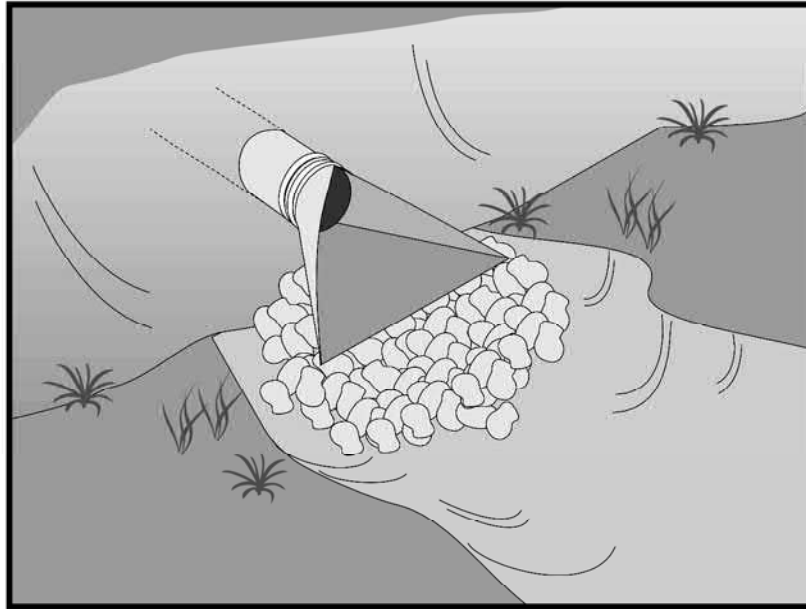


EXHIBIT "C" (Stormwater Pollution Prevention Plan)



Description and Purpose

Outlet protection is a physical device composed of rock, grouted riprap, or concrete rubble, which is placed at the outlet of a pipe or channel to prevent scour of the soil caused by concentrated, high velocity flows.

Suitable Applications

Whenever discharge velocities and energies at the outlets of culverts, conduits, or channels are sufficient to erode the next downstream reach. This includes temporary diversion structures to divert runoff during construction.

- These devices may be used at the following locations:
 - Outlets of pipes, drains, culverts, slope drains, diversion ditches, swales, conduits, or channels.
 - Outlets located at the bottom of mild to steep slopes.
 - Discharge outlets that carry continuous flows of water.
 - Outlets subject to short, intense flows of water, such as flash floods.
 - Points where lined conveyances discharge to unlined conveyances

Limitations

- Large storms or high flows can wash away the rock outlet protection and leave the area susceptible to erosion.

Categories

EC	Erosion Control	<input checked="" type="checkbox"/>
SE	Sediment Control	
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	

Legend:

- Primary Objective
- Secondary Objective

Targeted Constituents

Sediment	<input checked="" type="checkbox"/>
Nutrients	
Trash	
Metals	
Bacteria	
Oil and Grease	
Organics	

Potential Alternatives

None

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- Sediment captured by the rock outlet protection may be difficult to remove without removing the rock.
- Outlet protection may negatively impact the channel habitat.
- Grouted riprap may break up in areas of freeze and thaw.
- If there is not adequate drainage, and water builds up behind grouted riprap, it may cause the grouted riprap to break up due to the resulting hydrostatic pressure.
- Sediment accumulation, scour depressions, and/or persistent non-stormwater discharges can result in areas of standing water suitable for mosquito production in velocity dissipation devices.

Implementation

General

Outlet protection is needed where discharge velocities and energies at the outlets of culverts, conduits or channels are sufficient to erode the immediate downstream reach. This practice protects the outlet from developing small eroded pools (plunge pools) and protects against gully erosion resulting from scouring at a culvert mouth.

Design and Layout

As with most channel design projects, depth of flow, roughness, gradient, side slopes, discharge rate, and velocity should be considered in the outlet design. Compliance to local and state regulations should also be considered while working in environmentally sensitive streambeds. General recommendations for rock size and length of outlet protection mat are shown in the rock outlet protection figure in this BMP and should be considered minimums. The apron length and rock size gradation are determined using a combination of the discharge pipe diameter and estimate discharge rate: Select the longest apron length and largest rock size suggested by the pipe size and discharge rate. Where flows are conveyed in open channels such as ditches and swales, use the estimated discharge rate for selecting the apron length and rock size. Flows should be same as the culvert or channel design flow but never the less than the peak 5-year flow for temporary structures planned for one rainy season, or the 10-year peak flow for temporary structures planned for two or three rainy seasons.

- There are many types of energy dissipaters, with rock being the one that is represented in the attached figure.
- Best results are obtained when sound, durable, and angular rock is used.
- Install riprap, grouted riprap, or concrete apron at selected outlet. Riprap aprons are best suited for temporary use during construction. Grouted or wired tied rock riprap can minimize maintenance requirements.
- Rock outlet protection is usually less expensive and easier to install than concrete aprons or energy dissipaters. It also serves to trap sediment and reduce flow velocities.
- Carefully place riprap to avoid damaging the filter fabric.

EXHIBIT "C" (Stormwater Pollution Prevention Plan)

- Stone 4 in. to 6 in. may be carefully dumped onto filter fabric from a height not to exceed 12 in.
 - Stone 8 in. to 12 in. must be hand placed onto filter fabric, or the filter fabric may be covered with 4 in. of gravel and the 8 in. to 12 in. rock may be dumped from a height not to exceed 16 in.
 - Stone greater than 12 in. shall only be dumped onto filter fabric protected with a layer of gravel with a thickness equal to one half the D_{50} rock size, and the dump height limited to twice the depth of the gravel protection layer thickness.
- For proper operation of apron: Align apron with receiving stream and keep straight throughout its length. If a curve is needed to fit site conditions, place it in upper section of apron.
 - Outlets on slopes steeper than 10 percent should have additional protection.

Costs

Costs are low if material is readily available. If material is imported, costs will be higher. Average installed cost is \$250 per device.

Inspection and Maintenance

- Inspect BMPs in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- Inspect BMPs subjected to non-stormwater discharges daily while non-stormwater discharges occur. Minimize areas of standing water by removing sediment blockages and filling scour depressions.
- Inspect apron for displacement of the riprap and damage to the underlying fabric. Repair fabric and replace riprap that has washed away. If riprap continues to wash away, consider using larger material.
- Inspect for scour beneath the riprap and around the outlet. Repair damage to slopes or underlying filter fabric immediately.
- Temporary devices should be completely removed as soon as the surrounding drainage area has been stabilized or at the completion of construction.

References

County of Sacramento Improvement Standards, Sacramento County, May 1989.

Erosion and Sediment Control Handbook, S.J. Goldman, K. Jackson, T.A. Bursztynsky, P.E., McGraw Hill Book Company, 1986.

Handbook of Steel Drainage & Highway Construction, American Iron and Steel Institute, 1983.

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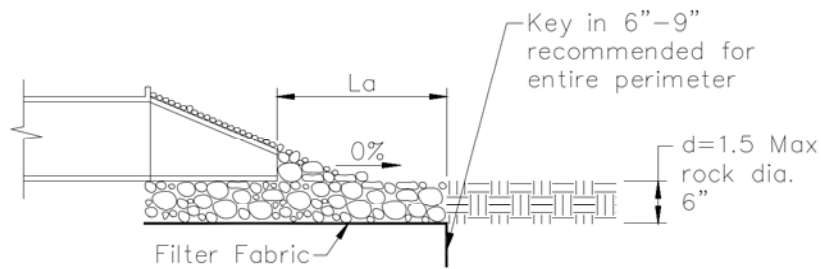
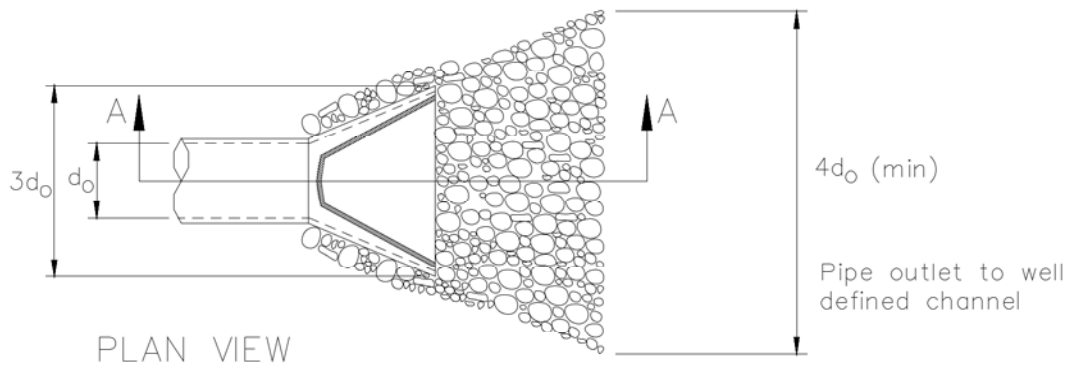
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EXHIBIT "C" (Stormwater Pollution Prevention Plan)

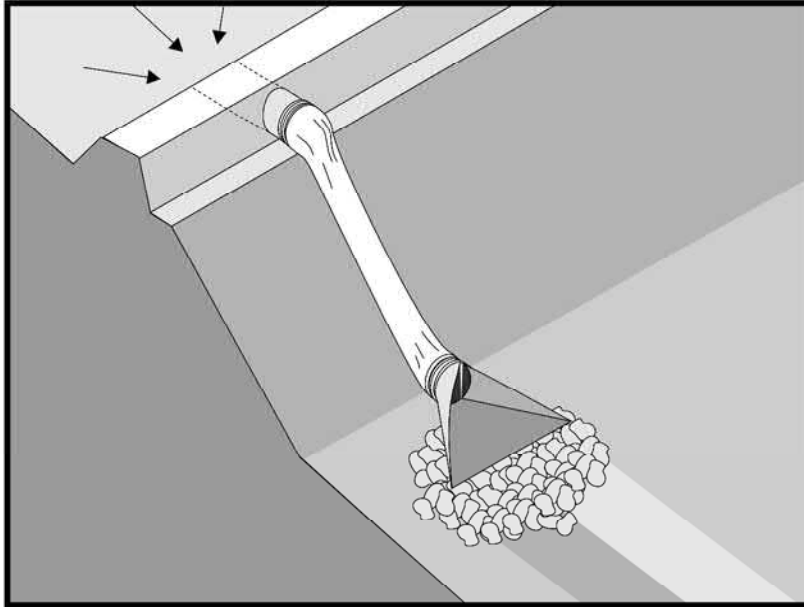


Pipe Diameter inches	Discharge ft ³ /s	Apron Length, La ft	Rip Rap D ₅₀ Diameter Min inches
12	5	10	4
	10	13	6
18	10	10	6
	20	16	8
	30	23	12
24	40	26	16
	30	16	8
	40	26	8
	50	26	12
	60	30	16

For larger or higher flows consult a Registered Civil Engineer

Source: USDA - SCS

EXHIBIT "C" (Stormwater Pollution Prevention Plan)



Description and Purpose

A slope drain is a pipe used to intercept and direct surface runoff or groundwater into a stabilized watercourse, trapping device, or stabilized area. Slope drains are used with earth dikes and drainage ditches to intercept and direct surface flow away from slope areas to protect cut or fill slopes.

Suitable Applications

- Where concentrated flow of surface runoff must be conveyed down a slope in order to prevent erosion.
- Drainage for top of slope diversion dikes or swales.
- Drainage for top of cut and fill slopes where water can accumulate.
- Emergency spillway for a sediment basin.

Limitations

Installation is critical for effective use of the pipe slope drain to minimize potential gully erosion.

- Maximum drainage area per slope drain is 10 acres. (For large areas use a paved chute, rock lined channel, or additional pipes.)
- Severe erosion may result when slope drains fail by overtopping, piping, or pipe separation.

Categories

EC	Erosion Control	<input checked="" type="checkbox"/>
SE	Sediment Control	<input type="checkbox"/>
TC	Tracking Control	<input type="checkbox"/>
WE	Wind Erosion Control	<input type="checkbox"/>
NS	Non-Stormwater Management Control	<input type="checkbox"/>
WM	Waste Management and Materials Pollution Control	<input type="checkbox"/>

Legend:

- Primary Objective
- Secondary Objective

Targeted Constituents

Sediment	<input checked="" type="checkbox"/>
Nutrients	<input type="checkbox"/>
Trash	<input type="checkbox"/>
Metals	<input type="checkbox"/>
Bacteria	<input type="checkbox"/>
Oil and Grease	<input type="checkbox"/>
Organics	<input type="checkbox"/>

Potential Alternatives

EC-9 Earth Dike, Drainage Swales

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- During large storms, pipe slope drains may become clogged or over charged, forcing water around the pipe and causing extreme slope erosion.
- If the sectional down drain is not sized correctly, the runoff can spill over the drain sides causing gully erosion and potential failure of the structure.
- Dissipation of high flow velocities at the pipe outlet is required to avoid downstream erosion.
- Sediment accumulation, scour depressions, and/or persistent non-stormwater discharges can result in areas of standing water suitable for mosquito production in energy dissipaters associated with slope drain outlets.

Implementation

General

The slope drain is applicable for any construction site where concentrated surface runoff can accumulate and must be conveyed down the slope in order to prevent erosion. The slope drain is effective because it prevents the stormwater from flowing directly down the slope by confining all the runoff into an enclosed pipe or channel. Due to the time lag between grading slopes and installation of permanent stormwater collection systems and slope stabilization measures, temporary provisions to intercept runoff are sometimes necessary. Particularly in steep terrain, slope drains can protect unstabilized areas from erosion.

Installation

The slope drain may be a rigid pipe, such as corrugated metal, a flexible conduit, or a lined terrace drain with the inlet placed on the top of a slope and the outlet at the bottom of the slope. This BMP typically is used in combination with a diversion control, such as an earth dike or drainage swale at the top of the slope.

The following criteria must be considered when siting slope drains.

- Permanent structures included in the project plans can often serve as construction BMPs if implemented early. However, the permanent structure must meet or exceed the criteria for the temporary structure.
- Inlet structures must be securely entrenched and compacted to avoid severe gully erosion.
- Slope drains must be securely anchored to the slope and must be adequately sized to carry the capacity of the design storm and associated forces.
- Outlets must be stabilized with riprap, concrete or other type of energy dissipator, or directed into a stable sediment trap or basin. See EC-10, Velocity Dissipation Devices.
- Debris racks are recommended at the inlet. Debris racks located several feet upstream of the inlet can usually be larger than racks at the inlet, and thus provide enhanced debris protection and less plugging.
- Safety racks are also recommended at the inlet and outlet of pipes where children or animals could become entrapped.
- Secure inlet and surround with dikes to prevent gully erosion and anchor pipe to slope.

- When using slope drains, limit drainage area to 10 acres per pipe. For larger areas, use a rock lined channel or a series of pipes.
- Size to convey at least the peak flow of a 10-year storm. The design storm is conservative due to the potential impact of system failures.
- Maximum slope generally limited to 2:1 (H:V) as energy dissipation below steeper slopes is difficult.
- Direct surface runoff to slope drains with interceptor dikes. See BMP EC-9, Earth Dikes and Drainage Swales. Top of interceptor dikes should be 12 in. higher than the top of the slope drain.
- Slope drains can be placed on or buried underneath the slope surface.
- Recommended materials include both metal and plastic pipe, either corrugated or smooth wall. Concrete pipe can also be used.
- When installing slope drains:
 - Install slope drains perpendicular to slope contours.
 - Compact soil around and under entrance, outlet, and along length of pipe.
 - Securely anchor and stabilize pipe and appurtenances into soil.
 - Check to ensure that pipe connections are watertight.
 - Protect area around inlet with filter cloth. Protect outlet with riprap or other energy dissipation device. For high energy discharges, reinforce riprap with concrete or use reinforced concrete device.
 - Protect outlet of slope drains using a flared end section when outlet discharges to a flexible energy dissipation device.
 - A flared end section installed at the inlet will improve flow into the slope drain and prevent erosion at the pipe entrance. Use a flared end section with a 6 in. minimum toe plate to help prevent undercutting. The flared section should slope towards the pipe inlet.

Design and Layout

The capacity for temporary drains should be sufficient to convey at least the peak runoff from a 10-year rainfall event. The pipe size may be computed using the Rational Method or a method established by the local municipality. Higher flows must be safely stored or routed to prevent any offsite concentration of flow and any erosion of the slope. The design storm is purposely conservative due to the potential impacts associated with system failures.

As a guide, temporary pipe slope drains should not be sized smaller than shown in the following table:

EXHIBIT "C" (Stormwater Pollution Prevention Plan)

Minimum Pipe Diameter (Inches)	Maximum Drainage Area (Acres)
12	1.0
18	3.0
21	5.0
24	7.0
30	10.0

Larger drainage areas can be treated if the area can be subdivided into areas of 10 acres or less and each area is treated as a separate drainage. Drainage areas exceeding 10 acres must be designed by a Registered Civil Engineer and approved by the agency that issued the grading permit.

Materials:

Soil type, rainfall patterns, construction schedule, local requirements, and available supply are some of the factors to be considered when selecting materials. The following types of slope drains are commonly used:

- **Rigid Pipe:** This type of slope drain is also known as a pipe drop. The pipe usually consists of corrugated metal pipe or rigid plastic pipe. The pipe is placed on undisturbed or compacted soil and secured onto the slope surface or buried in a trench. Concrete thrust blocks must be used when warranted by the calculated thrust forces. Collars should be properly installed and secured with metal strappings or watertight collars.
- **Flexible Pipe:** The flexible pipe slope drain consists of a flexible tube of heavy-duty plastic, rubber, or composite material. The tube material is securely anchored onto the slope surface. The tube should be securely fastened to the metal inlet and outlet conduit sections with metal strappings or watertight collars.
- **Section Downdrains:** The section downdrain consists of pre-fabricated, section conduit of half round or third round material. The sectional downdrain performs similar to a flume or chute. The pipe must be placed on undisturbed or compacted soil and secured into the slope.
- **Concrete-lined Terrace Drain:** This is a concrete channel for draining water from a terrace on a slope to the next level. These drains are typically specified as permanent structures and if installed early, can serve as slope drains during construction, which should be designed according to local drainage design criteria.

Costs

- Cost varies based on pipe selection and selected outlet protection.

EXHIBIT "C" (Stormwater Pollution Prevention Plan)

Corrugated Steel Pipes, Per Foot	
Size	Supplied and Installed Cost (No Trenching Included)
12"	\$25 per LF
15"	\$28.00
18"	\$33.00
24"	\$41.00
30"	\$64.00
PVC Pipes, Per Foot	
Size	Supplied and Installed Cost (No Trenching Included)
12"	\$31.00
14"	\$63.00
16"	\$65.00
18"	\$69.00
20"	\$84.00
24"	\$119.00
30"	\$166.00

Adjusted for inflation (2016 dollars) by Tetra Tech, Inc.

Inspection and Maintenance

- Inspect BMPs in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- Inspect BMPs subjected to non-stormwater discharges daily while non-stormwater discharges occur. Minimize areas of standing water by removing sediment blockages and filling scour depressions.
- Inspect outlet for erosion and downstream scour. If eroded, repair damage and install additional energy dissipation measures. If downstream scour is occurring, it may be necessary to reduce flows being discharged into the channel unless other preventative measures are implemented.
- Insert inlet for clogging or undercutting. Remove debris from inlet to maintain flows. Repair undercutting at inlet and if needed, install flared section or rip rap around the inlet to prevent further undercutting.

- Inspect pipes for leakage. Repair leaks and restore damaged slopes.

EXHIBIT "C" (Stormwater Pollution Prevention Plan)

- Inspect slope drainage for accumulations of debris and sediment.
- Remove built up sediment from entrances and outlets as required. Flush drains if necessary; capture and settle out sediment from discharge.
- Make sure water is not ponding onto inappropriate areas (e.g., active traffic lanes, material storage areas, etc.).
- Pipe anchors must be checked to ensure that the pipe remains anchored to the slope. Install additional anchors if pipe movement is detected.

References

Draft – Sedimentation and Erosion Control, An Inventory of Current Practices, U.S.E.P.A., April 1990.

Metzger, M.E. 2004. Managing mosquitoes in stormwater treatment devices. University of California Division of Agriculture and Natural Resources, Publication 8125. On-line: <http://anrcatalog.ucdavis.edu/pdf/8125.pdf>

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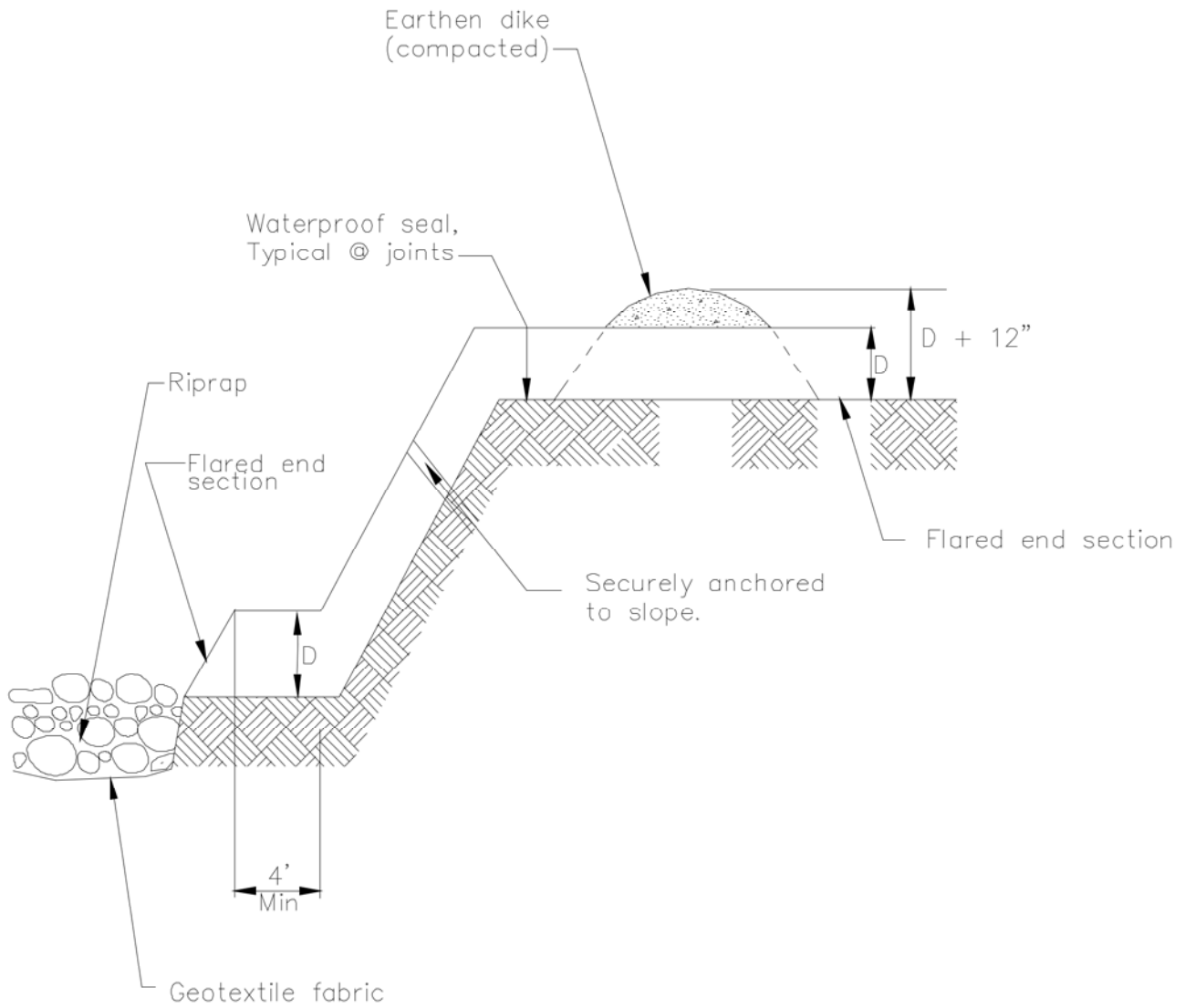
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EXHIBIT "C" (Stormwater Pollution Prevention Plan)



TYPICAL SLOPE DRAIN
NOT TO SCALE

EXHIBIT "C" (Stormwater Pollution Prevention Plan)



Description and Purpose

Stream channels, streambanks, and associated riparian areas are dynamic and sensitive ecosystems that respond to changes in land use activity. Streambank and channel disturbance resulting from construction activities can increase the stream's sediment load, which can cause channel erosion or sedimentation and have adverse effects on the biotic system. BMPs can reduce the discharge of sediment and other pollutants to minimize the impact of construction activities on watercourses. Streams on the 303(d) list and listed for sediment may require numerous measures to prevent any increases in sediment load to the stream.

Suitable Applications

These procedures typically apply to all construction projects that disturb or occur within stream channels and their associated riparian areas.

Limitations

Specific permit requirements or mitigation measures such as Regional Water Quality Control Board (RWQCB) 401 Certification, U.S. Army Corps of Engineers 404 permit and approval by California Department of Fish and Game supercede the guidance in this BMP.

- If numerical based water quality standards are mentioned in any of these and other related permits, testing and sampling may be required. Streams listed as 303(d) impaired for sediment, silt, or turbidity, are required to

Categories

EC	Erosion Control	<input checked="" type="checkbox"/>
SE	Sediment Control	<input checked="" type="checkbox"/>
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	<input checked="" type="checkbox"/>
WM	Waste Management and Materials Pollution Control	

Legend:

- Primary Objective
- Secondary Objective

Targeted Constituents

Sediment	<input checked="" type="checkbox"/>
Nutrients	
Trash	
Metals	
Bacteria	
Oil and Grease	
Organics	

Potential Alternatives

Combination of erosion and sediment controls.

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conduct sampling to verify that there is no net increase in sediment load due to construction activities.

Implementation

Planning

- Proper planning, design, and construction techniques can minimize impacts normally associated with in stream construction activities. Poor planning can adversely affect soil, fish, wildlife resources, land uses, or land users. Planning should take into account: scheduling; avoidance of in-stream construction; minimizing disturbance area and construction time period; using pre-disturbed areas; selecting crossing location; and selecting equipment.

Scheduling

- Construction activities should be scheduled according to the relative sensitivity of the environmental concerns and in accordance with EC-1, Scheduling. Scheduling considerations will be different when working near perennial streams vs. ephemeral streams and are as follows.
- When in-stream construction is conducted in a perennial stream, work should optimally be performed during the rainy season. This is because in the summer, any sediment-containing water that is discharged into the watercourse will cause a large change in both water clarity and water chemistry. During the rainy season, there is typically more and faster flowing water in the stream, so discharges are diluted faster. However, should in-stream work be scheduled for summer, establishing an isolation area, or diverting the stream, will significantly decrease the amount of sediment stirred up by construction work. Construction work near perennial streams should optimally be performed during the dry season (see below).
- When working in or near ephemeral streams, work should be performed during the dry season. By their very nature, ephemeral streams are usually dry in the summer, and therefore, in-stream construction activities will not cause significant water quality problems. However, when tying up the site at the end of the project, wash any fines (see Washing Fines) that accumulated in the channel back into the bed material, to decrease pollution from the first rainstorm of the season.
- When working near ephemeral or perennial streams, erosion and sediment controls (see silt fences, straw bale barriers, etc.) should be implemented to keep sediment out of stream channel.

Minimize Disturbance

- Minimize disturbance through: selection of the narrowest crossing location; limiting the number of equipment trips across a stream during construction; and, minimizing the number and size of work areas (equipment staging areas and spoil storage areas). Place work areas at least 50 ft from stream channel. Field reconnaissance should be conducted during the planning stage to identify work areas.

Use of Pre-Disturbed Areas

- Locate project sites and work areas in areas disturbed by prior construction or other activity when possible.

EXHIBIT "C" (Stormwater Pollution Prevention Plan)

Selection of Project Site

- Avoid steep and unstable banks, highly erodible or saturated soils, or highly fractured rock.
- Select project site that minimizes disturbance to aquatic species or habitat.

Equipment Selection

- Select equipment that reduces the amount of pressure exerted on the ground surface, and therefore, reduces erosion potential and/or use overhead or aerial access for transporting equipment across drainage channels. Use equipment that exerts ground pressures of less than 5 or 6 lb/in², where possible. Low ground pressure equipment includes: wide or high flotation tires (34 to 72 in. wide); dual tires; bogie axle systems; tracked machines; lightweight equipment; and, central tire inflation systems.

Streambank Stabilization

Preservation of Existing Vegetation

- Preserve existing vegetation in accordance with EC-2, Preservation of Existing Vegetation. In a streambank environment, preservation of existing vegetation provides the following benefits.

Water Quality Protection

- Vegetated buffers on slopes trap sediment and promote groundwater recharge. The buffer width needed to maintain water quality ranges from 15 to 100 ft. On gradual slopes, most of the filtering occurs within the first 30 ft. Steeper slopes require a greater width of vegetative buffer to provide water quality benefits.

Streambank Stabilization

- The root system of riparian vegetation stabilizes streambanks by increasing tensile strength in the soil. The presence of vegetation modifies the moisture condition of slopes (infiltration, evapo transpiration, interception) and increases bank stability.

Riparian Habitat

- Buffers of diverse riparian vegetation provide food and shelter for riparian and aquatic organisms. Minimizing impacts to fisheries habitat is a major concern when working near streams and rivers. Riparian vegetation provides shade, shelter, organic matter (leaf detritus and large woody debris), and other nutrients that are necessary for fish and other aquatic organisms. Buffer widths for habitat concerns are typically wider than those recommended for water quality concerns (100 to 1500 ft).
- When working near watercourses, it is important to understand the work site's placement in the watershed. Riparian vegetation in headwater streams has a greater impact on overall water quality than vegetation in downstream reaches. Preserving existing vegetation upstream is necessary to maintain water quality, minimize bank failure, and maximize riparian habitat, downstream of the work site.

Limitations

- Local county and municipal ordinances regarding width, extent and type of vegetative buffer required may exceed the specifications provided here; these ordinances should be investigated prior to construction.

EXHIBIT "C" (Stormwater Pollution Prevention Plan)

Streambank Stabilization Specific Installation

- As a general rule, the width of a buffer strip between a road and the stream is recommended to be 50 ft plus four times the percent slope of the land, measured between the road and the top of stream bank.

Hydraulic Mulch

- Apply hydraulic mulch on disturbed streambanks above mean high water level in accordance with EC-3, Hydraulic Mulch to provide temporary soil stabilization.

Limitations

- Do not place hydraulic mulch or tackifiers below the mean high-water level, as these materials could wash into the channel and impact water quality or possibly cause eutrophication (eutrophication is an algal bloom caused by excessively high nutrient levels in the water).

Hydroseeding

- Hydroseed disturbed streambanks in accordance with EC-4, Hydroseeding.

Limitations

- Do not place tackifiers or fertilizers below the mean high-water level, as these materials could wash into the channel and impact water quality or possibly cause eutrophication.

Soil Binders

- Apply soil binders to disturbed streambanks in accordance with EC-5, Soil Binders.

Limitations

- Do not place soil binders below the mean high-water level. Soil binder must be environmentally benign and non-toxic to aquatic organisms.

Straw Mulch

- Apply straw mulch to disturbed streambanks in accordance with EC-6, Straw Mulch.

Limitations

- Do not place straw mulch below the mean high-water level, as this material could wash into the channel and impact water quality or possibly cause eutrophication.

Geotextiles and Mats

- Install geotextiles and mats as described in EC-7, Geotextiles and Mats, to stabilize disturbed channels and streambanks. Not all applications should be in the channel, for example, certain geotextile netting may snag fish gills and are not appropriate in fish bearing streams. Geotextile fabrics that are not biodegradable are not appropriate for in stream use. Additionally, geotextile fabric or blankets placed in channels must be adequate to sustain anticipated hydraulic forces.

Earth Dikes, Drainage Swales, and Lined Ditches

- Convey, intercept, or divert runoff from disturbed streambanks using EC-9, Earth Dikes and Drainage Swales.

EXHIBIT "C" (Stormwater Pollution Prevention Plan)

Limitations

- Do not place earth dikes in watercourses, as these structures are only suited for intercepting sheet flow and should not be used to intercept concentrated flow.
- Appropriately sized velocity dissipation devices (EC-10) must be placed at outlets to minimize erosion and scour.

Velocity Dissipation Devices

- Place velocity dissipation devices at outlets of pipes, drains, culverts, slope drains, diversion ditches, swales, conduits or channels in accordance with EC-10, Velocity Dissipation Devices.

Slope Drains

- Use slope drains to intercept and direct surface runoff or groundwater into a stabilized watercourse, trapping device or stabilized area in accordance with EC-11, Slope Drains.

Limitations

- Appropriately sized outlet protection and velocity dissipation devices (EC-10) must be placed at outlets to minimize erosion and scour.

Streambank Sediment Control

Silt Fences

- Install silt fences in accordance with SE-1, Silt Fence, to control sediment. Silt fences should only be installed where sediment laden water can pond, thus allowing the sediment to settle out.

Fiber Rolls

- Install fiber rolls in accordance with SE-5, Fiber Rolls, along contour of slopes above the high-water level to intercept runoff, reduce flow velocity, release the runoff as sheet flow and provide removal of sediment from the runoff. In a stream environment, fiber rolls should be used in conjunction with other sediment control methods such as SE-1, Silt Fence or SE-9 Straw Bale Barrier. Install silt fence, straw bale barrier, or other erosion control method along toe of slope above the high-water level.

Gravel Bag Berm

- A gravel bag berm or barrier can be utilized to intercept and slow the flow of sediment laden sheet flow runoff in accordance with SE-6, Gravel Bag Berm. In a stream environment gravel bag barrier can allow sediment to settle from runoff before water leaves the construction site and can be used to isolate the work area from the live stream.

Limitations

- Gravel bag barriers are not recommended as a perimeter sediment control practice around streams.

Straw Bale Barrier

- Install straw bale barriers in accordance with SE-9, Straw Bale Barrier, to control sediment. Straw bale barriers should only be installed where sediment laden water can pond, thus allowing the sediment to settle out. Install a silt fence in accordance with SE-1, Silt Fence.

on down slope side of straw bale barrier closest to stream channel to provide added sediment control.

Rock Filter

Description and Purpose

Rock filters are temporary erosion control barriers composed of rock that is anchored in place. Rock filters detain the sediment laden runoff, retain the sediment, and release the water as sheet flow at a reduced velocity. Typical rock filter installations are illustrated at the end of this BMP.

Applications

- Near the toe of slopes that may be subject to flow and rill erosion.

Limitations

- Inappropriate for contributing drainage areas greater than 5 acres.
- Requires sufficient space for ponded water.
- Ineffective for diverting runoff because filters allow water to slowly seep through.
- Rock filter berms are difficult to remove when construction is complete.
- Unsuitable in developed areas or locations where aesthetics is a concern.

Specifications

- Rock: open graded rock, 0.75 to 5 in. for concentrated flow applications.
- Woven wire sheathing: 1 in. diameter, hexagonal mesh, galvanized 20gauge (used with rock filters in areas of concentrated flow).
- In construction traffic areas, maximum rock berm heights should be 12 in. Berms should be constructed every 300 ft on slopes less than 5%, every 200 ft on slopes between 5% and 10%, and every 100 ft on slopes greater than 10%.

Maintenance

- Inspect and verify that activity-based BMPs are in place prior to the commencement of associated activities. While activities associated with the BMP are under way, inspect weekly during the rainy season and at two-week intervals in the non-rainy season to verify continued BMP implementation.
- Inspect BMPs subject to non-stormwater discharges daily while non-stormwater discharges occur.
- Reshape berms as needed and replace lost or dislodged rock, and filter fabric.
- Sediment that accumulates in the BMP must be periodically removed in order to maintain BMP effectiveness. Sediment should be removed when the sediment accumulation reaches one third of the barrier height. Sediment removed during maintenance may be incorporated into earthwork on the site or disposed at an appropriate location.

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K-rail

Description and Purpose

This is temporary sediment control that uses K-rails to form the sediment deposition area, or to isolate the near bank construction area. Install K-rails at toe of slope in accordance with procedures described in NS-5, Clear Water Diversion.

Barriers are placed end to end in a pre-designed configuration and gravel filled bags are used at the toe of the barrier and at their abutting ends to seal and prevent movement of sediment beneath or through the barrier walls.

Appropriate Applications

- This technique is useful at the toe of embankments, cuts or fills slopes.

Limitations

- The K-rail method should not be used to dewater a project site, as the barrier is not watertight.

Implementation

- Refer to NS-5, Clear Water Diversion, for implementation requirements.

Instream Construction Sediment Control

There are three different options currently available for reducing turbidity while working in a stream or river. The stream can be isolated from the area in which work is occurring by means of a water barrier, the stream can be diverted around the work site through a pipe or temporary channel, or one can employ construction practices that minimize sediment suspension.

Whatever technique is implemented, an important thing to remember is that dilution can sometimes be the solution. A probable “worst time” to release high TSS into a stream system might be when the stream is very low; summer low flow, for example. During these times, the flow may be low while the biological activity in the stream is very high. Conversely, the addition of high TSS or sediment during a big storm discharge might have a relatively low impact, because the stream is already turbid, and the stream energy is capable of transporting both suspended solids, and large quantities of bedload through the system. The optimum time to “pull” in-stream structures may be during the rising limb of a storm hydrograph.

Techniques to minimize Total Suspended Solids (TSS)

- **Padding** - Padding laid in the stream below the work site may trap some solids that are deposited in the stream during construction. After work is done, the padding is removed from the stream, and placed on the bank to assist in re-vegetation.
- **Clean, washed gravel** - Using clean, washed gravel decreases solid suspension, as there are fewer small particles deposited in the stream.
- **Excavation using a large bucket** - Each time a bucket of soil is placed in the stream, a portion is suspended. Approximately the same amount is suspended whether a small amount of soil is placed in the stream, or a large amount. Therefore, using a large excavator bucket instead of a small one, will reduce the total amount of soil that washes downstream.

EXHIBIT "C" (Stormwater Pollution Prevention Plan)

- **Use of dozer for backfilling** - Using a dozer for backfilling instead of a backhoe follows the same principles – the fewer times soil is deposited in the stream, the less soil will be suspended.
- **Partial dewatering with a pump** - Partially dewatering a stream with a pump reduces the amount of water, and thus the amount of water that can suspend sediment.

Washing Fines

Definition and Purpose

- Washing fines is an “in-channel” sediment control method, which uses water, either from a water truck or hydrant, to wash stream fines that were brought to the surface of the channel bed during restoration, back into the interstitial spaces of the gravel and cobbles.
- The purpose of this technique is to reduce or eliminate the discharge of sediment from the channel bottom during the first seasonal flow. Sediment should not be allowed into stream channels; however, occasionally in-channel restoration work will involve moving or otherwise disturbing fines (sand and silt sized particles) that are already in the stream, usually below bankfull discharge elevation. Subsequent re-watering of the channel can result in a plume of turbidity and sedimentation.
- This technique washes the fines back into the channel bed. Bedload materials, including gravel cobbles, boulders and those fines, are naturally mobilized during higher storm flows. This technique is intended to delay the discharge until the fines would naturally be mobilized.

Appropriate Applications

- This technique should be used when construction work is required in channels. It is especially useful in intermittent or ephemeral streams in which work is performed “in the dry”, and which subsequently become re-watered.

Limitations

- The stream must have sufficient gravel and cobble substrate composition.
- The use of this technique requires consideration of time of year and timing of expected stream flows.
- The optimum time for the use of this technique is in the fall, prior to winter flows.
- Consultation with, and approval from the Department of Fish and Game and the Regional Water Quality Control Board may be required.

Implementation

- Apply sufficient water to wash fines, but not cause further erosion or runoff.
- Apply water slowly and evenly to prevent runoff and erosion.
- Consult with Department of Fish and Game and the Regional Water Quality Control Board for specific water quality requirements of applied water (e.g. chlorine).

EXHIBIT "C" (Stormwater Pollution Prevention Plan)

Inspection and Maintenance

- None necessary

Costs

Cost may vary according to the combination of practices implemented.

Inspection and Maintenance

- Inspect and verify that activity-based BMPs are in place prior to the commencement of associated activities. While activities associated with the BMP are under way, inspect BMPs in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events until final stabilization is achieved.
- Inspect BMPs subject to non-stormwater discharges daily while non-stormwater discharges occur.
- Inspect and repair equipment (for damaged hoses, fittings, and gaskets).

References

Manual of Standards of Erosion and Sediment Control Measures, Association of Bay Area Governments, May 1995.

Proposed Guidance Specifying Management Measures for Sources of Nonpoint Pollution in Coastal Waters, Work Group Working Paper, USEPA, April 1992.

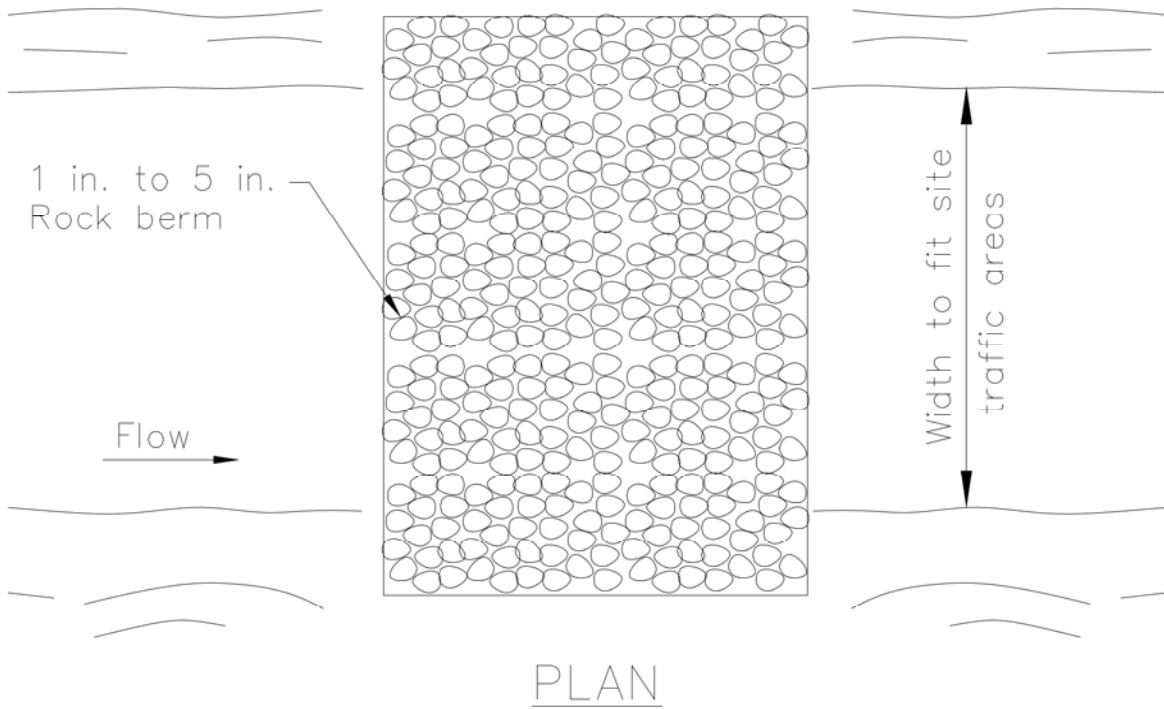
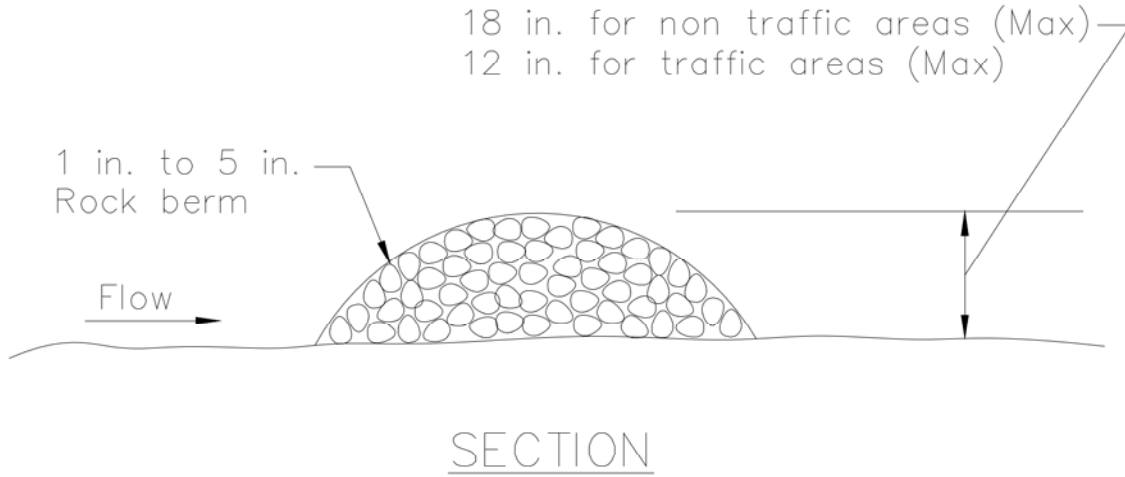
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Stormwater Management for Construction Activities, Developing Pollution Prevention Plans and Best Management Practices, EPA 832-R-92005; USEPA, April 1992.

Water Quality Management Plan for the Lake Tahoe Region, Volume II, Handbook of Management Practices, Tahoe Regional Planning Agency, November 1988.

EXHIBIT "C" (Stormwater Pollution Prevention Plan)



TYPICAL ROCK FILTER
NOT TO SCALE

EXHIBIT "C" (Stormwater Pollution Prevention Plan)



Description and Purpose

A compost blanket is applied to slopes and earth disturbed areas to prevent erosion, and in some cases, increase infiltration and/or establish vegetation. The compost blanket can be applied by hand, conveyor system, compost spreader, or pneumatic delivery (blower) system. The blanket thickness is determined from the slope steepness and anticipated precipitation. A compost blanket protects the soil surface from raindrop erosion, particularly rills and gullies that may form under other methods of erosion control.

A compost blanket, if properly installed, can be very successful at vegetation establishment, weed suppression and erosion control. The compost blanket comes into direct contact with the underlying soil, reducing rill formation. Furthermore, compost provides organic matter and nutrients important for vegetation growth. The compost blanket provides soil structure that allows water to infiltrate the soil surface and retain moisture, which also promotes seed germination and vegetation growth, in addition to reducing runoff.

Compost is typically derived from combinations of feedstocks, biosolids, leaf and yard trimmings, manure, wood, or mixed solid waste. Many types of compost are products of municipal recycle or "Green waste" programs. Compost is organic and biodegradable and can be left onsite. There are many types of compost with a variety of properties with specific functions, and accordingly, compost selection is an important design consideration in the application of this type of erosion control.

Categories

EC	Erosion Control	<input checked="" type="checkbox"/>
SE	Sediment Control	<input type="checkbox"/>
TC	Tracking Control	<input type="checkbox"/>
WE	Wind Erosion Control	<input type="checkbox"/>
NS	Non-Stormwater Management Control	<input type="checkbox"/>
WM	Waste Management and Materials Pollution Control	<input type="checkbox"/>

Legend:

- Primary Category
- Secondary Category

Targeted Constituents

Sediment	<input checked="" type="checkbox"/>
Nutrients	<input type="checkbox"/>
Trash	<input type="checkbox"/>
Metals	<input type="checkbox"/>
Bacteria	<input type="checkbox"/>
Oil and Grease	<input type="checkbox"/>
Organics	<input type="checkbox"/>

Potential Alternatives

- EC-3 Hydraulic Mulch
- EC-4 Hydroseeding
- EC-5 Soil Binders
- EC-7 Geotextiles and Mats
- EC-8 Wood Mulching

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Suitable Applications

A compost blanket is appropriate for slopes and earth disturbed areas requiring protection until permanent stabilization is established. A compost blanket can also be used in combination with temporary and/or permanent seeding strategies to enhance plant establishment. Examples include:

- Rough-graded areas that will remain inactive for longer than 14 days
- Soil stockpiles
- Slopes with exposed soil between existing vegetation such as trees or shrubs
- Slopes planted with live, container-grown vegetation
- Disturbed areas where plants are slow to develop

A compost blanket is typically used on slopes of 2:1 (H:V) or gentler. However, a compost blanket can be effective when applied to slopes as steep as 1:1 (H:V) with appropriate design considerations including slope length, blanket thickness, adding components such as a tackifier, or using compost blankets in conjunction with other techniques, such as compost socks and berms or fiber rolls.

Compost can be pre-seeded prior to application to the soil (recommended by the EPA for construction site stormwater runoff control) or seeded after the blanket has been installed. The compost medium can also remove pollutants in stormwater including heavy metals; oil and grease; and hydrocarbons (USEPA, 1998).

Limitations

- Compost can potentially leach nutrients (dissolved phosphorus and nitrogen) into runoff and potentially impact water quality. Compost should not be used directly upstream from nutrient impaired waterbodies (Adams et. al, 2008).
- Compost may also contain other undesirable constituents that are detrimental to water quality. Carefully consider the qualifications and experience of any compost producer/supplier.
- A compost blanket applied by hand is more time intensive and potentially costly. Using a pneumatic blower truck is the recommended cost-effective method of application.
- When blowers are used, the treatment areas should be within 300 ft of a road or surface capable of supporting trucks.
- Wind may limit application of compost and result in application to undesired locations.
- Compost blankets should not be applied in areas of concentrated flows.
- Steeper slopes may require additional blanket thickness and other stability measures such as using tackifiers or slope interruption devices (compost socks and berms, or fiber rolls). The same applies for sites with high precipitation totals or during the rainy season.

EXHIBIT "C" (Stormwater Pollution Prevention Plan)

Implementation

- Additional guidance on the comparison and selection of temporary slope stabilization methods is provided in Appendix F of the Handbook.

Compost Materials

- California Compost Regulations (Title 14, California Code of Regulations, Division 7, Chapter 3.1, Article 7, Section 17868.3) define and require a quality of compost for application. Compost should comply with all physical and chemical requirements. Specific requirements are provided in Table 1 below, taken from Caltrans Standard Special Provision 10-1 (SSP 10-1), Erosion Control (Compost Blanket).
- The compost producer should be fully permitted as specified under the California Integrated Waste Management Board, Local Enforcement Agencies and any other State and Local Agencies that regulate Solid Waste Facilities. If exempt from State permitting requirements, the composting facility should certify that it follows guidelines and procedures for production of compost meeting the environmental health standards of Title 14, California Code of Regulations, Division 7, Chapter 3.1, Article 7.
- The compost producer should be a participant in United States Composting Council's Seal of Testing Assurance program.
- Compost moisture should be considered for composition quality and application purposes. A range of 30-50% is typical. Compost that is too dry is hard to apply and compost that is too wet is more difficult (and more expensive) to transport. For arid or semi-arid areas, or for application during the dry season, use compost with greater moisture content than areas with wetter climates. For wetter or more humid climates or for application during the wet season, drier composts can be used as the compost will absorb moisture from the ambient air.
- Organic content of the compost is also important and should range from 30 to 65% depending on site conditions.
- Compost should be high-quality mature compost. Immature compost can potentially leach nutrients.
- Compost should not be derived from mixed municipal solid waste and should be free of visible contaminants.
- Compost should not contain paint, petroleum products, pesticides or any other chemical residues harmful to animal life or plant growth. Metal concentrations in compost should not exceed the maximum metal concentrations listed under Title 14, California Code of Regulations, Division 7, Chapter 3.1, Section 17868.2.
- Compost should not possess objectionable odors.
- Compost should be weed free.

EXHIBIT "C" (Stormwater Pollution Prevention Plan)

Table 1. Physical/Chemical Requirements of Compost
Reference - Caltrans SSP-10 Erosion Control Blanket (Compost)

Property	Test Method	Requirement
pH	*TMECC 04.11-A Elastomeric pH 1:5 Slurry Method pH Units	6.0-8.0
Soluble Salts	TMECC 04.10-A Electrical Conductivity 1:5 Slurry Method dS/m (mmhos/cm)	0-10.0
Moisture Content	TMECC 03.09-A Total Solids & Moisture at 70+/- 5 deg C % Wet Weight Basis	30-60
Organic Matter Content	TMECC 05.07-A Loss-On-Ignition Organic Matter Method (LOI) % Dry Weight Basis	30-65
Maturity	TMECC 05.05-A Germination and Vigor Seed Emergence Seedling Vigor % Relative to Positive Control	80 or Above 80 or Above
Stability	TMECC 05.08-B Carbon Dioxide Evolution Rate mg CO ₂ -C/g OM per day	8 or below
Particle Size	TMECC 02.02-B Sample Sieving for Aggregate Size Classification % Dry Weight Basis	100% Passing, 3 inches 90-100% Passing, 1 inch 65-100% Passing, 3/4 inch 0 - 75% Passing, 1/4 inch Maximum length 6 inches
Pathogen	TMECC 07.01-B Fecal Coliform Bacteria < 1000 MPN/gram dry wt.	Pass
Pathogen	TMECC 07.01-B Salmonella < 3 MPN/4 grams dry wt.	Pass
Physical Contaminants	TMECC 02.02-C Man Made Inert Removal and Classification: Plastic, Glass and Metal % > 4mm fraction	Combined Total: < 1.0
Physical Contaminants	TMECC 02.02-C Man Made Inert Removal and Classification: Sharps (Sewing needles, straight pins and hypodermic needles) % > 4mm fraction	None Detected

*TMECC refers to "Test Methods for the Examination of Composting and Compost," published by the United States Department of Agriculture and the United States Compost Council (USCC).

Installation

- Prior to compost application, prepare the slope by removing loose rocks, roots, stumps, and other debris greater than 2" in diameter. Prepare the slope area surface by scarifying or track walking/roughening if necessary.
- Select method to apply the compost blanket. A pneumatic blower is most cost effective and most adaptive in applying compost to steep, rough terrain, and hard to reach locations.
- A compost blanket thickness of 1" to 4" should be applied to slopes of 2:1 (H:V) or gentler, based on site-specific conditions. Increase blanket thickness with increased slope steepness and/or during installation during the rainy season (for example, 2" to 3" should be used for a

3:1 slope, while 1" to 2" can be used for a 4:1 slope). Erosion control using a compost blanket is not recommended for slopes greater than 1:1 (H:V).

- For steeper slopes, tackifiers should be utilized and/or other stabilization techniques employed. For example, compost socks or berms can be installed at intervals over the compost blanket (in a similar manner as Fiber Rolls, SE-5).
- Compost socks or berms (or equivalent linear sediment control BMP) should be placed at the top and/or bottom of the slope for additional erosion control performance.
- For optimum vegetation establishment, a blanket thickness of 1" to 2" is recommended. If vegetation establishment is not the primary function of the compost blanket, a thicker blanket may be recommended based on slope or rainfall conditions.
- Evenly distribute compost on the soil surface to the desired blanket thickness (1/2" to 4" as calculated prior based on-site conditions and objectives). Even distribution is an important factor in preventing future rill and gully erosion.
- The compost blanket should extend 3 to 6 feet over the top of the shoulder of the slope. A compost sock or compost berm can be used at the top of the slope as an auxiliary technique to prevent runoff from flowing underneath the compost blanket.
- Use additional anchoring and erosion control BMPs in conjunction of the compost blanket as needed.

Costs

The cost associated with a compost blanket is similar to that of a straw mat and generally less expensive than a geotextile blanket (USEPA, 2009). Caltrans has provided a recent estimate for \$5,600 to \$9,000 per acre for application of an unseeded 1-inch compost blanket (Caltrans Compost Specifications, 2009. Adjusted for inflation (2016 dollars) by Tetra Tech, Inc.). Vendor costs indicate that proprietary blends of compost that are seeded and contain a nutrient rich "tackifier" can cost approximately \$0.45 per square foot, or approximately \$19,200 per acre for a 2-inch blanket (Adjusted for inflation (2016 dollars) by Tetra Tech, Inc.). Application by hand is more time intensive and likely more costly.

Inspection and Maintenance

- BMPs must be inspected in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- Areas where erosion is evident, another layer of compost should be reapplied as soon as possible. It may be necessary to install an additional type of stormwater BMP at the top of slope or as a slope interrupter to control flow, such as a fiber roll (SE-5) or compost sock (SE-11).
- Care should be exercised to minimize the damage to protected areas while making repairs, as any area damaged will require reapplication of BMPs.

EXHIBIT "C" (Stormwater Pollution Prevention Plan)

- Limit or prohibit foot traffic to minimize damage to BMP or impede vegetation establishment.

References

An Analysis of Composting as an Environmental Remediation Technology, U.S. Environmental Protection Agency (USEPA), Solid Waste and Emergency Response (5305W), EPA530-R-8-008, 1998.

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National Pollutant Discharge Elimination System (NPDES), Compost Blankets, U.S. Environmental Protection Agency (USEPA).

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Standard Specifications for Transportation Materials and Methods of Sampling and Testing Designation M10-03, Compost for Erosion/Sediment Control (Compost Blankets), Provisional, American Association of State Highway Transportation Officials (AASHTO), 2003.

Stormwater Best Management Practices (BMPs) Field Trials of Erosion Control Compost in Reclamation of Rock Quarry Operations, Nonpoint Source Protection Program CWA §319(h), Texas Commission on Environmental Quality, Adams, T., McFarland, A., Hauck, L., Barrett, M., and Eck, B., 2008.

EXHIBIT "C" (Stormwater Pollution Prevention Plan)



Description and Purpose

Soil Preparation/Roughening involves assessment and preparation of surface soils for BMP installation. This can include soil testing (for seed base, soil characteristics, or nutrients), as well as roughening surface soils by mechanical methods (including sheep's foot rolling, track walking, scarifying, stair stepping, and imprinting) to prepare soil for additional BMPs, or to break up sheet flow. Soil Preparation can also involve tilling topsoil to prepare a seed bed and/or incorporation of soil amendments, to enhance vegetative establishment.

Suitable Applications

Soil preparation: Soil preparation is essential to proper vegetative establishment. In particular, soil preparation (i.e. tilling, raking, and amendment) is suitable for use in combination with any soil stabilization method, including Rolled Erosion Control Products (RECPs) or sod. Soil preparation should not be confused with roughening.

Roughening: Soil roughening is generally referred to as track walking (sometimes called imprinting) a slope, where treads from heavy equipment run parallel to the contours of the slope and act as mini terraces. Soil preparation is most effective when used in combination with erosion controls. Soil Roughening is suitable for use as a complementary process for controlling erosion on a site. Roughening is not intended to be used as a stand-alone BMP, and should be used with perimeter controls, additional erosion control measures, grade breaks, and vegetative establishment for maximum effectiveness. Roughening is intended to only affect surface soils and should not compromise slope stability or overall compaction. Suitable applications for soil roughening include:

Categories

EC	Erosion Control	<input checked="" type="checkbox"/>
SE	Sediment Control	<input checked="" type="checkbox"/>
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	

Legend:

- Primary Category
- Secondary Category

Targeted Constituents

Sediment	<input checked="" type="checkbox"/>
Nutrients	
Trash	
Metals	
Bacteria	
Oil and Grease	
Organics	

Potential Alternatives

- EC-3 Hydraulic Mulch
- EC-5 Soil Binders
- EC-7 Geotextiles and Mats

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- Along any disturbed slopes, including temporary stockpiles, sediment basins, or compacted soil diversion berms and swales.
- Roughening should be used in combination with hydraulically applied stabilization methods, compost blanket, or straw mulch; but should not be used in combination with RECPs or sod because roughening is intended to leave terraces on the slope.

Limitations

- Preparation and roughening must take place prior to installing other erosion controls (such as hydraulically applied stabilizers) or sediment controls (such as fiber rolls) on the faces of slopes.
- In such cases where slope preparation is minimal, erosion control/revegetation BMPs that do not require extensive soil preparation - such as hydraulic mulching and seeding applications - should be employed.
- Consideration should be given to the type of erosion control BMP that follows surface preparation, as some BMPs are not designed to be installed over various types of tillage/roughening, i.e., RECPs should not be used with soil roughening due to a “bridging” effect, which suspends the blanket above the seed bed.
- Surface roughness has an effect on the amount of mulch material that needs to be applied, which shows up as a general increase in mulch material due to an increase in surface area (Topographic Index -see EC-3 Hydraulic Mulch).

Implementation

- Additional guidance on the comparison and selection of temporary slope stabilization methods is provided in Appendix F of the Handbook.

General

A roughened surface can significantly reduce erosion. Based on tests done at the San Diego State Erosion Research Laboratory, various roughening techniques on slopes can result in a 12 - 76% reduction in the erosion rate versus smooth slopes.

Materials

Minimal materials are required unless amendments and/or seed are added to the soil. The majority of soil roughening/preparation can be done with equipment that is on hand at a normal construction site, such as bull dozers and compaction equipment.

Installation Guidelines

Soil Preparation

- Where appropriate or feasible, soil should be prepared to receive the seed by disking or otherwise scarifying the surface to eliminate crust, improve air and water infiltration and create a more favorable environment for germination and growth.
- Based upon soil testing conducted, apply additional soil amendments (e.g., fertilizers, additional seed) to the soil to help with germination. Follow EC-4, Hydroseeding, when selecting and applying seed and fertilizers.

Cut Slope Roughening:

- Stair-step grade or groove the cut slopes that are steeper than 3:1.
- Use stair-step grading on any erodible material soft enough to be ripped with a bulldozer. Slopes consisting of soft rock with some subsoil are particularly suited to stair-step grading.
- Make the vertical cut distance less than the horizontal distance, and slightly slope the horizontal position of the "step" in toward the vertical wall.
- Do not make individual vertical cuts more than 2 ft. (0.6 m) high in soft materials or more than 3 ft. (0.9 m) high in rocky materials.
- Groove the slope using machinery to create a series of ridges and depressions that run across the slope, on the contour.

Fill Slope Roughening:

- Place on fill slopes with a gradient steeper than 3:1 in lifts not to exceed 8 in. (0.2 m), and make sure each lift is properly compacted.
- Ensure that the face of the slope consists of loose, uncompacted fill 4-6 in. (0.1-0.2 m) deep.
- Use grooving or tracking to roughen the face of the slopes, if necessary.
- Do not blade or scrape the final slope face.

Roughening for Slopes to be Mowed:

- Slopes that require mowing activities should not be steeper than 3:1.
- Roughen these areas to shallow grooves by track walking, scarifying, sheepsfoot rolling, or imprinting.
- Make grooves close together (less than 10 in.), and not less than 1 in. deep, and perpendicular to the direction of runoff (i.e., parallel to the slope contours).
- Excessive roughness is undesirable where mowing is planned.

Roughening with Tracked Machinery:

- Limit roughening with tracked machinery to soils with a sandy textural component to avoid undue compaction of the soil surface.
- Operate tracked machinery up and down the slope to leave horizontal depressions in the soil. Do not back-blade during the final grading operation.
- Seed and mulch roughened areas as soon as possible to obtain optimum seed germination and growth.

EXHIBIT "C" (Stormwater Pollution Prevention Plan)

Costs

Costs are based on the additional labor of tracking or preparation of the slope plus the cost of any required soil amendment materials.

Inspection and Maintenance

- BMPs must be inspected in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- Check the seeded slopes for signs of erosion such as rills and gullies. Fill these areas slightly above the original grade, then reseed and mulch as soon as possible.
- Inspect BMPs weekly during normal operations, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.

References

Soil Stabilization BMP Research for Erosion and Sediment Controls: Cost Survey Technical Memorandum, State of California Department of Transportation (Caltrans), July 2007.

Erosion and Sediment Control Manual, Oregon Department of Environmental Quality, February 2005.

EXHIBIT "C" (Stormwater Pollution Prevention Plan)



Description and Purpose

Non-vegetative stabilization methods are used for temporary or permanent stabilization of areas prone to erosion and should be used only where vegetative options are not feasible; examples include:

- Areas of vehicular or pedestrian traffic such as roads or paths;
- Arid environments where vegetation would not provide timely ground coverage, or would require excessive irrigation;
- Rocky substrate, infertile or droughty soils where vegetation would be difficult to establish; and
- Areas where vegetation will not grow adequately within the construction time frame.

There are several non-vegetative stabilization methods and selection should be based on site-specific conditions.

Decomposed Granite (DG) is a permanent erosion protection method that consists of a layer of stabilized decomposed granite placed over an erodible surface.

Degradable Mulches of various types (see EC-3, EC-6, EC-8) can be used for temporary non-vegetative stabilization; examples include straw mulch, compost, wood chips or hydraulic mulch.

Geotextiles and Mats can be used for temporary non-vegetative stabilization (see EC-7). These BMPs are typically manufactured from degradable or synthetic materials and are

Categories

EC	Erosion Control	<input checked="" type="checkbox"/>
SE	Sediment Control	<input checked="" type="checkbox"/>
TR	Tracking Control	
WE	Wind Erosion Control	<input checked="" type="checkbox"/>
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	

Legend:

- Primary Category
- Secondary Category

Targeted Constituents

Sediment	<input checked="" type="checkbox"/>
Nutrients	
Trash	
Metals	
Bacteria	
Oil and Grease	
Organics	

Potential Alternatives

None

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designed and specified based on their functional longevity, i.e., how long they will persist and provide erosion protection. All geotextiles and mats should be replaced when they exceed their functional longevity or when permanent stabilization methods are instituted.

Gravel Mulch is a non-degradable erosion control product that is composed of washed and screened coarse to very coarse gravel, 16 mm to 64 mm (0.6" - 2.5"), similar to an AASHTO No. 3 coarse aggregate.

Rock Slope Protection consists of utilizing large rock or rip-rap (4" - 24") to stabilize slopes with a high erosion potential and those subject to scour along waterways.

Soil Binders can be used for temporary non-vegetative stabilization (see EC-5). The key to their use is functional longevity. In most cases, the soil binder will need to be routinely monitored and re-applied to maintain an erosion-resistant coverage.

Suitable Applications

Non-vegetated stabilization methods are suitable for use on disturbed soil areas and on material stockpiles that need to be temporarily or permanently protected from erosion by water and wind. Non-vegetated stabilization should only be utilized when vegetation cannot be established in the required timeframe, due to soil or climactic conditions, or where vegetation may be a potential fire hazard.

Decomposed Granite (DG) and Gravel Mulch are suitable for use in areas where vegetation establishment is difficult, on flat surfaces, trails and pathways, and when used in conjunction with a stabilizer or tackifier, on shallow slopes (i.e., 10:1 [H:V]). DG and gravel can also be used on shallow rocky slopes where vegetation cannot be established for permanent erosion control.

Degradable Mulches can be used to cover and protect soil surfaces from erosion both in temporary and permanent applications. In many cases, the use of mulches by themselves requires routine inspection and re-application. See EC-3 Hydraulic Mulch, EC-6 Straw Mulch, EC-8 Wood Mulch, or EC-14 Compost Blankets for more information.

Geotextiles and Mats can be used as a temporary stand-alone soil stabilization method. Depending on material selection, geotextiles and mats can be a short-term (3 mos – 1 year) or long-term (1-2 years) temporary stabilization method. For more information on geotextiles and mats see EC-7 Geotextiles and Mats.

Rock Slope Protection can be used when the slopes are subject to scour or have a high erosion potential, such as slopes adjacent to flowing waterways or slopes subject to overflow from detention facilities (spillways).

Soil Binders can be used for temporary stabilization of stockpiles and disturbed areas not subject to heavy traffic. See EC-5 Soil Binders for more information.

Limitations

General

- Refer to EC-3, EC-6, EC-8, and EC-14 for limitations on use of mulches. Refer to EC-7 for limitations on use of geotextiles and mats. Refer to EC-5 for limitations on use of Soil Binders.

Decomposed Granite

- Not available in some geographic regions.
- If not tackified, material may be susceptible to erosion even on slight slopes (e.g., 30:1 [H:V]).
- Installed costs may be more expensive than vegetative stabilization methods.

Gravel Mulch

- Availability is limited in some geographic regions.
- If not properly screened and washed, can contain fine material that can erode and/or create dust problems.
- If inadequately sized, material may be susceptible to erosion on sloped areas.
- Pore spaces fill with dirt and debris over time; may provide a growing medium for weeds.

Rock Slope Protection

- Installation is labor intensive.
- Installed costs can be significantly higher than vegetative stabilization methods.
- Rounded stones may not be used on slopes greater than 2:1 [H:V].

Implementation

General

Non-vegetated stabilization should be used in accordance with the following general guidance:

- Should be used in conjunction with other BMPs, including drainage, erosion controls and sediment controls.
- Refer to EC-3, EC-6, EC-8, and EC-14 for implementation details for mulches. Refer to EC-7 for implementation details for geotextiles and mats. Refer to EC-5 for implementation details for soil binders.
- Non-vegetated stabilization measures should be implemented as soon as the disturbance in the areas they are intended to protect has ceased.
- Additional guidance on the comparison and selection of temporary slope stabilization methods is provided in Appendix F of the Handbook.

Decomposed Granite Stabilization

- If used for a road or path should be installed on a prepared base.
- Should be mixed with a stabilizer if used for roads or pathways, or on slope applications.
- Though porous it is recommended to prevent standing water on or next to a decomposed granite road or pathway.

Gravel Mulch

- Should be sized based on slope, rainfall, and upgradient run-on conditions. Stone size should be increased as potential for erosion increases (steeper slopes, high intensity rainfall).
- If permanent, a weed control fabric should be placed prior to installation.
- Should be installed at a minimum 2" depth.
- Should completely cover all exposed surfaces.

Rock Slope Protection

- Rock slope protection installation should follow Caltrans Standard Specification 72-2: Rock Slope Protection. Refer to the specification for rock conformity requirements and installation methods.
- When using rock slope protection, rock size and installation method should be specified by an Engineer.
- A geotextile fabric should be placed prior to installation.

Costs

- Costs are highly variable depending not only on technique chosen, but also on materials chosen within specific techniques. In addition, availability of certain materials will vary by region/location, which will also affect the cost. Costs of mulches, geotextiles and mats, and soil binders are presented in their respective fact sheets. Costs for decomposed granite, gravel mulch stabilization and rock slope protection may be higher depending on location and availability of materials. Caltrans has provided an estimate for gravel mulch of \$13 - \$20/yd² in flat areas and \$14 - \$30/yd² on side slopes (adjusted for inflation, 2016 dollars).

Inspection and Maintenance

General

- BMPs must be inspected in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- For permanent installation, require inspection periodically and after major storm events to look for signs of erosion or damage to the stabilization.
- All damage should be repaired immediately.
- Refer to EC-3, EC-6, EC-8, and EC-14 for inspection and maintenance requirements for mulches. Refer to EC-7 for inspection and maintenance requirements for geotextiles and mats. Refer to EC-5 for inspection and maintenance requirements for soil binders.

Decomposed Granite and Gravel Mulch Stabilization

- Rake out and add decomposed granite or gravel as needed to areas subject to rill erosion. Inspect upgradient drainage controls and repair/modify as necessary.

- Should remain stable under loose surface material. Any significant problem areas should be repaired to restore uniformity to the installation.

References

Arid Zone Forestry: A Guide for Field Technicians. Food and Agriculture Organization of the United Nations, 1989.

Design of Roadside Channels with Flexible Linings, Hydraulic Engineering Circular Number 15, Third Edition, Federal Highway Administration, 2007.

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Erosion and Sediment Control Handbook: A Guide for Protection of State Waters through the use of Best Management Practices during Land Disturbing Activities, Tennessee Department of Environment and Conservation, 2002.

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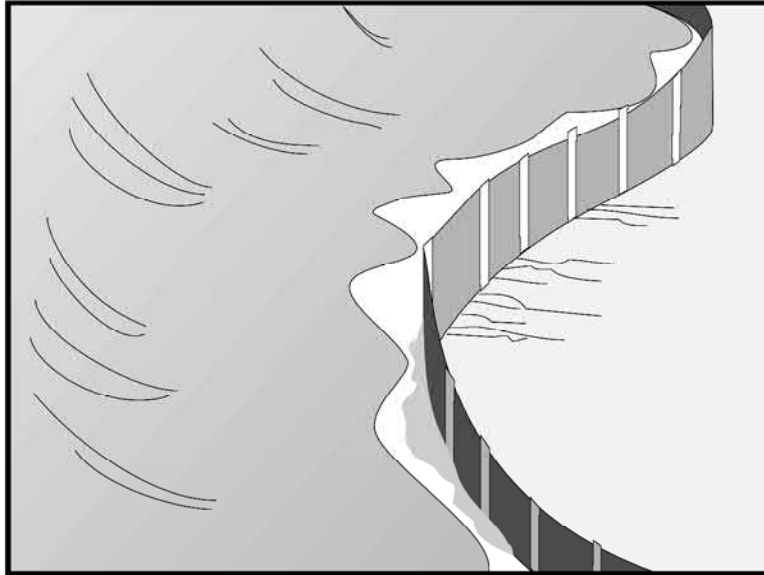
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Standard Specification 72-2: Rock Slope Protection. California Department of Transportation, 2006.

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EXHIBIT "C" (Stormwater Pollution Prevention Plan)



Description and Purpose

A silt fence is made of a woven geotextile that has been entrenched, attached to supporting poles, and sometimes backed by a plastic or wire mesh for support. The silt fence detains water, promoting sedimentation of coarse sediment behind the fence. Silt fence does not retain soil fine particles like clays or silts.

Suitable Applications

Silt fences are suitable for perimeter control, placed below areas where sheet flows discharge from the site. They could also be used as interior controls below disturbed areas where runoff may occur in the form of sheet and rill erosion and around inlets within disturbed areas (Storm Drain Inlet Protection, SE-10). Silt fences should not be used in locations where the flow is concentrated. Silt fences should always be used in combination with erosion controls. Suitable applications include:

- At perimeter of a project (although they should not be installed up and down slopes).
- Below the toe or down slope of exposed and erodible slopes.
- Along streams and channels.
- Around temporary spoil areas and stockpiles.
- Around inlets.
- Below other small cleared areas.

Categories

EC	Erosion Control	
SE	Sediment Control	<input checked="" type="checkbox"/>
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	

Legend:

- Primary Category
- Secondary Category

Targeted Constituents

Sediment (coarse sediment)	<input checked="" type="checkbox"/>
Nutrients	
Trash	
Metals	
Bacteria	
Oil and Grease	
Organics	

Potential Alternatives

- SE-5 Fiber Rolls
- SE-6 Gravel Bag Berm
- SE-12 Manufactured Linear Sediment Controls
- SE-13 Compost Socks and Berms
- SE-14 Biofilter Bags

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Limitations

- Do not use in streams, channels, drain inlets, or anywhere flow is concentrated.
- Do not use in locations where ponded water may cause a flooding hazard.
- Do not use silt fence to divert water flows or place across any contour line.
- Improperly installed fences are subject to failure from undercutting, overtopping, or collapsing.
- Must be trenched and keyed in.
- According to the State Water Board's *CGP Review, Issue #2 (2014)*, silt fences reinforced with metal or plastic mesh should be avoided due to plastic pollution and wildlife concerns.
- Not intended for use as a substitute for Fiber Rolls (SE-5), when fiber rolls are being used as a slope interruption device.
- Do not use on slopes subject to creeping, slumping, or landslides.

Implementation

General

A silt fence is a temporary sediment barrier consisting of woven geotextile stretched across and attached to supporting posts, trenched-in, and, depending upon the strength of fabric used, supported with plastic or wire mesh fence. Silt fences trap coarse sediment by intercepting and detaining sediment-laden runoff from disturbed areas in order to promote sedimentation behind the fence.

The following layout and installation guidance can improve performance and should be followed:

- Silt fence should be used in combination with erosion controls up-slope in order to provide the most effective sediment control.
- Silt fence alone is not effective at reducing turbidity. (Barrett and Malina, 2004)
- Designers should consider diverting sediment laden water to a temporary sediment basin or trap. (EPA, 2012)
- Use principally in areas where sheet flow occurs.
- Install along a level contour, so water does not pond more than 1.5 ft. at any point along the silt fence.
- Provide sufficient room for runoff to pond behind the fence and to allow sediment removal equipment to pass between the silt fence and toes of slopes or other obstructions. About 1200 ft.² of ponding area should be provided for every acre draining to the fence.
- Efficiency of silt fences is primarily dependent on the detention time of the runoff behind the control. (Barrett and Malina, 2004)

EXHIBIT "C" (Stormwater Pollution Prevention Plan)

- The drainage area above any fence should not exceed a quarter of an acre. (Rule of Thumb-100-feet of silt fence per 10,000 ft.² of disturbed area.) (EPA, 2012)
- The maximum length of slope draining to any point along the silt fence should be 100 ft. per ft of silt fence.
- Turn the ends of the filter fence uphill to prevent stormwater from flowing around the fence.
- Leave an undisturbed or stabilized area immediately down slope from the fence where feasible.
- Silt fences should remain in place until the disturbed area draining to the silt fence is permanently stabilized, after which, the silt fence fabric and posts should be removed and properly disposed.
- J-hooks, which have ends turning up the slope to break up long runs of fence and provide multiple storage areas that work like mini-retention areas, may be used to increase the effectiveness of silt fence.
- Be aware of local regulations regarding the type and installation requirements of silt fence, which may differ from those presented in this fact sheet.

Design and Layout

In areas where high winds are anticipated the fence should be supported by a plastic or wire mesh. The geotextile fabric of the silt fence should contain ultraviolet inhibitors and stabilizers to provide longevity equivalent to the project life or replacement schedule.

- Layout in accordance with the attached figures.
- For slopes that contain a high number of rocks or large dirt clods that tend to dislodge, it may be necessary to protect silt fence from rocks (e.g., rockfall netting) ensure the integrity of the silt fence installation.

Standard vs. Heavy Duty Silt Fence

Standard Silt Fence

- Generally applicable in cases where the area draining to fence produces moderate sediment loads.

Heavy Duty Silt Fence

- Heavy duty silt fence usually has 1 or more of the following characteristics, not possessed by standard silt fence.
 - Fabric is reinforced with wire backing or additional support.
 - Posts are spaced closer than pre-manufactured, standard silt fence products.
- Use is generally limited to areas affected by high winds.
- Area draining to fence produces moderate sediment loads.

Materials

Standard Silt Fence

- Silt fence material should be woven geotextile with a minimum width of 36 in. The fabric should conform to the requirements in ASTM designation D6461.

- Wooden stakes should be commercial quality lumber of the size and shape shown on the plans. Each stake should be free from decay, splits or cracks longer than the thickness of the stake or other defects that would weaken the stakes and cause the stakes to be structurally unsuitable.
- Staples used to fasten the fence fabric to the stakes should be not less than 1.75 in. long and should be fabricated from 15-gauge or heavier wire. The wire used to fasten the tops of the stakes together when joining two sections of fence should be 9 gauge or heavier wire. Galvanizing of the fastening wire will not be required.

Heavy-Duty Silt Fence

- Some silt fence has a wire backing to provide additional support, and there are products that may use prefabricated plastic holders for the silt fence and use metal posts instead of wood stakes.

Installation Guidelines – Traditional Method

Silt fences are to be constructed on a level contour. Sufficient area should exist behind the fence for ponding to occur without flooding or overtopping the fence.

- A trench should be excavated approximately 6 in. wide and 6 in. deep along the line of the proposed silt fence (trenches should not be excavated wider or deeper than necessary for proper silt fence installation).
- Bottom of the silt fence should be keyed-in a minimum of 12 in.
- Posts should be spaced a maximum of 6 ft. apart and driven securely into the ground a minimum of 18 in. or 12 in. below the bottom of the trench.
- When standard strength geotextile is used, a plastic or wire mesh support fence should be fastened securely to the upslope side of posts using heavy-duty wire staples at least 1 in. long. The mesh should extend into the trench.
- When extra-strength geotextile and closer post spacing are used, the mesh support fence may be eliminated.
- Woven geotextile should be purchased in a long roll, then cut to the length of the barrier. When joints are necessary, geotextile should be spliced together only at a support post, with a minimum 6 in. overlap and both ends securely fastened to the post.
- The trench should be backfilled with native material and compacted.
- Construct the length of each reach so that the change in base elevation along the reach does not exceed 1/3 the height of the barrier; in no case should the reach exceed 500 ft.
- Cross barriers should be a minimum of 1/3 and a maximum of 1/2 the height of the linear barrier.
- See typical installation details at the end of this fact sheet.

EXHIBIT "C" (Stormwater Pollution Prevention Plan)

Installation Guidelines - Static Slicing Method

- Static Slicing is defined as insertion of a narrow blade pulled behind a tractor, similar to a plow blade, at least 10 in. into the soil while at the same time pulling silt geotextile fabric into the ground through the opening created by the blade to the depth of the blade. Once the geotextile is installed, the soil is compacted using tractor tires.
- This method will not work with pre-fabricated, wire backed silt fence.
- Benefits:
 - Ease of installation (most often done with a 2-person crew).
 - Minimal soil disturbance.
 - Better level of compaction along fence, less susceptible to undercutting
 - Uniform installation.
- Limitations:
 - Does not work in shallow or rocky soils.
 - Complete removal of geotextile material after use is difficult.
 - Be cautious when digging near potential underground utilities.

Costs

- It should be noted that costs vary greatly across regions due to available supplies and labor costs.
- Average annual cost for installation using the traditional silt fence installation method (assumes 6 month useful life) is \$7 per linear foot based on vendor research. Range of cost is \$3.50 - \$9.10 per linear foot.

Inspection and Maintenance

- BMPs must be inspected in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- Repair undercut silt fences.
- Repair or replace split, torn, slumping, or weathered fabric. The lifespan of silt fence fabric is generally 5 to 8 months.
- Silt fences that are damaged and become unsuitable for the intended purpose should be removed from the site of work, disposed, and replaced with new silt fence barriers.
- Sediment that accumulates in the BMP should be periodically removed in order to maintain BMP effectiveness. Sediment should be removed when the sediment accumulation reaches 1/3 of the barrier height.

EXHIBIT "C" (Stormwater Pollution Prevention Plan)

- Silt fences should be left in place until the upgradient area is permanently stabilized. Until then, the silt fence should be inspected and maintained regularly.
- Remove silt fence when upgradient areas are stabilized. Fill and compact post holes and anchor trench, remove sediment accumulation, grade fence alignment to blend with adjacent ground, and stabilize disturbed area.

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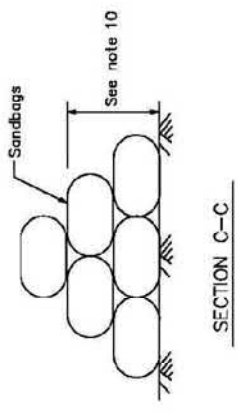
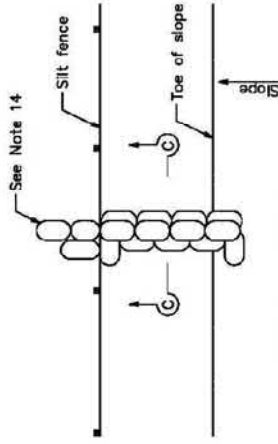
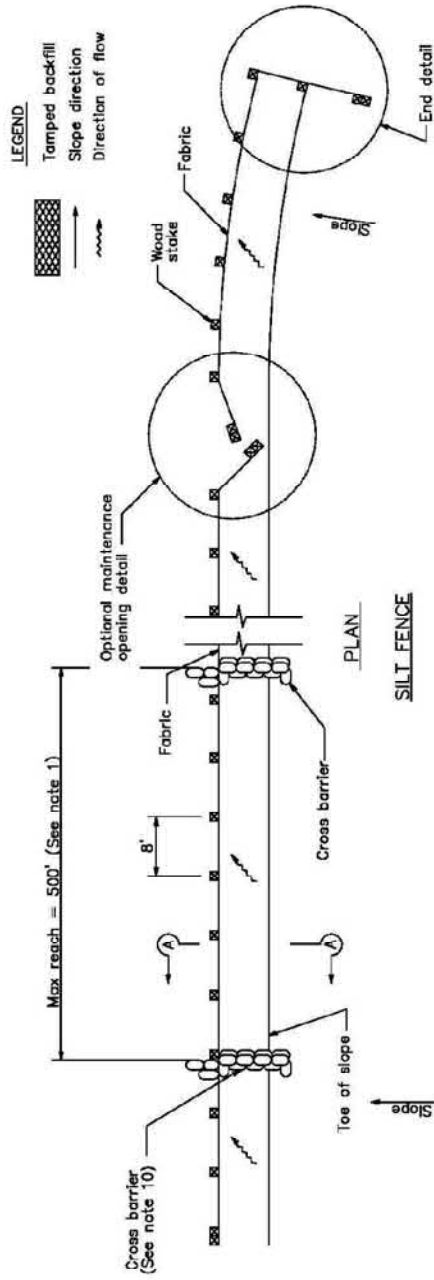
EXHIBIT "C" (Stormwater Pollution Prevention Plan)

Erosion and Sediment Control Manual, Oregon Department of Environmental Quality, February 2005.

EXHIBIT "C" (Stormwater Pollution Prevention Plan)

Silt Fence

SE-1

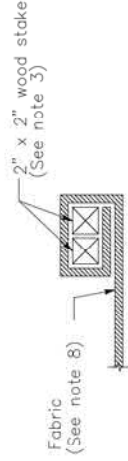
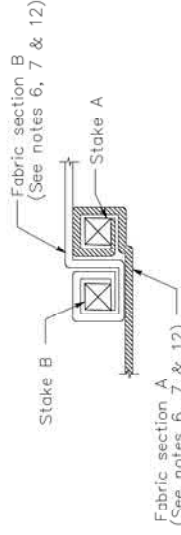
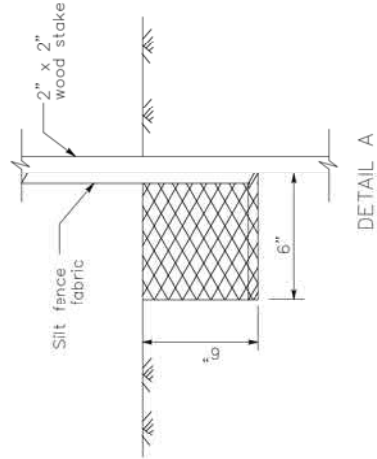
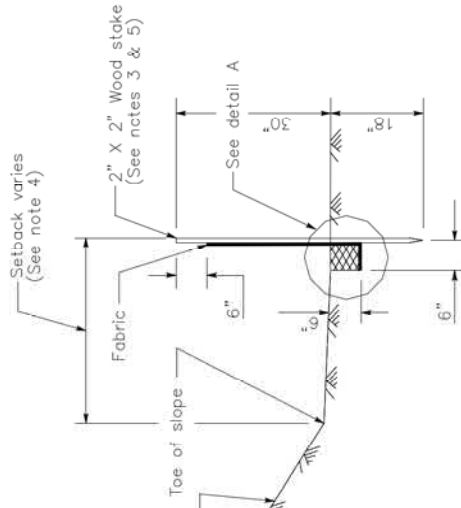


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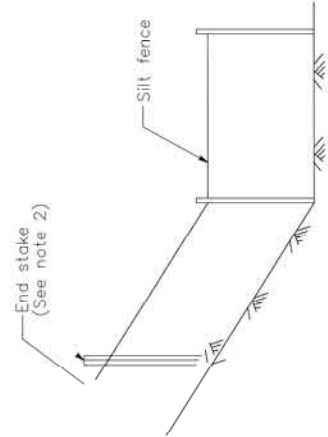
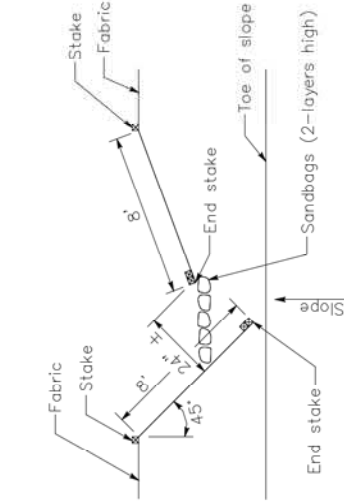
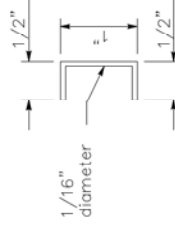
1. Construct the length of each reach so that the change in base elevation along the reach does not exceed 1/3 the height of the linear barrier. In no case shall the reach length exceed 500'.
2. The last 8'-0" of fence shall be turned up slope.
3. Stake dimensions are nominal.
4. Dimension may vary to fit field condition.
5. Stakes shall be spaced at 8'-0" maximum and shall be positioned on downstream side of fence.
6. Stakes to overlap and fence fabric to fold around each stake one full turn. Secure fabric to stake with 4 staples.
7. Stakes shall be driven tightly together to prevent potential flow-through of sediment at joint. The tops of the stakes shall be secured with wire.
8. For end stake, fence fabric shall be folded around two stakes are full turn and secured with 4 staples.
9. Minimum 4 staples per stake. Dimensions shown are typical.
10. Cross barriers shall be a minimum of 1/3 and a maximum of 1/2 the height of the linear barrier.
11. Maintenance openings shall be constructed in a manner to ensure sediment remains behind silt fence.
12. Joining sections shall not be placed at sump locations.
13. Sandbag rows and layers shall be offset to eliminate gaps.
14. Add 3-4 bags to cross barrier on downgradient side of silt fence as needed to prevent bypass or undermining and as allowable based on site limits of disturbance.

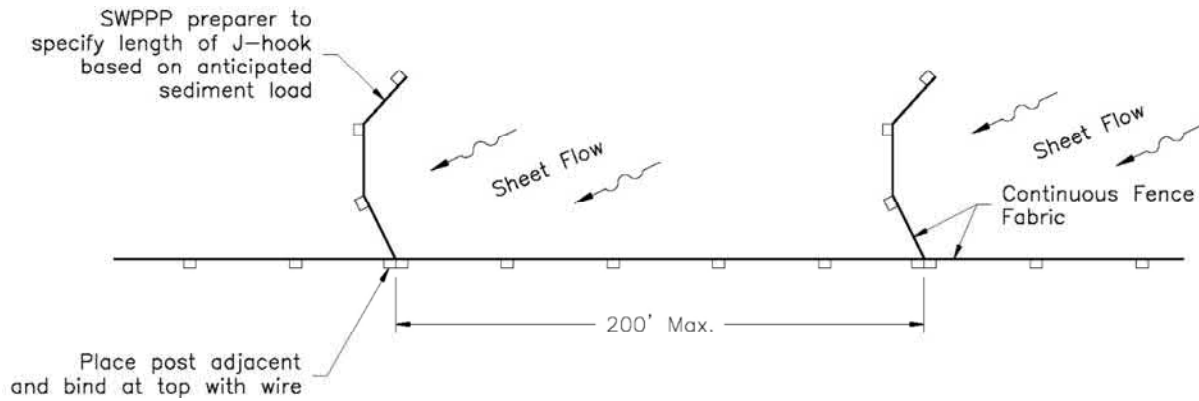
Silt Fence

SE-1



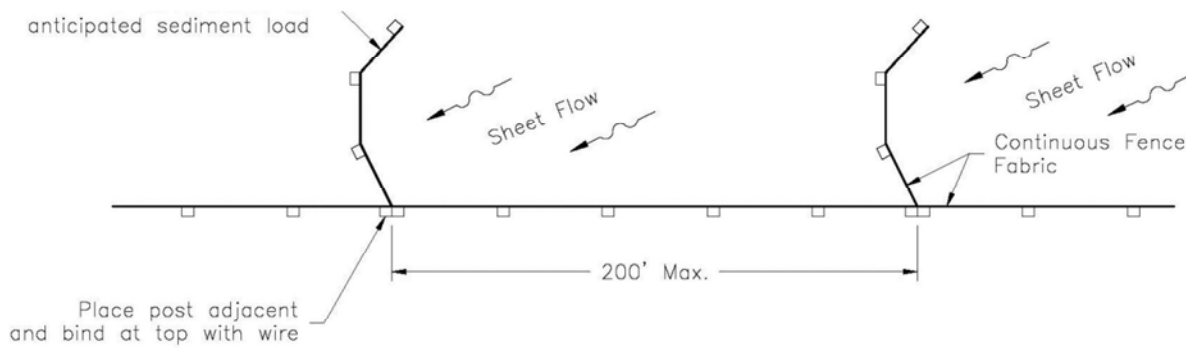
END STAKE DETAIL (TOP VIEW)
(SEE NOTE 9)





Plan

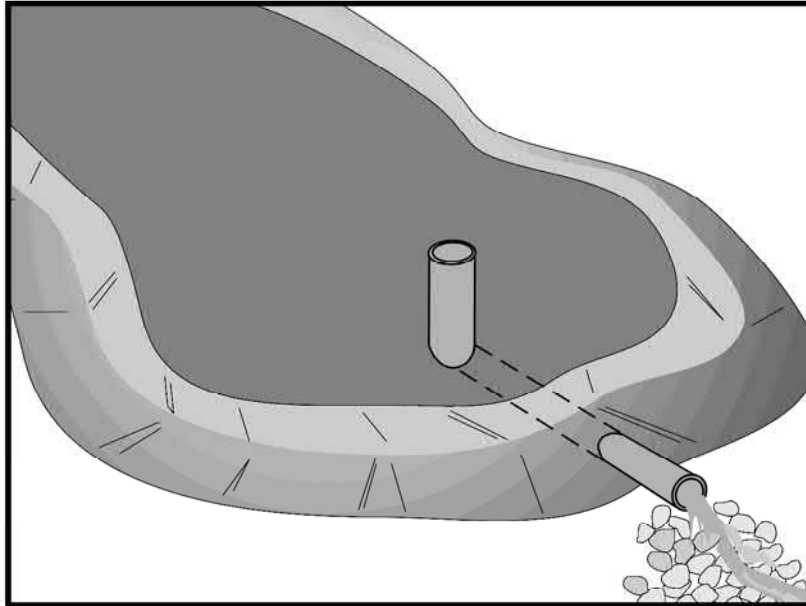
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Plan

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EXHIBIT "C" (Stormwater Pollution Prevention Plan)



Description and Purpose

A sediment basin is a temporary basin formed by excavation or by constructing an embankment so that sediment-laden runoff is temporarily detained under quiescent conditions, allowing sediment to settle out before the runoff is released.

Sediment basin design guidance presented in this fact sheet is intended to provide options, methods, and techniques to optimize temporary sediment basin performance and basin sediment removal. Basin design guidance provided in this fact sheet is not intended to guarantee basin effluent compliance with numeric discharge limits (numeric action levels or numeric effluent limits for turbidity). Compliance with discharge limits requires a thoughtful approach to comprehensive BMP planning, implementation, and maintenance. Therefore, optimally designed and maintained sediment basins should be used in conjunction with a comprehensive system of BMPs that includes:

- Diverting runoff from undisturbed areas away from the basin
- Erosion control practices to minimize disturbed areas on-site and to provide temporary stabilization and interim sediment controls (e.g., stockpile perimeter control, check dams, perimeter controls around individual lots) to reduce the basin's influent sediment concentration.

At some sites, sediment basin design enhancements may be required to adequately remove sediment. Traditional

Categories

EC	Erosion Control	
SE	Sediment Control	<input checked="" type="checkbox"/>
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	

Legend:

- Primary Category
- Secondary Category

Targeted Constituents

Sediment	<input checked="" type="checkbox"/>
Nutrients	
Trash	<input checked="" type="checkbox"/>
Metals	
Bacteria	
Oil and Grease	
Organics	

Potential Alternatives

SE-3 Sediment Trap (for smaller areas)

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(a.k.a. “physical”) enhancements such as alternative outlet configurations or flow deflection baffles increase detention time and other techniques such as outlet skimmers preferentially drain flows with lower sediment concentrations. These “physical” enhancement techniques are described in this fact sheet. To further enhance sediment removal particularly at sites with fine soils or turbidity sensitive receiving waters, some projects may need to consider implementing Active Treatment Systems (ATS) whereby coagulants and flocculants are used to enhance settling and removal of suspended sediments. Guidance on implementing ATS is provided in SE-11.

Suitable Applications

Sediment basins may be suitable for use on larger projects with sufficient space for constructing the basin. Sediment basins should be considered for use:

- Where sediment-laden water may enter the drainage system or watercourses
- On construction projects with disturbed areas during the rainy season
- At the outlet of disturbed watersheds between 5 acres and 75 acres and evaluated on a site by site basis
- Where post construction detention basins are required
- In association with dikes, temporary channels, and pipes used to convey runoff from disturbed areas

Limitations

Sediment basins must be installed only within the property limits and where failure of the structure will not result in loss of life, damage to homes or buildings, or interruption of use or service of public roads or utilities. In addition, sediment basins are attractive to children and can be very dangerous. Local ordinances regarding health and safety must be adhered to. If fencing of the basin is required, the type of fence and its location should be shown in the SWPPP and in the construction specifications.

- As a general guideline, sediment basins are suitable for drainage areas of 5 acres or more, but not appropriate for drainage areas greater than 75 acres. However, the tributary area should be evaluated on a site by site basis.
- Sediment basins may become an “attractive nuisance” and care must be taken to adhere to all safety practices. If safety is a concern, basin may require protective fencing.
- Sediment basins designed according to this fact sheet are only effective in removing sediment down to about the silt size fraction. Sediment-laden runoff with smaller size fractions (fine silt and clay) may not be adequately treated unless chemical (or other appropriate method) treatment is used in addition to the sediment basin.
- Basins with a height of 25 ft or more or an impounding capacity of 50 ac-ft or more must obtain approval from California Department of Water Resources Division of Safety of Dams (<http://www.water.ca.gov/damsafety/>).

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- Water that stands in sediment basins longer than 96 hours may become a source of mosquitoes (and midges), particularly along perimeter edges, in shallow zones, in scour or below-grade pools, around inlet pipes, along low-flow channels, and among protected habitats created by emergent or floating vegetation (e.g. cattails, water hyacinth), algal mats, riprap, etc.
- Basins require large surface areas to permit settling of sediment. Size may be limited by the available area.

Implementation

General

A sediment basin is a controlled stormwater release structure formed by excavation or by construction of an embankment of compacted soil across a drainage way, or other suitable location. It is intended to trap sediment before it leaves the construction site. The basin is a temporary measure expected to be used during active construction in most cases and is to be maintained until the site area is permanently protected against erosion or a permanent detention basin is constructed.

Sediment basins are suitable for nearly all types of construction projects. Whenever possible, construct the sediment basins before clearing and grading work begins. Basins should be located at the stormwater outlet from the site but not in any natural or undisturbed stream. A typical application would include temporary dikes, pipes, and/or channels to convey runoff to the basin inlet.

Many development projects in California are required by local ordinances to provide a stormwater detention basin for post-construction flood control, desilting, or stormwater pollution control. A temporary sediment basin may be constructed by rough grading the post-construction control basins early in the project.

Sediment basins if properly designed and maintained can trap a significant amount of the sediment that flows into them. However, traditional basins do not remove all inflowing sediment. Therefore, they should be used in conjunction with erosion control practices such as temporary seeding, mulching, diversion dikes, etc., to reduce the amount of sediment flowing into the basin.

Planning

To improve the effectiveness of the basin, it should be located to intercept runoff from the largest possible amount of disturbed area. Locations best suited for a sediment basin are generally in lower elevation areas of the site (or basin tributary area) where site drainage would not require significant diversion or other means to direct water to the basin but outside jurisdictional waterways. However, as necessary, drainage into the basin can be improved by the use of earth dikes and drainage swales (see BMP EC-9). . The basin should not be located where its failure would result in the loss of life or interruption of the use or service of public utilities or roads.

Construct before clearing and grading work begins when feasible.

- Do not locate the basin in a jurisdictional stream.

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- Basin sites should be located where failure of the structure will not cause loss of life, damage to homes or buildings, or interruption of use or service of public roads or utilities.
- Basins with a height of 25 ft or more or an impounding capacity of 50 ac-ft must obtain approval from the Division of Dam Safety. Local dam safety requirements may be more stringent.
- Limit the contributing area to the sediment basin to only the runoff from the disturbed soil areas. Use temporary concentrated flow conveyance controls to divert runoff from undisturbed areas away from the sediment basin.
- The basin should be located: (1) by excavating a suitable area or where a low embankment can be constructed across a swale, (2) where post-construction (permanent) detention basins will be constructed, and (3) where the basins can be maintained on a year-round basis to provide access for maintenance, including sediment removal and sediment stockpiling in a protected area, and to maintain the basin to provide the required capacity.

Design

When designing a sediment basin, designers should evaluate the site constraints that could affect the efficiency of the BMP. Some of these constraints include: the relationship between basin capacity, anticipated sediment load, and freeboard, available footprint for the basin, maintenance frequency and access, and hydraulic capacity and efficiency of the temporary outlet infrastructure. Sediment basins should be designed to maximize sediment removal and to consider sediment load retained by the basin as it affects basin performance.

Three Basin Design Options (Part A) are presented below along with a Typical Sediment/Detention Basin Design Methodology (Part B). Regardless of the design option that is selected, designers also need to evaluate the sediment basin capacity with respect to sediment accumulation (See “*Step 3. Evaluate the Capacity of the Sediment Basin*”) and should incorporate approaches identified in “*Step 4. Other Design Considerations*” to enhance basin performance.

A) Basin Design Options:

Option 1:

Design sediment basin(s) using the standard equation:

$$A_s = \frac{1.2Q}{V_s} \quad (\text{Eq. 1})$$

Where:

A_s = Minimum surface area for trapping soil particles of a certain size

V_s = Settling velocity of the design particle size chosen ($V_s = 0.00028$ ft/s for a design particle size of 0.01 mm at 68°F)

1.2 = Factor of safety recommended by USEPA to account for the reduction in basin efficiency caused due to turbulence and other non ideal conditions.

$$Q = CIA \quad (\text{Eq.2})$$

Where

Q = Peak basin influent flow rate measured in cubic feet per second (ft³/s)

C = Runoff coefficient (unitless)

I = Peak rainfall intensity for the 10-year, 6-hour rain event (in/hr)

A = Area draining into the sediment basin in acres

The design particle size should be the smallest soil grain size determined by wet sieve analysis, or the fine silt sized (0.01 mm [or 0.0004 in.]) particle, and the Vs used should be 100 percent of the calculated settling velocity.

This sizing basin method is dependent on the outlet structure design or the total basin length with an appropriate outlet. If the designer chooses to utilize the outlet structure to control the flow duration in the basin, the basin length (distance between the inlet and the outlet) should be a minimum of twice the basin width; the depth should not be less than 3 ft nor greater than 5 ft for safety reasons and for maximum efficiency (2 ft of sediment storage, 2 ft of capacity). If the designer chooses to utilize the basin length (with appropriate basin outlet) to control the flow duration in the basin, the basin length (distance between the inlet and the outlet) should be a specifically designed to capture 100% of the design particle size; the depth should not be less than 3 ft nor greater than 5 ft for safety reasons and for maximum efficiency (2 ft of sediment storage, 2 ft of capacity).

Basin design guidance provided herein assumes standard water properties (e.g., estimated average water temperature, kinematic viscosity, etc.) as a basis of the design. Designers can use an alternative design (Option 3) with site specific water properties as long as the design is as protective as Option 1.

The design guidance uses the peak influent flow rate to size sediment basins. Designers can use an alternative design (Option 3) with site specific average flow rates as long as the design is as protective as Option 1.

The basin should be located on the site where it can be maintained on a year-round basis and should be maintained on a schedule to retain the 2 ft of capacity.

Option 2:

Design pursuant to local ordinance for sediment basin design and maintenance, provided that the design efficiency is as protective or more protective of water quality than Option 1.

Option 3:

The use of an equivalent surface area design or equation provided that the design efficiency is as protective or more protective of water quality than Option 1.

B) Typical Sediment/Detention Basin Design Methodology:

Design of a sediment basin requires the designer to have an understanding of the site constraints, knowledge of the local soil (e.g., particle size distribution of potentially contributing soils), drainage area of the basin, and local hydrology. Designers should not assume that a sediment basin for location A is applicable to location B. Therefore, designers can use this factsheet as guidance but will need to apply professional judgment and knowledge of the site to design an effective and efficient sediment basin. The following provides a general overview of typical design methodologies:

Step 1. Hydrologic Design

- Evaluate the site constraints and assess the drainage area for the sediment basin. Designers should consider on- and off-site flows as well as changes in the drainage area associated with site construction/disturbance. To minimize additional construction during the course of the project, the designer should consider identifying the maximum drainage area when calculating the basin dimensions.
- If a local hydrology manual is not available, it is recommended to follow standard rational method procedures to estimate the flow rate. The references section of this factsheet provides a reference to standard hydrology textbooks that can provide standard methodologies. If local rainfall depths are not available, values can be obtained from standard precipitation frequency maps from NOAA (downloaded from <http://www.wrcc.dri.edu/pcpnfreq.html>).

Step 2. Hydraulic Design

- Calculate the surface area required for the sediment basin using Equation 1. In which the flow rate is estimated for a 10-yr 6-hr event using rational method procedure listed in local hydrology manual and V_s is estimated using Stokes Law presented in Equation 3.

$$V_s = 2.81d^2 \quad (\text{Eq.3})$$

Where

V_s = Settling velocity in feet per second at 68°F

d = diameter of sediment particle in millimeters (smallest soil grain size determined by wet sieve analysis or fine silt (0.01 mm [or 0.0004 in.]

- In general, the basin outlet design requires an iterative trial and error approach that considered the maximum water surface elevation, the elevation versus volume (stage-storage) relationship, the elevation versus basin outflow (a.k.a.-discharge) relationship, and the estimated inflow hydrograph. To adequately design the basins to settle sediment, the outlet configuration and associated outflow rates can be estimated by numerous methodologies. The following provides some guidance for design the basin outlet:

- An outlet should have more than one orifice.

- An outlet design typically utilizes multiple horizontal rows of orifices (approximately 3 or more) with at least 2 orifices per row (see Figures 1 and 2 at the end of this fact sheet).

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- Orifices can vary in shape.
- Select the appropriate orifice diameter and number of perforations per row with the objective of minimizing the number of rows while maximizing the detention time.
- The diameter of each orifice is typically a maximum of 3-4 inches and a minimum of 0.25-0.5 inches.
- If a rectangular orifice is used, it is recommended to have minimum height of 0.5 inches and a maximum height of 6 inches.
- Rows are typically spaced at three times the diameter center to center vertically with a minimum distance of approximately 4 inches on center and a maximum distance of 1 foot on center.
- To estimate the outflow rate, each row is calculated separately based on the flow through a single orifice then multiplied by the number of orifices in the row. This step is repeated for each of the rows. Once all of the orifices are estimated, the total outflow rate versus elevation (stage-discharge curve) is developed to evaluate the detention time within the basin.
- Flow through a single orifice can be estimated using an Equation 4:

$$Q = BC' A(2gH)^{0.5} \quad (\text{Eq.4})$$

Where

Q = Outflow rate in ft³/s

C' = Orifice coefficient (unitless)

A = Area of the orifice (ft²)

g = acceleration due to gravity (ft³/s)

H = Head above the orifice (ft)

B = Anticipated Blockage or clogging factor (unitless), It is dependent on anticipated sediment and debris load, trash rack configuration etc, so the value is dependent on design engineer's professional judgment and/or local requirements (B is never greater than 1 and a value of 0.5 is generally used)

- Care must be taken in the selection of orifice coefficient ("C'"); 0.60 is most often recommended and used. However, based on actual tests, Young and Graziano (1989), "Outlet Hydraulics of Extended Detention Facilities for Northern Virginia Planning District Commission", recommends the following:
 - C' = 0.66 for thin materials; where the thickness is equal to or less than the orifice diameter, or
 - C' = 0.80 when the material is thicker than the orifice diameter
- If different sizes of orifices are used along the riser then they have to be sized such that not more than 50 percent of the design storm event drains in one-third of the drawdown time (to provide adequate settling time for events smaller than the design storm event)

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and the entire volume drains within 96 hours or as regulated by the local vector control agency. If a basin fails to drain within 96 hours, the basin must be pumped dry.

- Because basins are not maintained for infiltration, water loss by infiltration should be disregarded when designing the hydraulic capacity of the outlet structure.
- **Floating Outlet Skimmer:** The floating skimmer (see Figure 3 at the end of this fact sheet is an alternative outlet configuration (patented) that drains water from upper portion of the water column. This configuration has been used for temporary and permanent basins and can improve basin performance by eliminating bottom orifices which have the potential of discharging solids. Some design considerations for this alternative outlet device includes the addition of a sand filter or perforated under drain at the low point in the basin and near the floating skimmer. These secondary drains allow the basin to fully drain. More detailed guidelines for sizing the skimmer can be downloaded from <http://www.fairclothskimmer.com/>.
- **Hold and Release Valve:** An ideal sediment/detention basin would hold all flows to the design storm level for sufficient time to settle solids, and then slowly release the storm water. Implementing a reliable valve system for releasing detention basins is critical to eliminate the potential for flooding in such a system. Some variations of hold and release valves include manual valves, bladder devices or electrically operated valves. When a precipitation event is forecast, the valve would be close for the duration of the storm and appropriate settling time. When the settling duration is met (approximately 24 or 48 hours), the valve would be opened and allow the stormwater to be released at a rate that does not resuspend settled solids and in a non-erosive manner. If this type of system is used the valve should be designed to empty the entire basin within 96 hours or as stipulated by local vector control regulations.

Step 3. Evaluate the Capacity of the Sediment Basin

- Typically, sediment basins do not perform as designed when they are not properly maintained or the sediment yield to the basin is larger than expected. As part of a good sediment basin design, designers should consider maintenance cycles, estimated soil loss and/or sediment yield, and basin sediment storage volume. The two equations below can be used to quantify the amount of soil entering the basin.
- The Revised Universal Soil Loss Equation (RUSLE, Eq.5) can be used to estimate annual soil loss and the Modified Universal Soil Equation (MUSLE, Eq.6) can be used to estimate sediment yield from a single storm event.

$$A = R \times K \times LS \times C \times P \quad (\text{Eq.5})$$

$$Y = 95(Q \times q_p)^{0.56} \times K \times LS \times C \times P \quad (\text{Eq.6})$$

Where:

A = annual soil loss, tons/acre-year

R = rainfall erosion index, in 100 ft. Tons/acre.in/hr.

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K = soil erodibility factor, tons/acre per unit of R

LS = slope length and steepness factor (unitless)

C = vegetative cover factor (unitless)

P = erosion control practice factor (unitless)

Y = single storm sediment yield in tons

Q = runoff volume in acre-feet

q_p = peak flow in cfs

- Detailed descriptions and methodologies for estimating the soil loss can be obtained from standard hydrology text books (See References section).
- Determination of the appropriate equation should consider construction duration and local environmental factors (soils, hydrology, etc.). For example, if a basin is planned for a project duration of 1 year and the designer specifies one maintenance cycle, RUSLE could be used to estimate the soil loss and thereby the designer could indicate that the sediment storage volume would be half of the soil loss value estimated. As an example, for use of MUSLE, a project may have a short construction duration thereby requiring fewer maintenance cycles and a reduced sediment storage volume. MUSLE would be used to estimate the anticipated soil loss based on a specific storm event to evaluate the sediment storage volume and appropriate maintenance frequency.
- The soil loss estimates are an essential step in the design, and it is essential that the designer provide construction contractors with enough information to understand maintenance frequency and/or depths within the basin that would trigger maintenance. Providing maintenance methods, frequency and specification should be included in design bid documents such as the SWPPP Site Map.
- Once the designer has quantified the amount of soil entering the basin, the depth required for sediment storage can be determined by dividing the estimated sediment loss by the surface area of the basin.

Step 4. Other Design Considerations

- Consider designing the volume of the settling zone for the total storm volume associated with the 2-year event or other appropriate design storms specified by the local agency. This volume can be used as a guide for sizing the basin without iterative routing calculations. The depth of the settling zone can be estimated by dividing the estimated 2-yr storm volume by the surface area of the basin.
- The basin volume consists of two zones:
 - A sediment storage zone at least 1 ft deep.
 - A settling zone at least 2 ft deep.

- The basin depth must be no less than 3 ft (not including freeboard).
- Proper hydraulic design of the outlet is critical to achieving the desired performance of the basin. The outlet should be designed to drain the basin within 24 to 96 hours (also referred to as “drawdown time”). The 24-hour limit is specified to provide adequate settling time; the 96-hour limit is specified to mitigate vector control concerns.
- Confirmation of the basin performance can be evaluated by routing the design storm (10-yr 6-hr, or as directed by local regulations) through the basin based on the basin volume (stage-storage curve) and the outlet design (stage-discharge curve based on the orifice configuration or equivalent outlet design).
- Sediment basins, regardless of size and storage volume, should include features to accommodate overflow or bypass flows that exceed the design storm event.
 - Include an emergency spillway to accommodate flows not carried by the principal spillway. The spillway should consist of an open channel (earthen or vegetated) over undisturbed material (not fill) or constructed of a non-erodible riprap (or equivalent protection) on fill slopes.
 - The spillway control section, which is a level portion of the spillway channel at the highest elevation in the channel, should be a minimum of 20 ft in length.
- Rock, vegetation or appropriate erosion control should be used to protect the basin inlet, outlet, and slopes against erosion.
- The total depth of the sediment basin should include the depth required for sediment storage, depth required for settling zone and freeboard of at least 1 foot or as regulated by local flood control agency for a flood event specified by the local agency.
- The basin alignment should be designed such that the length of the basin is more than twice the width of the basin; the length should be determined by measuring the distance between the inlet and the outlet. If the site topography does not allow for this configuration baffles should be installed so that the ratio is satisfied. If a basin has more than one inflow point, any inflow point that conveys more than 30 percent of the total peak inflow rate has to meet the required length to width ratio.
- An alternative basin sizing method proposed by Fifield (2004) can be consulted to estimate an alternative length to width ratio and basin configuration. These methods can be considered as part of Option 3 which allows for alternative designs that are protective or more protective of water quality.
- Baffles (see Figure 4 at the end of this fact sheet) can be considered at project sites where the existing topography or site constraints limit the length to width ratio. Baffles should be constructed of earthen berms or other structural material within the basin to divert flow in the basin, thus increasing the effective flow length from the basin inlet to the outlet riser. Baffles also reduce the change of short circuiting and allows for settling throughout the basin.

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- Baffles are typically constructed from the invert of the basin to the crest of the emergency spillway (i.e., design event flows are meant to flow around the baffles and flows greater than the design event would flow over the baffles to the emergency spillway).
- Use of other materials for construction of basin baffles (such as silt fence) may not be appropriate based on the material specifications and will require frequent maintenance (maintain after every storm event). Maintenance may not be feasible when required due to flooded conditions resulting from frequent (i.e., back to back) storm events. Use of alternative baffle materials should not deviate from the intended purpose of the material, as described by the manufacturer.
- Sediment basins are best used in conjunction with erosion controls.
- Basins with an impounding levee greater than 4.5 ft tall, measured from the lowest point to the impounding area to the highest point of the levee, and basins capable of impounding more than 35,000 ft³, should be designed by a Registered Civil Engineer. The design should include maintenance requirements, including sediment and vegetation removal, to ensure continuous function of the basin outlet and bypass structures.
- A forebay, constructed upstream of the basin, may be provided to remove debris and larger particles.
- The outflow from the sediment basin should be provided with velocity dissipation devices (see BMP EC-10) to prevent erosion and scouring of the embankment and channel.
- The principal outlet should consist of a corrugated metal, high density polyethylene (HDPE), or reinforced concrete riser pipe with dewatering holes and an anti-vortex device and trash rack attached to the top of the riser, to prevent floating debris from flowing out of the basin or obstructing the system. This principal structure should be designed to accommodate the inflow design storm.
- A rock pile or rock-filled gabions can serve as alternatives to the debris screen, although the designer should be aware of the potential for extra maintenance involved should the pore spaces in the rock pile clog.
- The outlet structure should be placed on a firm, smooth foundation with the base securely anchored with concrete or other means to prevent floatation.
- Attach riser pipe (watertight connection) to a horizontal pipe (barrel). Provide anti-seep collars on the barrel.
- Cleanout level should be clearly marked on the riser pipe.

Installation

- Securely anchor and install an anti-seep collar on the outlet pipe/riser and provide an emergency spillway for passing major floods (see local flood control agency).
- Areas under embankments must be cleared and stripped of vegetation.

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- Chain link fencing should be provided around each sediment basin to prevent unauthorized entry to the basin or if safety is a concern.

Costs

The cost of a sediment basin is highly variable and is dependent of the site configuration. To decrease basin construction costs, designers should consider using existing site features such as berms or depressed area to site the sediment basin. Designers should also consider potential savings associated with designing the basin to minimize the number of maintenance cycles and siting the basin in a location where a permanent BMP (e.g., extended detention basin) is required for the project site.

Inspection and Maintenance

- BMPs must be inspected in accordance with General Permit requirements for the associated project type and risk level and as required by local requirements. It is recommended that at a minimum, basins be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- Examine basin banks for seepage and structural soundness.
- Check inlet and outlet structures and spillway for any damage or obstructions. Repair damage and remove obstructions as needed.
- Check inlet and outlet area for erosion and stabilize if required.
- Check fencing for damage and repair as needed.
- Sediment that accumulates in the basin must be periodically removed in order to maintain BMP effectiveness. Sediment should be removed when sediment accumulation reaches one-half the designated sediment storage volume. Sediment removed during maintenance should be managed properly. The sediment should be appropriately evaluated and used or disposed of accordingly. Options include: incorporating sediment into earthwork on the site (only if there is no risk that sediment is contaminated); or off-site export/disposal at an appropriate location (e.g., sediment characterization and disposal to an appropriate landfill).
- Remove standing water from basin within 96 hours after accumulation.
- If the basin does not drain adequately (e.g., due to storms that are more frequent or larger than the design storm or other unforeseen site conditions), dewatering should be conducted in accordance with appropriate dewatering BMPs (see NS-2) and in accordance with local permits as applicable.
- To minimize vector production:
 - Remove accumulation of live and dead floating vegetation in basins during every inspection.
 - Remove excessive emergent and perimeter vegetation as needed or as advised by local or state vector control agencies.

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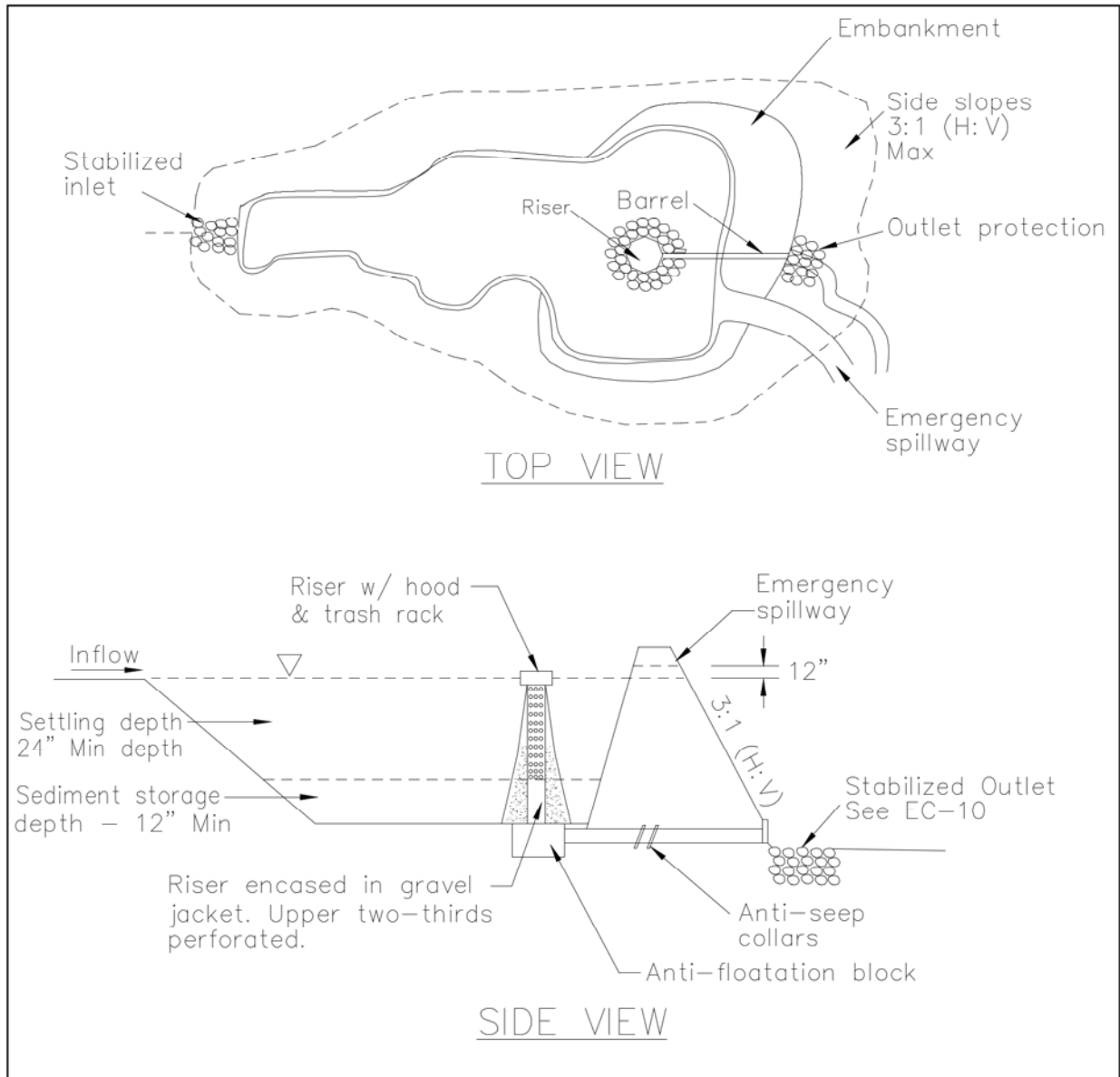
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**FIGURE 1: TYPICAL TEMPORARY SEDIMENT BASIN
MULTIPLE ORIFICE DESIGN
NOT TO SCALE**

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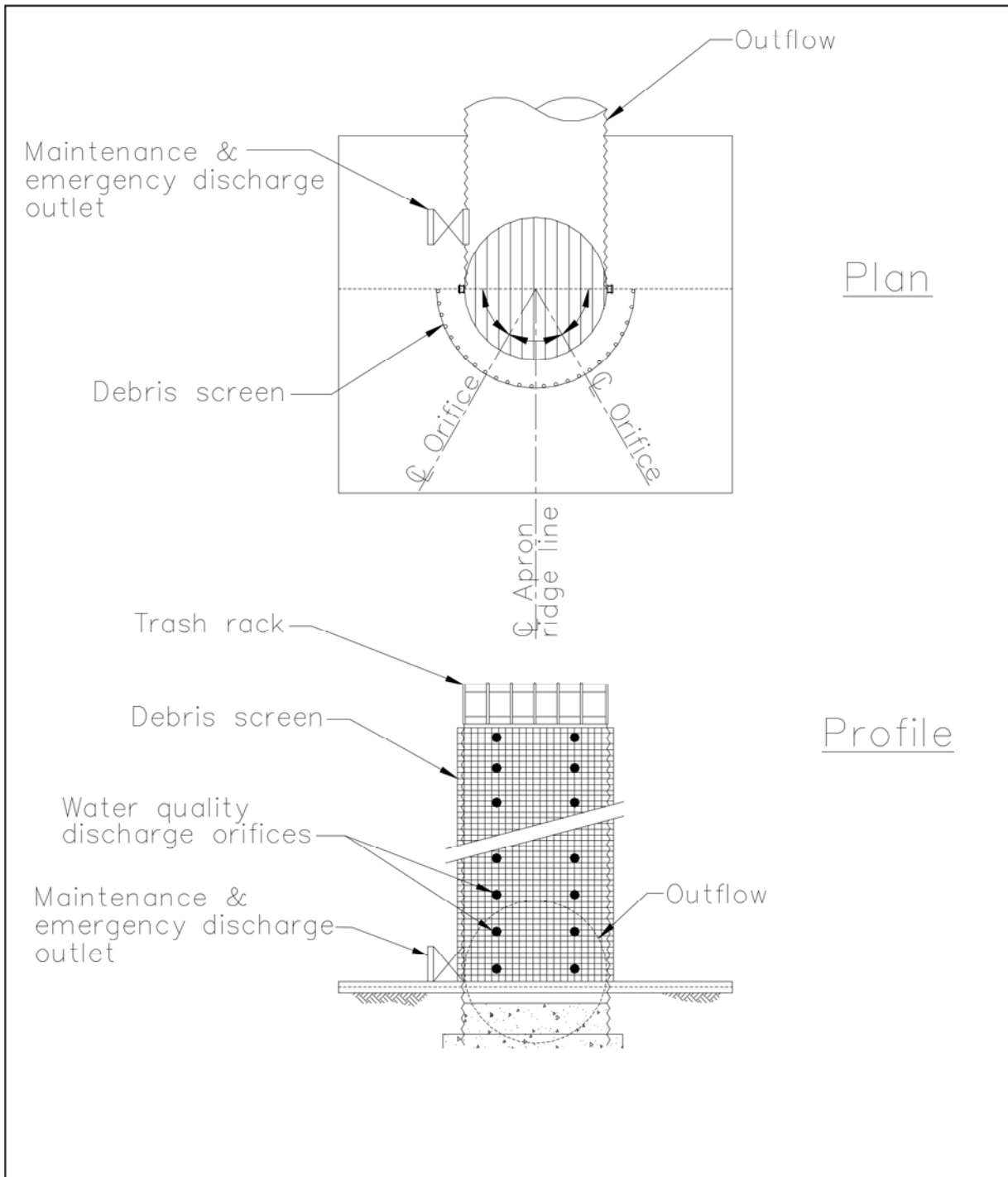


FIGURE 2: MULTIPLE ORIFICE OUTLET RISER
NOT TO SCALE

EXHIBIT "C" (Stormwater Pollution Prevention Plan)

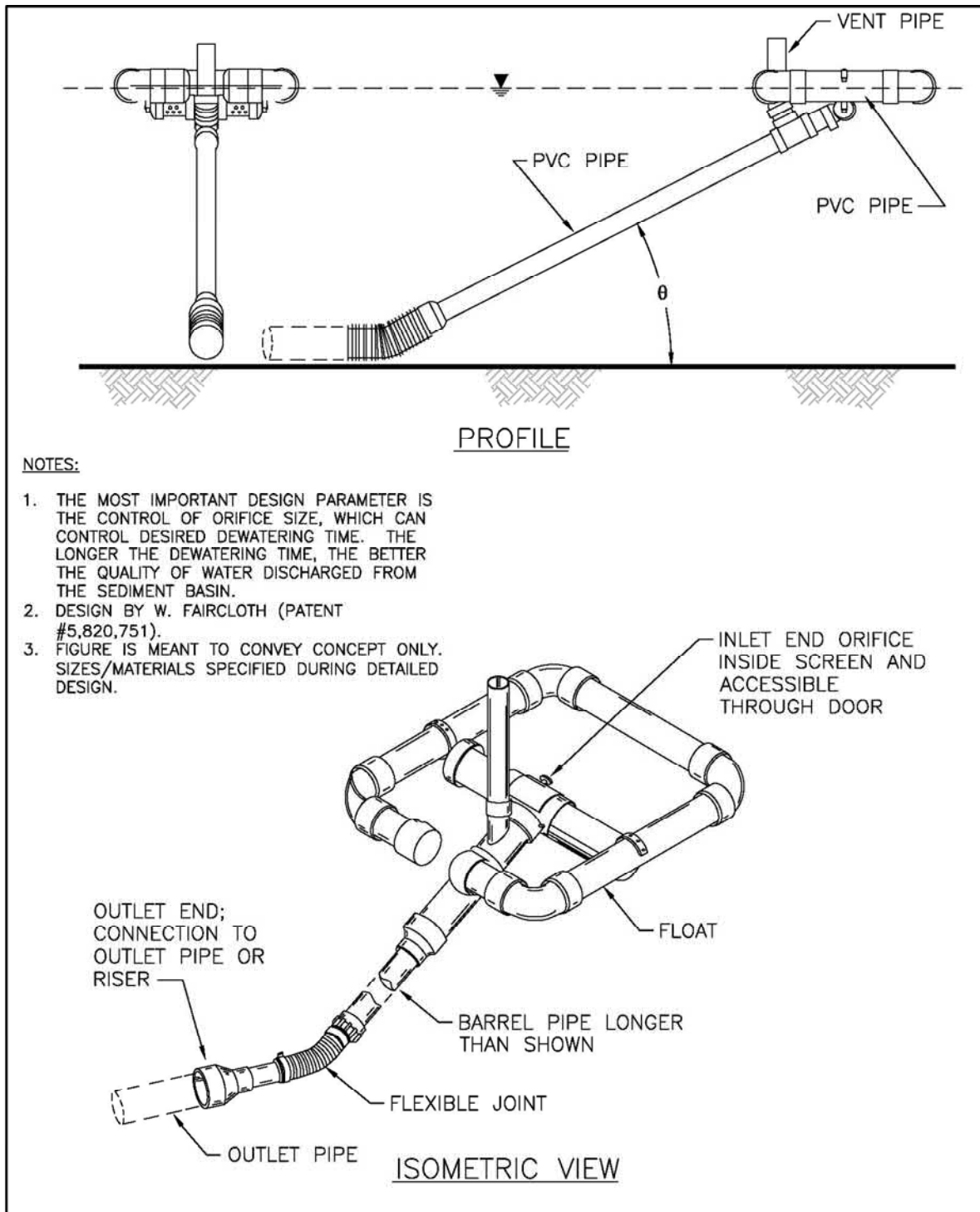


FIGURE 3: TYPICAL SKIMMER
NOT TO SCALE

EXHIBIT "C" (Stormwater Pollution Prevention Plan)

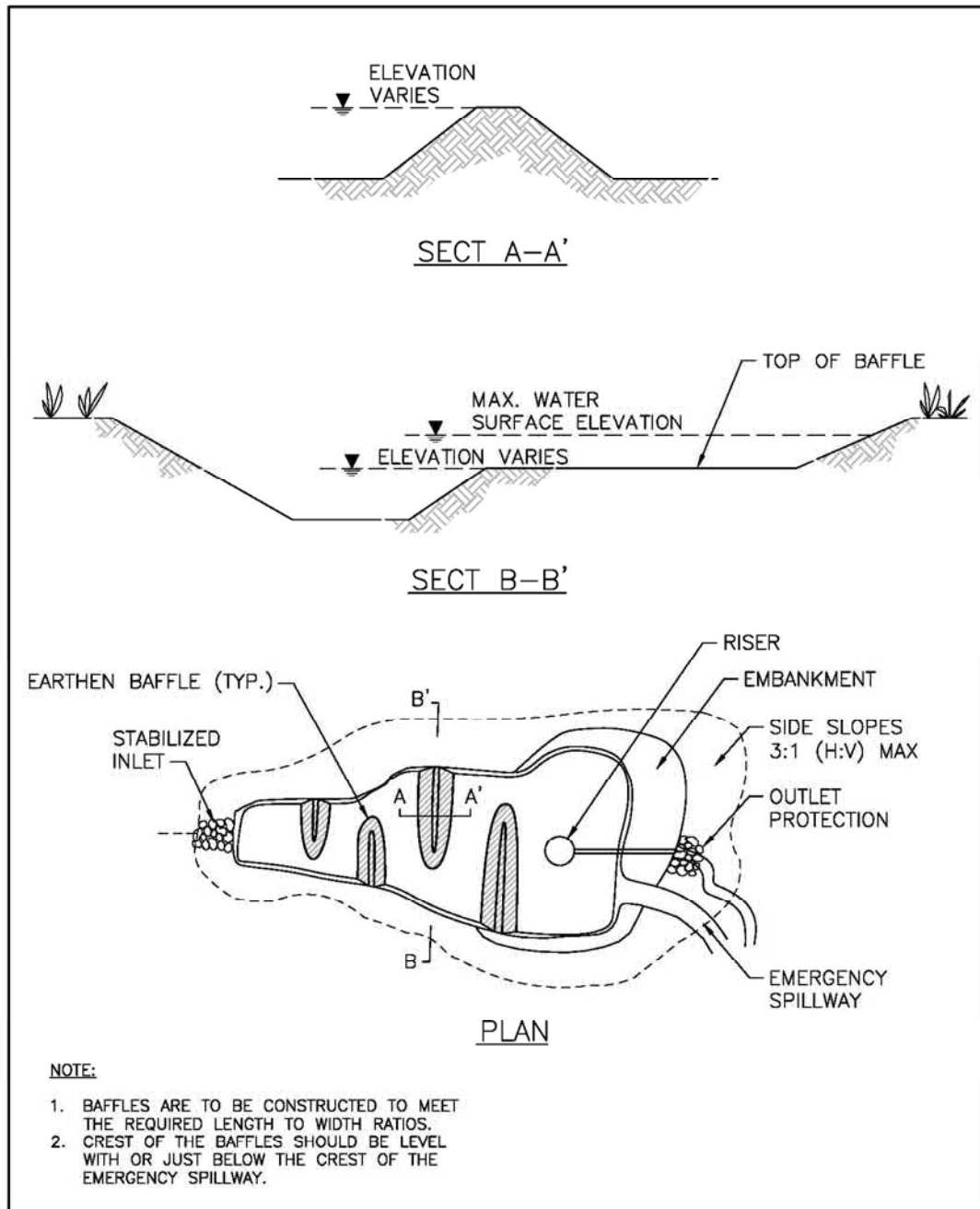
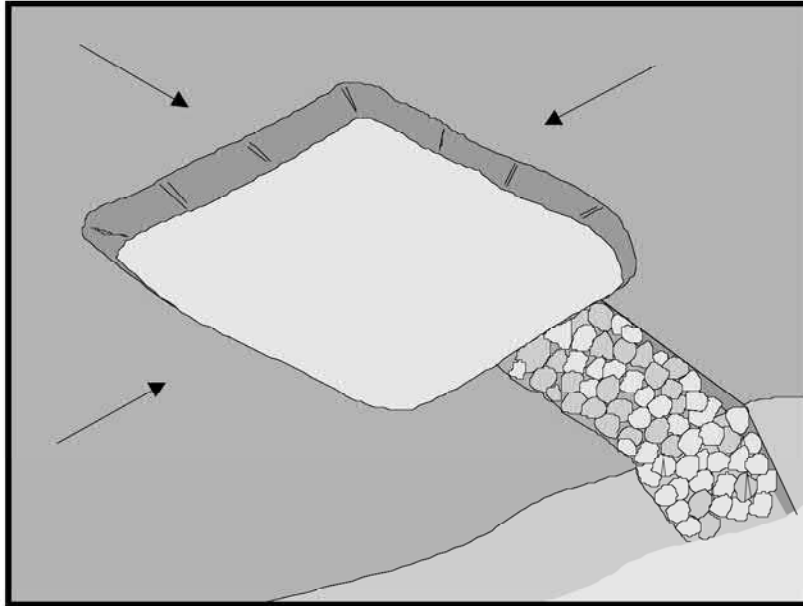


FIGURE 4: TYPICAL TEMPORARY SEDIMENT BASIN WITH BAFFLES
NOT TO SCALE

EXHIBIT "C" (Stormwater Pollution Prevention Plan)



Description and Purpose

A sediment trap is a containment area where sediment-laden runoff is temporarily detained under quiescent conditions, allowing sediment to settle out or before the runoff is discharged by gravity flow. Sediment traps are formed by excavating or constructing an earthen embankment across a waterway or low drainage area.

Trap design guidance provided in this fact sheet is not intended to guarantee compliance with numeric discharge limits (numeric action levels or numeric effluent limits for turbidity). Compliance with discharge limits requires a thoughtful approach to comprehensive BMP planning, implementation, and maintenance. Therefore, optimally designed and maintained sediment traps should be used in conjunction with a comprehensive system of BMPs.

Suitable Applications

Sediment traps should be considered for use:

- At the perimeter of the site at locations where sediment-laden runoff is discharged offsite.
- At multiple locations within the project site where sediment control is needed.
- Around or upslope from storm drain inlet protection measures.
- Sediment traps may be used on construction projects where the drainage area is less than 5 acres. Traps would be

Categories

EC	Erosion Control	
SE	Sediment Control	<input checked="" type="checkbox"/>
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	

Legend:

- Primary Objective
- Secondary Objective

Targeted Constituents

Sediment	<input checked="" type="checkbox"/>
Nutrients	
Trash	<input checked="" type="checkbox"/>
Metals	
Bacteria	
Oil and Grease	
Organics	

Potential Alternatives

SE-2 Sediment Basin (for larger areas)

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placed where sediment-laden stormwater may enter a storm drain or watercourse. SE-2, Sediment Basins, must be used for drainage areas greater than 5 acres.

- As a supplemental control, sediment traps provide additional protection for a water body or for reducing sediment before it enters a drainage system.

Limitations

- Requires large surface areas to permit infiltration and settling of sediment.
- Not appropriate for drainage areas greater than 5 acres.
- Only removes large and medium sized particles and requires upstream erosion control.
- Attractive and dangerous to children, requiring protective fencing.
- Conducive to vector production.
- Should not be located in live streams.

Implementation

Design

A sediment trap is a small temporary ponding area, usually with a gravel outlet, formed by excavation or by construction of an earthen embankment. Its purpose is to collect and store sediment from sites cleared or graded during construction. It is intended for use on small drainage areas with no unusual drainage features and projected for a quick build-out time. It should help in removing coarse sediment from runoff. The trap is a temporary measure with a design life of approximately six months to one year and is to be maintained until the site area is permanently protected against erosion by vegetation and/or structures.

Sediment traps should be used only for small drainage areas. If the contributing drainage area is greater than 5 acres, refer to SE-2, Sediment Basins, or subdivide the catchment area into smaller drainage basins.

Sediment usually must be removed from the trap after each rainfall event. The SWPPP should detail how this sediment is to be disposed, such as in fill areas onsite, or removal to an approved offsite dump. Sediment traps used as perimeter controls should be installed before any land disturbance takes place in the drainage area.

Sediment traps are usually small enough that a failure of the structure would not result in a loss of life, damage to home or buildings, or interruption in the use of public roads or utilities. However, sediment traps are attractive to children and can be dangerous. The following recommendations should be implemented to reduce risks:

- Install continuous fencing around the sediment trap or pond. Consult local ordinances regarding requirements for maintaining health and safety.
- Restrict basin side slopes to 3:1 or flatter.

Sediment trap size depends on the type of soil, size of the drainage area, and desired sediment removal efficiency (see SE-2, Sediment Basin). As a rule of thumb, the larger the basin volume

the greater the sediment removal efficiency. Sizing criteria are typically established under the local grading ordinance or equivalent. The runoff volume from a 2-year storm is a common design criterion for a sediment trap. The sizing criteria below assume that this runoff volume is 0.042 acre-ft/acre (0.5 in. of runoff). While the climatic, topographic, and soil type extremes make it difficult to establish a statewide standard, the following criteria should trap moderate to high amounts of sediment in most areas of California:

- Locate sediment traps as near as practical to areas producing the sediment.
- Trap should be situated according to the following criteria: (1) by excavating a suitable area or where a low embankment can be constructed across a swale, (2) where failure would not cause loss of life or property damage, and (3) to provide access for maintenance, including sediment removal and sediment stockpiling in a protected area.
- Trap should be sized to accommodate a settling zone and sediment storage zone with recommended minimum volumes of 67 yd³/acre and 33 yd³/acre of contributing drainage area, respectively, based on 0.5 in. of runoff volume over a 24-hour period. In many cases, the size of an individual trap is limited by available space. Multiple traps or additional volume may be required to accommodate specific rainfall, soil, and site conditions.
- Traps with an impounding levee greater than 4.5 ft tall, measured from the lowest point to the impounding area to the highest point of the levee, and traps capable of impounding more than 35,000 ft³, should be designed by a Registered Civil Engineer. The design should include maintenance requirements, including sediment and vegetation removal, to ensure continuous function of the trap outlet and bypass structures.
- The outlet pipe or open spillway must be designed to convey anticipated peak flows.
- Use rock or vegetation to protect the trap outlets against erosion.
- Fencing should be provided to prevent unauthorized entry.

Installation

Sediment traps can be constructed by excavating a depression in the ground or creating an impoundment with a small embankment. Sediment traps should be installed outside the area being graded and should be built prior to the start of the grading activities or removal of vegetation. To minimize the area disturbed by them, sediment traps should be installed in natural depressions or in small swales or drainage ways. The following steps must be followed during installation:

- The area under the embankment must be cleared, grubbed, and stripped of any vegetation and root mat. The pool area should be cleared.
- The fill material for the embankment must be free of roots or other woody vegetation as well as oversized stones, rocks, organic material, or other objectionable material. The embankment may be compacted by traversing with equipment while it is being constructed.
- All cut-and-fill slopes should be 3:1 or flatter.

- When a riser is used, all pipe joints must be watertight.

- When a riser is used, at least the top two-thirds of the riser should be perforated with 0.5 in. diameter holes spaced 8 in. vertically and 10 to 12 in. horizontally. See SE-2, Sediment Basin.
- When an earth or stone outlet is used, the outlet crest elevation should be at least 1 ft below the top of the embankment.
- When crushed stone outlet is used, the crushed stone used in the outlet should meet AASHTO M43, size No. 2 or 24, or its equivalent such as MSHA No. 2. Gravel meeting the above gradation may be used if crushed stone is not available.

Costs

Average annual cost per installation is \$15 ft² and plus additional costs for the design and maintenance.

Inspection and Maintenance

- Inspect BMPs in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- Inspect outlet area for erosion and stabilize if required.
- Inspect trap banks for seepage and structural soundness, repair as needed.
- Inspect outlet structure and spillway for any damage or obstructions. Repair damage and remove obstructions as needed.
- Inspect fencing for damage and repair as needed.
- Inspect the sediment trap for area of standing water during every visit. Corrective measures should be taken if the BMP does not dewater completely in 96 hours or less to prevent vector production.
- Sediment that accumulates in the BMP must be periodically removed in order to maintain BMP effectiveness. Sediment should be removed when the sediment accumulation reaches one-third of the trap capacity. Sediment removed during maintenance may be incorporated into earthwork on the site or disposed of at an appropriate location.
- Remove vegetation from the sediment trap when first detected to prevent pools of standing water and subsequent vector production.
- BMPs that require dewatering shall be continuously attended while dewatering takes place. Dewatering BMPs per NS-2 shall be implemented at all times during dewatering activities.

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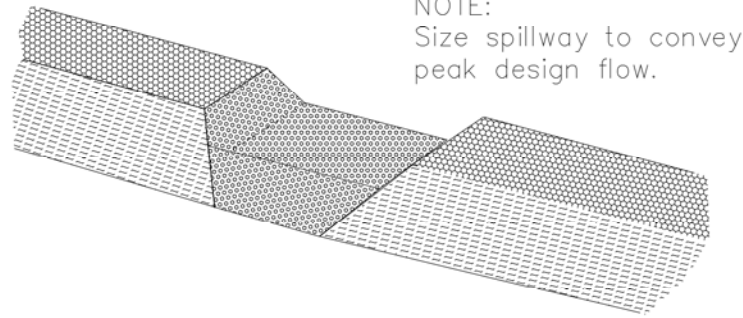
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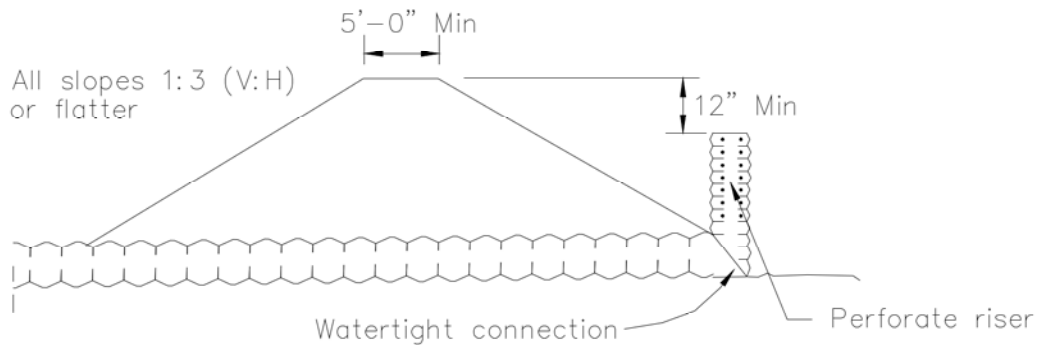
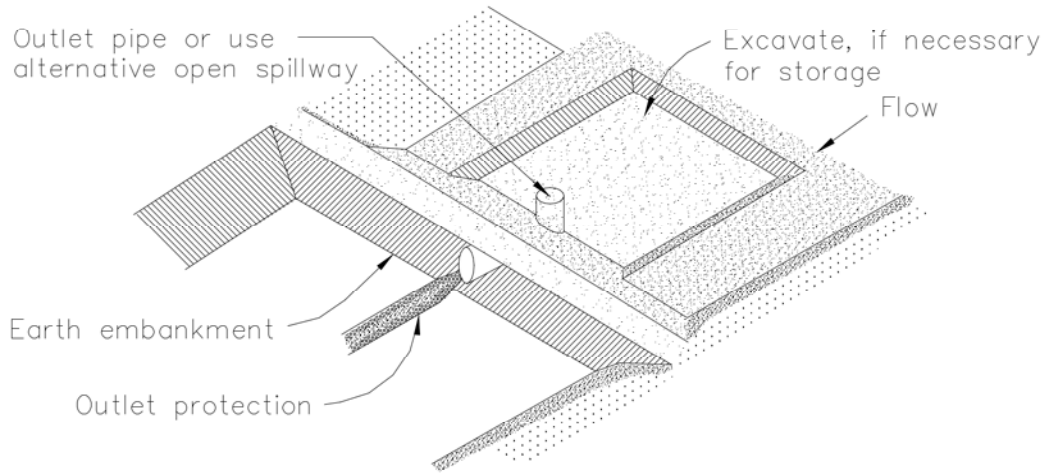
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EXHIBIT "C" (Stormwater Pollution Prevention Plan)



NOTE:
Size spillway to convey
peak design flow.

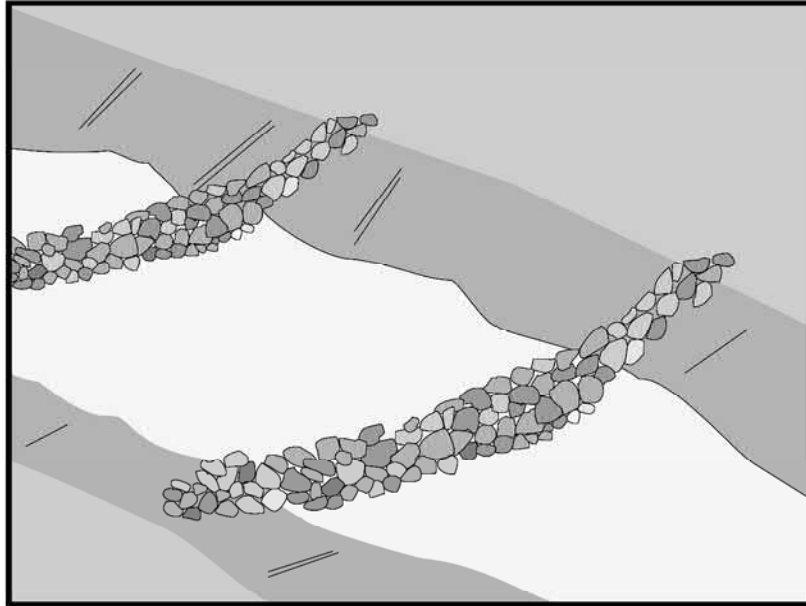
TYPICAL OPEN SPILLWAY



EMBANKMENT SECTION THRU RISER

TYPICAL SEDIMENT TRAP
NOT TO SCALE

EXHIBIT "C" (Stormwater Pollution Prevention Plan)



Description and Purpose

A check dam is a small barrier constructed of rock, gravel bags, sandbags, fiber rolls, or other proprietary products, placed across a constructed swale or drainage ditch. Check dams reduce the effective slope of the channel, thereby reducing scour and channel erosion by reducing flow velocity and increasing residence time within the channel, allowing sediment to settle.

Suitable Applications

Check dams may be appropriate in the following situations:

- To promote sedimentation behind the dam.
- To prevent erosion by reducing the velocity of channel flow in small intermittent channels and temporary swales.
- In small open channels that drain 10 acres or less.
- In steep channels where stormwater runoff velocities exceed 5 ft/s.
- During the establishment of grass linings in drainage ditches or channels.
- In temporary ditches where the short length of service does not warrant establishment of erosion-resistant linings.
- To act as a grade control structure.

Categories

EC	Erosion Control	<input checked="" type="checkbox"/>
SE	Sediment Control	<input checked="" type="checkbox"/>
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	

Legend:

- Primary Category
- Secondary Category

Targeted Constituents

Sediment	<input checked="" type="checkbox"/>
Nutrients	
Trash	
Metals	
Bacteria	
Oil and Grease	
Organics	

Potential Alternatives

- SE-5 Fiber Rolls
- SE-6 Gravel Bag Berm
- SE-8 Sandbag Barrier
- SE-12 Manufactured Linear Sediment Controls
- SE-14 Biofilter Bags

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Limitations

- Not to be used in live streams or in channels with extended base flows.
- Not appropriate in channels that drain areas greater than 10 acres.
- Not appropriate in channels that are already grass-lined unless erosion potential or sediment-laden flow is expected, as installation may damage vegetation.
- Require extensive maintenance following high velocity flows.
- Promotes sediment trapping which can be re-suspended during subsequent storms or removal of the check dam.
- Do not construct check dams with straw bales or silt fence.
- Water suitable for mosquito production may stand behind check dams, particularly if subjected to daily non-stormwater discharges.

Implementation

General

Check dams reduce the effective slope and create small pools in swales and ditches that drain 10 acres or less. Using check dams to reduce channel slope reduces the velocity of stormwater flows, thus reducing erosion of the swale or ditch and promoting sedimentation. Thus, check dams are dual-purpose and serve an important role as erosion controls as well as sediment controls. Note that use of 1-2 isolated check dams for sedimentation will likely result in little net removal of sediment because of the small detention time and probable scour during longer storms. Using a series of check dams will generally increase their effectiveness. A sediment trap (SE-3) may be placed immediately upstream of the check dam to increase sediment removal efficiency.

Design and Layout

Check dams work by decreasing the effective slope in ditches and swales. An important consequence of the reduced slope is a reduction in capacity of the ditch or swale. This reduction in capacity should be considered when using this BMP, as reduced capacity can result in overtopping of the ditch or swale and resultant consequences. In some cases, such as a “permanent” ditch or swale being constructed early and used as a “temporary” conveyance for construction flows, the ditch or swale may have sufficient capacity such that the temporary reduction in capacity due to check dams is acceptable. When check dams reduce capacities beyond acceptable limits, either:

- Don't use check dams. Consider alternative BMPs, or.
- Increase the size of the ditch or swale to restore capacity.

Maximum slope and velocity reduction is achieved when the toe of the upstream dam is at the same elevation as the top of the downstream dam (see “Spacing Between Check Dams” detail at the end of this fact sheet). The center section of the dam should be lower than the edge sections (at least 6 inches), acting as a spillway, so that the check dam will direct flows to the center of

the ditch or swale (see “Typical Rock Check Dam” detail at the end of this fact sheet). Bypass or side-cutting can occur if a sufficient spillway is not provided in the center of the dam.

Check dams are usually constructed of rock, gravel bags, sandbags, and fiber rolls. A number of products can also be used as check dams (e.g. HDPE check dams, temporary silt dikes (SE-12)), and some of these products can be removed and reused. Check dams can also be constructed of logs or lumber and have the advantage of a longer lifespan when compared to gravel bags, sandbags, and fiber rolls. Check dams should not be constructed from straw bales or silt fences, since concentrated flows quickly wash out these materials.

Rock check dams are usually constructed of 8 to 12 in. rock. The rock is placed either by hand or mechanically, but never just dumped into the channel. The dam should completely span the ditch or swale to prevent washout. The rock used should be large enough to stay in place given the expected design flow through the channel. It is recommended that abutments be extended 18 in. into the channel bank. Rock can be graded such that smaller diameter rock (e.g. 2-4 in) is located on the upstream side of larger rock (holding the smaller rock in place); increasing residence time.

Log check dams are usually constructed of 4 to 6 in. diameter logs, installed vertically. The logs should be embedded into the soil at least 18 in. Logs can be bolted or wired to vertical support logs that have been driven or buried into the soil.

See fiber rolls, SE-5, for installation of fiber roll check dams.

Gravel bag and sand bag check dams are constructed by stacking bags across the ditch or swale, shaped as shown in the drawings at the end of this fact sheet (see “Gravel Bag Check Dam” detail at the end of this fact sheet).

Manufactured products, such as temporary silt dikes (SE-12), should be installed in accordance with the manufacturer’s instructions. Installation typically requires anchoring or trenching of products, as well as regular maintenance to remove accumulated sediment and debris.

If grass is planted to stabilize the ditch or swale, the check dam should be removed when the grass has matured (unless the slope of the swales is greater than 4%).

The following guidance should be followed for the design and layout of check dams:

- Install the first check dam approximately 16 ft from the outfall device and at regular intervals based on slope gradient and soil type.
- Check dams should be placed at a distance and height to allow small pools to form between each check dam.
- For multiple check dam installation, backwater from a downstream check dam should reach the toes of the upstream check dam.
- A sediment trap provided immediately upstream of the check dam will help capture sediment. Due to the potential for this sediment to be resuspended in subsequent storms, the sediment trap should be cleaned following each storm event.

- High flows (typically a 2-year storm or larger) should safely flow over the check dam without an increase in upstream flooding or damage to the check dam.
- Where grass is used to line ditches, check dams should be removed when grass has matured sufficiently to protect the ditch or swale.

Materials

- Rock used for check dams should typically be 8-12 in rock and be sufficiently sized to stay in place given expected design flows in the channel. Smaller diameter rock (e.g. 2 to 4 in) can be placed on the upstream side of larger rock to increase residence time.
- Gravel bags used for check dams should conform to the requirements of SE-6, Gravel Bag Berms.
- Sandbags used for check dams should conform to SE-8, Sandbag Barrier.
- Fiber rolls used for check dams should conform to SE-5, Fiber Rolls.
- Temporary silt dikes used for check dams should conform to SE-12, Temporary Silt Dikes.

Installation

- Rock should be placed individually by hand or by mechanical methods (no dumping of rock) to achieve complete ditch or swale coverage.
- Tightly abut bags and stack according to detail shown in the figure at the end of this section (pyramid approach). Gravel bags and sandbags should not be stacked any higher than 3 ft.
- Upper rows of gravel and sand bags shall overlap joints in lower rows.
- Fiber rolls should be trenched in, backfilled, and firmly staked in place.
- Install along a level contour.
- HDPE check dams, temporary silt dikes, and other manufactured products should be used and installed per manufacturer specifications.

Costs

Cost consists of labor costs if materials are readily available (such as gravel on-site). If material must be imported, costs will increase. For other material and installation costs, see SE-5, SE-6, SE-8, SE-12, and SE-14.

Inspection and Maintenance

- BMPs must be inspected in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- Replace missing rock, bags, rolls, etc. Replace bags or rolls that have degraded or have become damaged.

- If the check dam is used as a sediment capture device, sediment that accumulates behind the BMP should be periodically removed in order to maintain BMP effectiveness. Sediment should be removed when the sediment accumulation reaches one-third of the barrier height.
- If the check dam is used as a grade control structure, sediment removal is not required as long as the system continues to control the grade.
- Inspect areas behind check dams for pools of standing water, especially if subjected to daily non-stormwater discharges.
- Remove accumulated sediment prior to permanent seeding or soil stabilization.
- Remove check dam and accumulated sediment when check dams are no longer needed.

References

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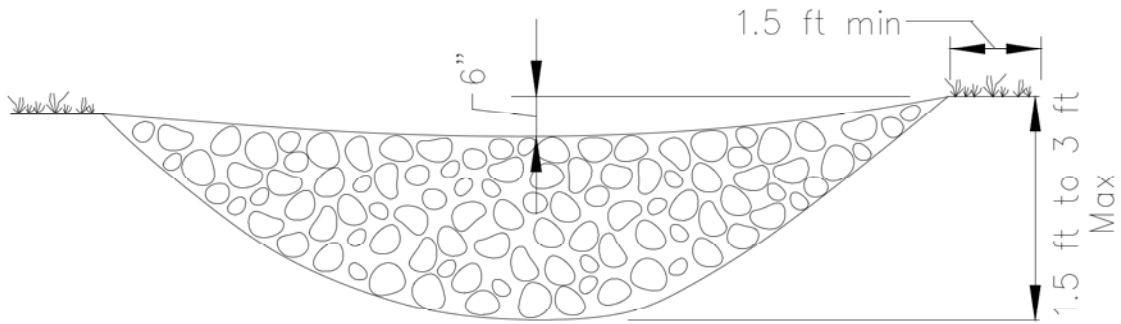
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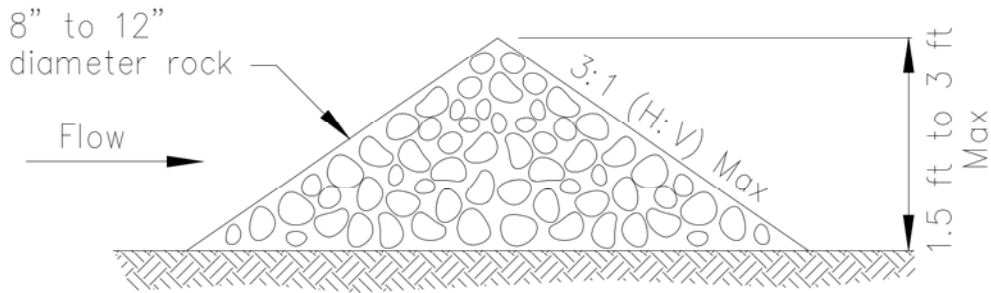
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EXHIBIT "C" (Stormwater Pollution Prevention Plan)

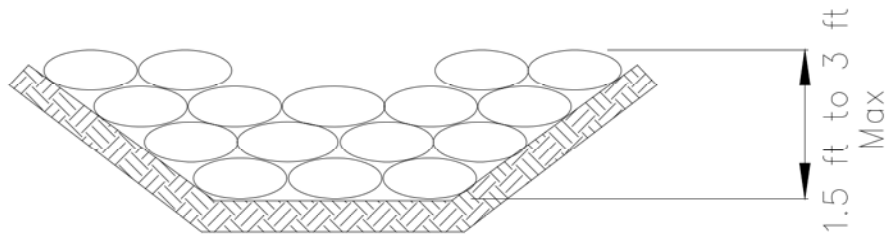


ELEVATION



TYPICAL ROCK CHECK DAM SECTION

ROCK CHECK DAM
NOT TO SCALE



GRAVEL BAG CHECK DAM ELEVATION
NOT TO SCALE

EXHIBIT "C" (Stormwater Pollution Prevention Plan)

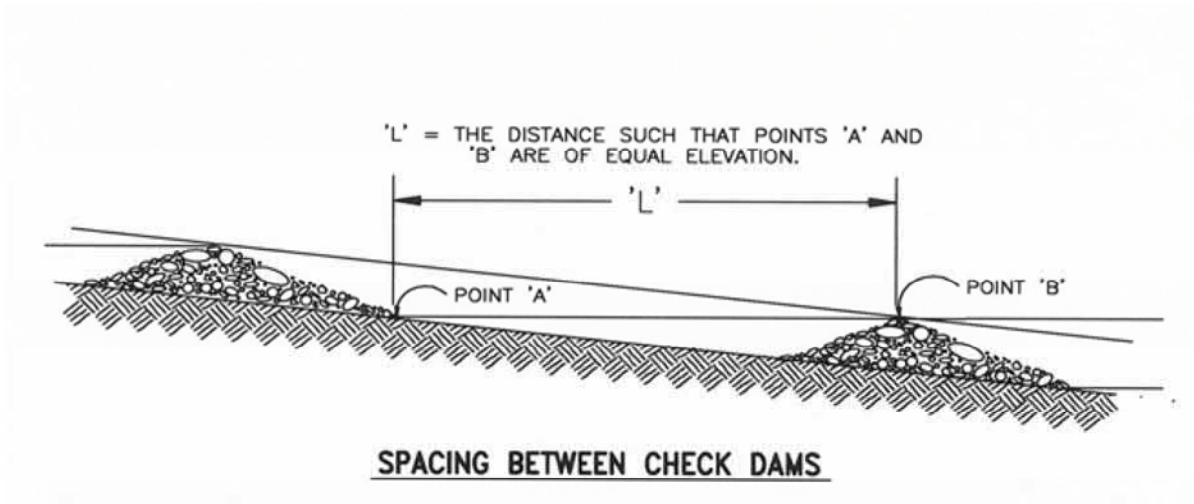
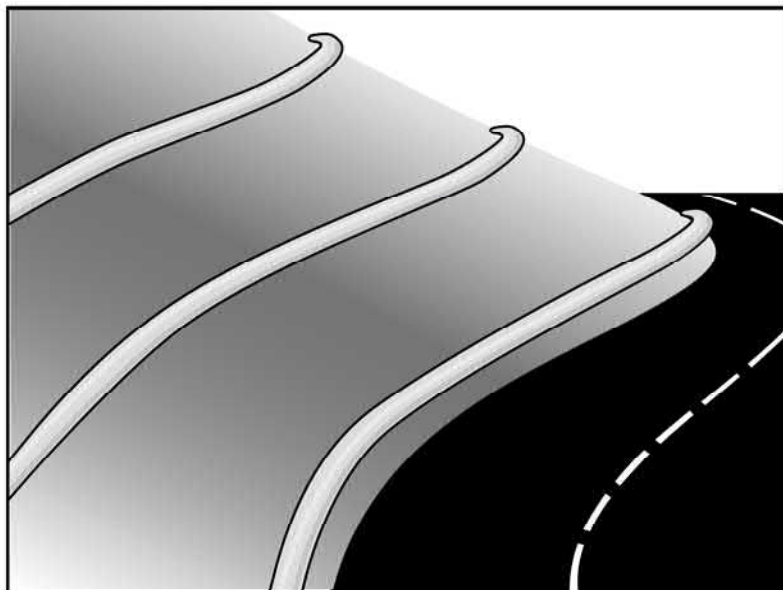


EXHIBIT "C" (Stormwater Pollution Prevention Plan)



Description and Purpose

A fiber roll (also known as wattles or logs) consists of straw, coir, curled wood fiber, or other biodegradable materials bound into a tight tubular roll wrapped by plastic netting, which can be photodegradable, or natural fiber, such as jute, cotton, or sisal. Additionally, gravel core fiber rolls are available, which contain an imbedded ballast material such as gravel or sand for additional weight when staking the rolls are not feasible (such as use as inlet protection). When fiber rolls are placed at the toe and on the face of slopes along the contours, they intercept runoff, reduce its flow velocity, release the runoff as sheet flow, and provide removal of sediment from the runoff (through sedimentation). By interrupting the length of a slope, fiber rolls can also reduce sheet and rill erosion until vegetation is established.

Suitable Applications

Fiber rolls may be suitable:

- Along the toe, top, face, and at grade breaks of exposed and erodible slopes to shorten slope length and spread runoff as sheet flow.
- At the end of a downward slope where it transitions to a steeper slope.
- Along the perimeter of a project.
- As check dams in unlined ditches with minimal grade.
- Down-slope of exposed soil areas.

Categories

EC	Erosion Control	<input checked="" type="checkbox"/>
SE	Sediment Control	<input checked="" type="checkbox"/>
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	

Legend:

- Primary Category
- Secondary Category

Targeted Constituents

Sediment	<input checked="" type="checkbox"/>
Nutrients	
Trash	
Metals	
Bacteria	
Oil and Grease	
Organics	

Potential Alternatives

- SE-1 Silt Fence
- SE-6 Gravel Bag Berm
- SE-8 Sandbag Barrier
- SE-12 Manufactured Linear Sediment Controls
- SE-14 Biofilter Bags

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- At operational storm drains as a form of inlet protection.
- Around temporary stockpiles.

Limitations

- Fiber rolls should be used in conjunction with erosion control, such as hydroseed, RECPs, etc.
- Only biodegradable fiber rolls containing no plastic can remain on a site applying for a Notice of Termination due to plastic pollution and wildlife concerns (State Water Board, 2016). Fiber rolls containing plastic that are used on a site must be disposed of for final stabilization.
- Fiber rolls are not effective unless trenched in and staked. If not properly staked and trenched in, fiber rolls will not work as intended and could be transported by high flows.
- Not intended for use in high flow situations (i.e., for concentrated flows).
- Difficult to move once saturated.
- Fiber rolls have a limited sediment capture zone.
- Fiber rolls should not be used on slopes subject to creep, slumping, or landslide.
- Rolls typically function for 12-24 months, depending upon local conditions and roll material.

Implementation

Fiber Roll Materials

- Fiber rolls should be prefabricated.
- Fiber rolls may come manufactured containing polyacrylamide (PAM), a flocculating agent within the roll. Fiber rolls impregnated with PAM provide additional sediment removal capabilities and should be used in areas with fine, clayey or silty soils to provide additional sediment removal capabilities. Monitoring may be required for these installations.
- Fiber rolls are made from weed-free rice straw, flax, curled wood fiber, or coir bound into a tight tubular roll by netting or natural fiber (see *Limitations* above regarding plastic netting).
- Typical fiber rolls vary in diameter from 6 in. to 20 in. Larger diameter rolls are available as well. The larger the roll, the higher the sediment retention capacity.
- Typical fiber rolls lengths are 4, 10, 20 and 25 ft., although other lengths are likely available.

Installation

- Locate fiber rolls on level contours spaced as follows:
 - Slope inclination of 4:1 (H:V) or flatter: Fiber rolls should be placed at a maximum interval of 20 ft.

- Slope inclination between 4:1 and 2:1 (H:V): Fiber Rolls should be placed at a maximum interval of 15 ft. (a closer spacing is more effective).
- Slope inclination 2:1 (H:V) or greater: Fiber Rolls should be placed at a maximum interval of 10 ft. (a closer spacing is more effective).
- Prepare the slope before beginning installation.
- Dig small trenches across the slope on the contour. The trench depth should be $\frac{1}{4}$ to $\frac{1}{3}$ of the thickness of the roll, and the width should equal the roll diameter, in order to provide area to backfill the trench.
- It is critical that rolls are installed perpendicular to water movement, and parallel to the slope contour.
- Start building trenches and installing rolls from the bottom of the slope and work up.
- It is recommended that pilot holes be driven through the fiber roll. Use a straight bar to drive holes through the roll and into the soil for the wooden stakes.
- Turn the ends of the fiber roll up slope to prevent runoff from going around the roll.
- Stake fiber rolls into the trench.
 - Drive stakes at the end of each fiber roll and spaced 4 ft maximum on center.
 - Use wood stakes with a nominal classification of 0.75 by 0.75 in. and minimum length of 24 in.
- If more than one fiber roll is placed in a row, the rolls should be overlapped, not abutted.
- See typical fiber roll installation details at the end of this fact sheet.

Removal

- Fiber rolls can be left in place or removed depending on the type of fiber roll and application (temporary vs. permanent installation). Fiber rolls encased with plastic netting or containing any plastic material will need to be removed from the site for final stabilization. Fiber rolls used in a permanent application are to be encased with a non-plastic material and are left in place. Removal of a fiber roll used in a permanent application can result in greater disturbance; therefore, during the BMP planning phase, the areas where fiber rolls will be used on final slopes, only fiber rolls wrapped in non-plastic material should be selected.
- Temporary installations should only be removed when up gradient areas are stabilized per General Permit requirements, and/or pollutant sources no longer present a hazard. But they should also be removed before vegetation becomes too mature so that the removal process does not disturb more soil and vegetation than is necessary.

EXHIBIT "C" (Stormwater Pollution Prevention Plan)

Costs

Material costs for straw fiber rolls range from \$26 - \$38 per 25-ft. roll¹ and curled wood fiber rolls range from \$30 - \$40 per roll².

Material costs for PAM impregnated fiber rolls range between \$9.00-\$12.00 per linear foot, based upon vendor research¹.

Inspection and Maintenance

- BMPs must be inspected in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- Repair or replace split, torn, unraveling, or slumping fiber rolls.
- If the fiber roll is used as a sediment capture device, or as an erosion control device to maintain sheet flows, sediment that accumulates in the BMP should be periodically removed in order to maintain BMP effectiveness. Sediment should be removed when sediment accumulation reaches one-third the designated sediment storage depth.
- If fiber rolls are used for erosion control, such as in a check dam, sediment removal should not be required as long as the system continues to control the grade. Sediment control BMPs will likely be required in conjunction with this type of application.
- Repair any rills or gullies promptly.

References

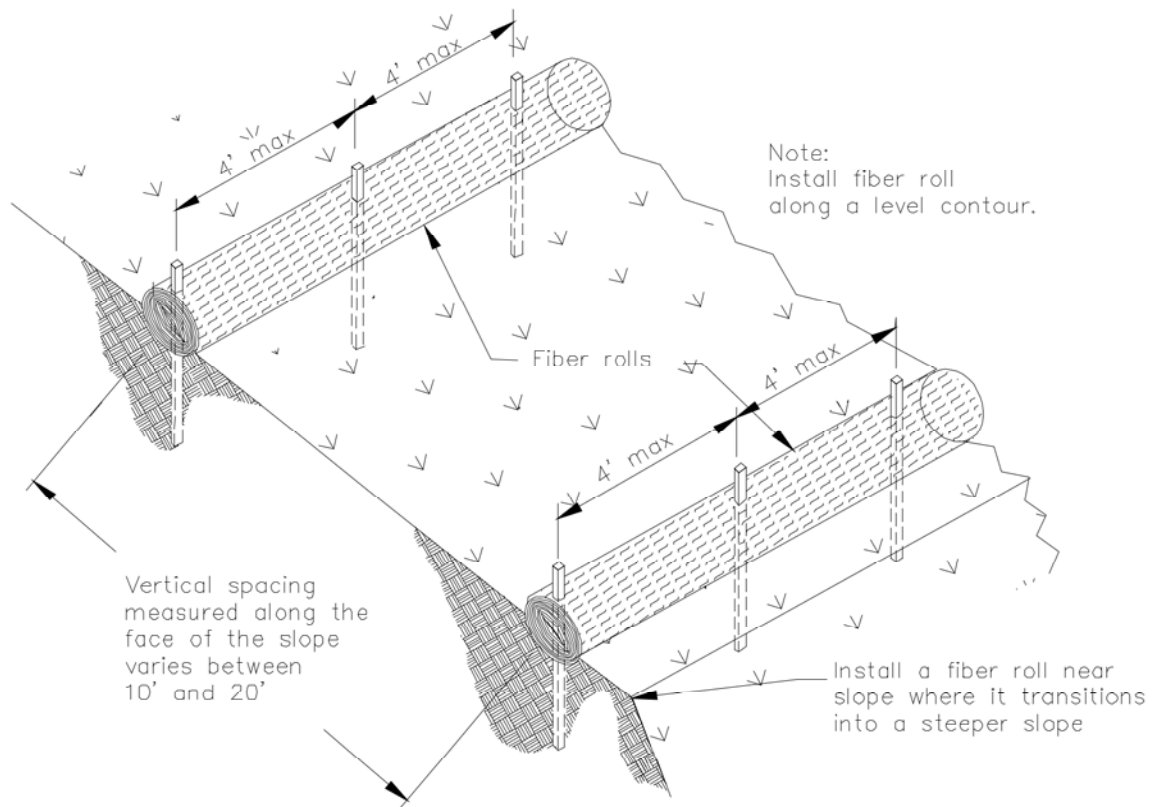
General Construction – Frequently Asked Questions, Storm Water Program website, State Water Resources Control Board, 2009 updated in 2016. Available online at: http://www.waterboards.ca.gov/water_issues/programs/stormwater/gen_const_faq.shtml.

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), March 2003.

Erosion and Sediment Control Manual, Oregon Department of Environmental Quality, February 2005.

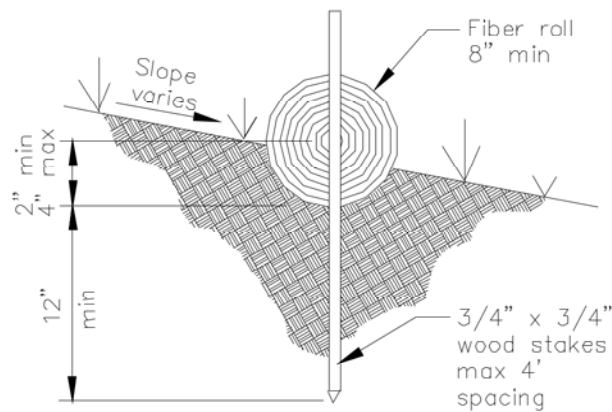
¹ Adjusted for inflation (2016 dollars) by Tetra Tech, Inc.

² Costs estimated based on vendor query by Tetra Tech, Inc. 2016.



TYPICAL FIBER ROLL INSTALLATION

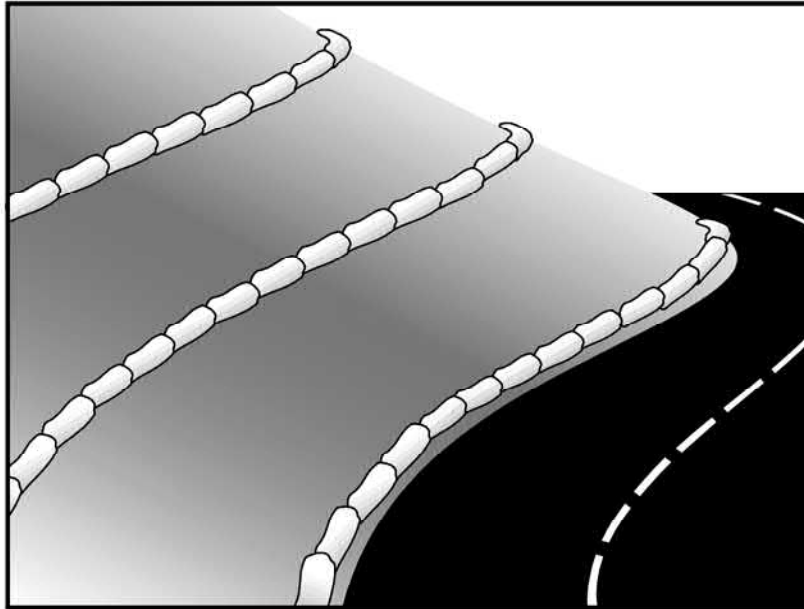
N.T.S.



ENTRENCHMENT DETAIL

N.T.S.

EXHIBIT "C" (Stormwater Pollution Prevention Plan)



Description and Purpose

A gravel bag berm is a series of gravel-filled bags placed on a level contour to intercept sheet flows. Gravel bags pond sheet flow runoff, allowing sediment to settle out, and release runoff slowly as sheet flow, preventing erosion.

Suitable Applications

Gravel bag berms may be suitable:

- As a linear sediment control measure:
 - Below the toe of slopes and erodible slopes
 - As sediment traps at culvert/pipe outlets
 - Below other small cleared areas
 - Along the perimeter of a site
 - Down slope of exposed soil areas
 - Around temporary stockpiles and spoil areas
 - Parallel to a roadway to keep sediment off paved areas
 - Along streams and channels
- As a linear erosion control measure:
 - Along the face and at grade breaks of exposed and erodible slopes to shorten slope length and spread runoff as sheet flow.

Categories

EC	Erosion Control	<input checked="" type="checkbox"/>
SE	Sediment Control	<input checked="" type="checkbox"/>
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	

Legend:

- Primary Category
- Secondary Category

Targeted Constituents

Sediment	<input checked="" type="checkbox"/>
Nutrients	
Trash	
Metals	
Bacteria	
Oil and Grease	
Organics	

Potential Alternatives

- SE-1 Silt Fence
- SE-5 Fiber Roll
- SE-8 Sandbag Barrier
- SE-12 Temporary Silt Dike
- SE-14 Biofilter Bags

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- At the top of slopes to divert runoff away from disturbed slopes.
- As chevrons (small check dams) across mildly sloped construction roads. For use check dam use in channels, see SE-4, Check Dams.

Limitations

- Gravel berms may be difficult to remove.
- Removal problems limit their usefulness in landscaped areas.
- Gravel bag berm may not be appropriate for drainage areas greater than 5 acres.
- Runoff will pond upstream of the berm, possibly causing flooding if sufficient space does not exist.
- Degraded gravel bags may rupture when removed, spilling contents.
- Installation can be labor intensive.
- Durability of gravel bags is somewhat limited, and bags may need to be replaced when installation is required for longer than 6 months.
- Easily damaged by construction equipment.
- When used to detain concentrated flows, maintenance requirements increase.

Implementation

General

A gravel bag berm consists of a row of open graded gravel-filled bags placed on a level contour. When appropriately placed, a gravel bag berm intercepts and slows sheet flow runoff, causing temporary ponding. The temporary ponding allows sediment to settle. The open graded gravel in the bags is porous, which allows the ponded runoff to flow slowly through the bags, releasing the runoff as sheet flows. Gravel bag berms also interrupt the slope length and thereby reduce erosion by reducing the tendency of sheet flows to concentrate into rivulets, which erode rills, and ultimately gullies, into disturbed, sloped soils. Gravel bag berms are similar to sand bag barriers but are more porous. Generally, gravel bag berms should be used in conjunction with temporary soil stabilization controls up slope to provide effective erosion and sediment control.

Design and Layout

- Locate gravel bag berms on level contours.
- When used for slope interruption, the following slope/sheet flow length combinations apply:
 - Slope inclination of 4:1 (H:V) or flatter: Gravel bags should be placed at a maximum interval of 20 ft, with the first row near the slope toe.
 - Slope inclination between 4:1 and 2:1 (H:V): Gravel bags should be placed at a maximum interval of 15 ft. (a closer spacing is more effective), with the first row near the slope toe.

EXHIBIT "C" (Stormwater Pollution Prevention Plan)

Slope inclination 2:1 (H:V) or greater: Gravel bags should be placed at a maximum interval of 10 ft. (a closer spacing is more effective), with the first row near the slope toe.

- Turn the ends of the gravel bag barriers up slope to prevent runoff from going around the berm.
- Allow sufficient space up slope from the gravel bag berm to allow ponding, and to provide room for sediment storage.
- For installation near the toe of the slope, gravel bag barriers should be set back from the slope toe to facilitate cleaning. Where specific site conditions do not allow for a set-back, the gravel bag barrier may be constructed on the toe of the slope. To prevent flows behind the barrier, bags can be placed perpendicular to a berm to serve as cross barriers.
- Drainage area should not exceed 5 acres.
- In Non-Traffic Areas:
 - Height = 18 in. maximum
 - Top width = 24 in. minimum for three or more-layer construction
 - Top width = 12 in. minimum for one- or two-layer construction
 - Side slopes = 2:1 (H:V) or flatter
- In Construction Traffic Areas:
 - Height = 12 in. maximum
 - Top width = 24 in. minimum for three or more-layer construction.
 - Top width = 12 in. minimum for one- or two-layer construction.
 - Side slopes = 2:1 (H:V) or flatter.
- Butt ends of bags tightly.
- On multiple row, or multiple layer construction, overlap butt joints of adjacent row and row beneath.
- Use a pyramid approach when stacking bags.

Materials

- **Bag Material:** Bags should be woven polypropylene, polyethylene or polyamide fabric or burlap, minimum unit weight of 4 ounces/yd², Mullen burst strength exceeding 300 lb/in² in conformance with the requirements in ASTM designation D3786, and ultraviolet stability exceeding 70% in conformance with the requirements in ASTM designation D4355.

EXHIBIT "C" (Stormwater Pollution Prevention Plan)

- **Bag Size:** Each gravel-filled bag should have a length of 18 in., width of 12 in., thickness of 3 in., and mass of approximately 33 lbs. Bag dimensions are nominal and may vary based on locally available materials.
- **Fill Material:** Fill material should be 0.5 to 1 in. Crushed rock, clean and free from clay, organic matter, and other deleterious material, or other suitable open graded, non-cohesive, porous gravel.

Costs

Material costs for gravel bags are average and are dependent upon material availability. \$3.20-\$3.80 per filled gravel bag is standard based upon vendor research (Adjusted for inflation, 2016 dollars, by Tetra Tech, Inc.).

Inspection and Maintenance

- BMPs must be inspected in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- Gravel bags exposed to sunlight will need to be replaced every two to three months due to degrading of the bags.
- Reshape or replace gravel bags as needed.
- Repair washouts or other damage as needed.
- Sediment that accumulates in the BMP should be periodically removed in order to maintain BMP effectiveness. Sediment should be removed when the sediment accumulation reaches one-third of the barrier height.
- Remove gravel bag berms when no longer needed and recycle gravel fill whenever possible and properly dispose of bag material. Remove sediment accumulation and clean, re-grade, and stabilize the area.

References

Handbook of Steel Drainage and Highway Construction, American Iron and Steel Institute, 1983.

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), March 2003.

Stormwater Pollution Plan Handbook, First Edition, State of California, Department of Transportation Division of New Technology, Materials and Research, October 1992.

Erosion and Sediment Control Manual, Oregon Department of Environmental Quality, February 2005.

EXHIBIT "C" (Stormwater Pollution Prevention Plan)



Description and Purpose

Street sweeping and vacuuming includes use of self-propelled and walk-behind equipment to remove sediment from streets and roadways and to clean paved surfaces in preparation for final paving. Sweeping and vacuuming prevents sediment from the project site from entering storm drains or receiving waters.

Suitable Applications

Sweeping and vacuuming are suitable anywhere sediment is tracked from the project site onto public or private paved streets and roads, typically at points of egress. Sweeping and vacuuming are also applicable during preparation of paved surfaces for final paving.

Limitations

- Sweeping and vacuuming may not be effective when sediment is wet or when tracked soil is caked (caked soil may need to be scraped loose).
- Sweeping may be less effective for fine particle soils (i.e., clay).

Implementation

- Controlling the number of points where vehicles can leave the site will allow sweeping and vacuuming efforts to be focused and perhaps save money.
- Inspect potential sediment tracking locations daily.

Categories

EC	Erosion Control	
SE	Sediment Control	<input checked="" type="checkbox"/>
TC	Tracking Control	<input checked="" type="checkbox"/>
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	

Legend:

- Primary Objective
- Secondary Objective

Targeted Constituents

Sediment	<input checked="" type="checkbox"/>
Nutrients	
Trash	<input checked="" type="checkbox"/>
Metals	
Bacteria	
Oil and Grease	<input checked="" type="checkbox"/>
Organics	

Potential Alternatives

None

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EXHIBIT "C" (Stormwater Pollution Prevention Plan)

- Visible sediment tracking should be swept or vacuumed on a daily basis.
- Do not use kick brooms or sweeper attachments. These tend to spread the dirt rather than remove it.
- If not mixed with debris or trash, consider incorporating the removed sediment back into the project

Costs

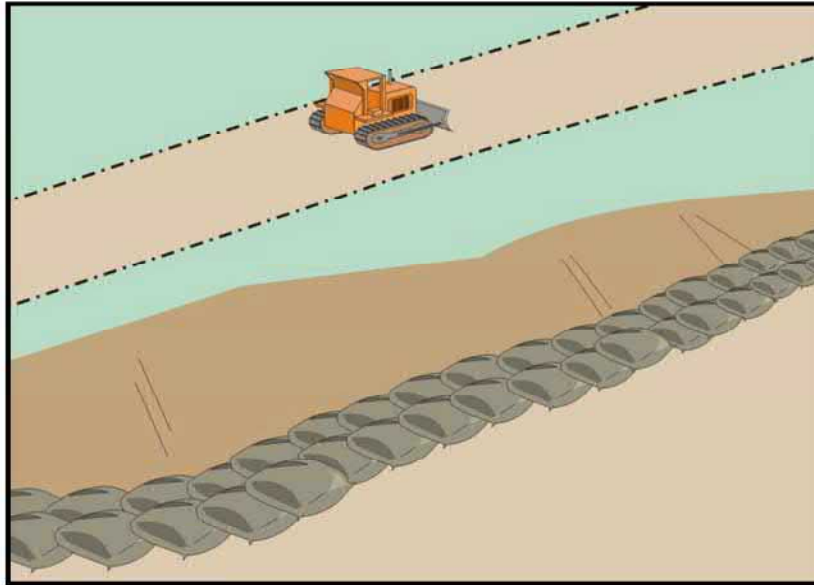
Rental rates for self-propelled sweepers vary depending on hopper size and duration of rental. Expect rental rates from \$ 650/day to \$2,500/day¹, plus operator costs. Hourly production rates vary with the amount of area to be swept and amount of sediment. Match the hopper size to the area and expect sediment load to minimize time spent dumping.

Inspection and Maintenance

- Inspect BMPs in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- When actively in use, points of ingress and egress must be inspected daily.
- When tracked or spilled sediment is observed outside the construction limits, it must be removed at least daily. More frequent removal, even continuous removal, may be required in some jurisdictions.
- Be careful not to sweep up any unknown substance or any object that may be potentially hazardous.
- Adjust brooms frequently; maximize efficiency of sweeping operations.
- After sweeping is finished, properly dispose of sweeper wastes at an approved dumpsite.

References

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.



Categories

EC	Erosion Control	<input checked="" type="checkbox"/>
SE	Sediment Control	<input checked="" type="checkbox"/>
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	

Legend:

- Primary Category
- Secondary Category

Description and Purpose

A sandbag barrier is a series of sand-filled bags placed on a level contour to intercept or to divert sheet flows. Sandbag barriers placed on a level contour pond sheet flow runoff, allowing sediment to settle out.

Suitable Applications

Sandbag barriers may be a suitable control measure for the applications described below. It is important to consider that sand bags are less porous than gravel bags and ponding or flooding can occur behind the barrier. Also, sand is easily transported by runoff if bags are damaged or ruptured. The SWPPP Preparer should select the location of a sandbag barrier with respect to the potential for flooding, damage, and the ability to maintain the BMP.

- As a linear sediment control measure:
 - Below the toe of slopes and erodible slopes.
 - As sediment traps at culvert/pipe outlets.
 - Below other small cleared areas.
 - Along the perimeter of a site.
 - Down slope of exposed soil areas.
 - Around temporary stockpiles and spoil areas.
 - Parallel to a roadway to keep sediment off paved areas.
 - Along streams and channels.

Targeted Constituents

Sediment	<input checked="" type="checkbox"/>
Nutrients	
Trash	
Metals	
Bacteria	
Oil and Grease	
Organics	

Potential Alternatives

- SE-1 Silt Fence
- SE-5 Fiber Rolls
- SE-6 Gravel Bag Berm
- SE-12 Manufactured Linear Sediment Controls
- SE-14 Biofilter Bags

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- As linear erosion control measure:
 - Along the face and at grade breaks of exposed and erodible slopes to shorten slope length and spread runoff as sheet flow.
 - At the top of slopes to divert runoff away from disturbed slopes.
 - As check dams across mildly sloped construction roads.

Limitations

- It is necessary to limit the drainage area upstream of the barrier to 5 acres.
- Sandbags are not intended to be used as filtration devices.
- Easily damaged by construction equipment.
- Degraded sandbags may rupture when removed, spilling sand.
- Installation can be labor intensive.
- Durability of sandbags is somewhat limited, and bags will need to be replaced when there are signs of damage or wear.
- Burlap should not be used for sandbags.

Implementation

General

A sandbag barrier consists of a row of sand-filled bags placed on a level contour. When appropriately placed, a sandbag barrier intercepts and slows sheet flow runoff, causing temporary ponding. The temporary ponding allows sediment to settle. Sand-filled bags have limited porosity, which is further limited as the fine sand tends to quickly plug with sediment, limiting or completely blocking the rate of flow through the barrier. If a porous barrier is desired, consider SE-1, Silt Fence, SE-5, Fiber Rolls, SE-6, Gravel Bag Berms or SE-14, Biofilter Bags. Sandbag barriers also interrupt the slope length and thereby reduce erosion by reducing the tendency of sheet flows to concentrate into rivulets which erode rills, and ultimately gullies, into disturbed, sloped soils. Sandbag barriers are similar to gravel bag berms, but less porous. Generally, sandbag barriers should be used in conjunction with temporary soil stabilization controls up slope to provide effective erosion and sediment control.

Design and Layout

- Locate sandbag barriers on a level contour.
- When used for slope interruption, the following slope/sheet flow length combinations apply:
 - Slope inclination of 4:1 (H:V) or flatter: Sandbags should be placed at a maximum interval of 20 ft, with the first row near the slope toe.
 - Slope inclination between 4:1 and 2:1 (H:V): Sandbags should be placed at a maximum interval of 15 ft. (a closer spacing is more effective), with the first row near the slope toe.

EXHIBIT "C" (Stormwater Pollution Prevention Plan)

- Slope inclination 2:1 (H:V) or greater: Sandbags should be placed at a maximum interval of 10 ft. (a closer spacing is more effective), with the first row near the slope toe.
- Turn the ends of the sandbag barrier up slope to prevent runoff from going around the barrier.
- Allow sufficient space up slope from the barrier to allow ponding, and to provide room for sediment storage.
- For installation near the toe of the slope, sand bag barriers should be set back from the slope toe to facilitate cleaning. Where specific site conditions do not allow for a set-back, the sand bag barrier may be constructed on the toe of the slope. To prevent flows behind the barrier, bags can be placed perpendicular to a berm to serve as cross barriers.
- Drainage area should not exceed 5 acres.
- Butt ends of bags tightly.
- Overlap butt joints of row beneath with each successive row.
- Use a pyramid approach when stacking bags.
- In non-traffic areas
 - Height = 18 in. maximum
 - Top width = 24 in. minimum for three or more-layer construction
 - Side slope = 2:1 (H:V) or flatter
- In construction traffic areas
 - Height = 12 in. maximum
 - Top width = 24 in. minimum for three or more-layer construction.
 - Side slopes = 2:1 (H:V) or flatter.
- See typical sandbag barrier installation details at the end of this fact sheet.

Materials

- **Sandbag Material:** Sandbag should be woven polypropylene, polyethylene or polyamide fabric, minimum unit weight of 4 ounces/yd², Mullen burst strength exceeding 300 lb/in² in conformance with the requirements in ASTM designation D3786, and ultraviolet stability exceeding 70% in conformance with the requirements in ASTM designation D4355. Use of burlap is not an acceptable substitute, as sand can more easily mobilize out of burlap.
- **Sandbag Size:** Each sand-filled bag should have a length of 18 in., width of 12 in., thickness of 3 in., and mass of approximately 33 lbs. Bag dimensions are nominal and may vary based on locally available materials.

- **Fill Material:** All sandbag fill material should be non-cohesive, Class 3 (Caltrans Standard Specification, Section 25) or similar permeable material free from clay and deleterious material, such as recycled concrete or asphalt.

Costs

Empty sandbags cost \$0.25 - \$0.75. Average cost of fill material is \$8 per yd³. Additional labor is required to fill the bags. Pre-filled sandbags are more expensive at \$1.50 - \$2.00 per bag. These costs are based upon vendor research.

Inspection and Maintenance

- BMPs must be inspected in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- Sandbags exposed to sunlight will need to be replaced every two to three months due to degradation of the bags.
- Reshape or replace sandbags as needed.
- Repair washouts or other damage as needed.
- Sediment that accumulates behind the BMP should be periodically removed in order to maintain BMP effectiveness. Sediment should be removed when the sediment accumulation reaches one-third of the barrier height.
- Remove sandbags when no longer needed and recycle sand fill whenever possible and properly dispose of bag material. Remove sediment accumulation, and clean, re-grade, and stabilize the area.

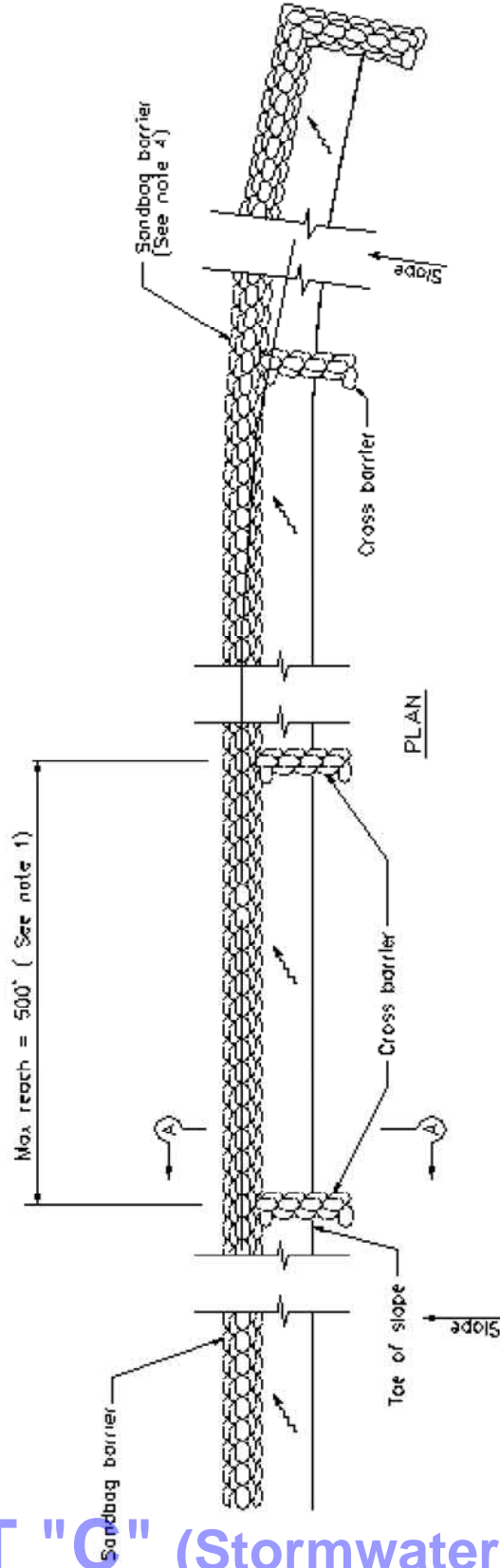
References

Standard Specifications for Construction of Local Streets and Roads, California Department of Transportation (Caltrans), July 2002.

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), March 2003.

Erosion and Sediment Control Manual, Oregon Department of Environmental Quality, February 2005.

EXHIBIT "C" (Stormwater Pollution Prevention Plan)



SANDBAG BARRIER

NOTES

1. Construct the length of each reach so that the change in base elevation along the reach does not exceed $1/2$ the height of the linear barrier. In no case shall the reach length exceed 500'.
2. Place sandbags tightly
3. Dimension may vary to fit field condition.
4. Sandbag barrier shall be a minimum of 3 bags high.
5. The end of the barrier shall be turned up slope.
6. Cross barriers shall be a min of $1/2$ and a max of $2/3$ the height of the linear barrier.
7. Sandbag rows and layers shall be staggered to eliminate gaps.

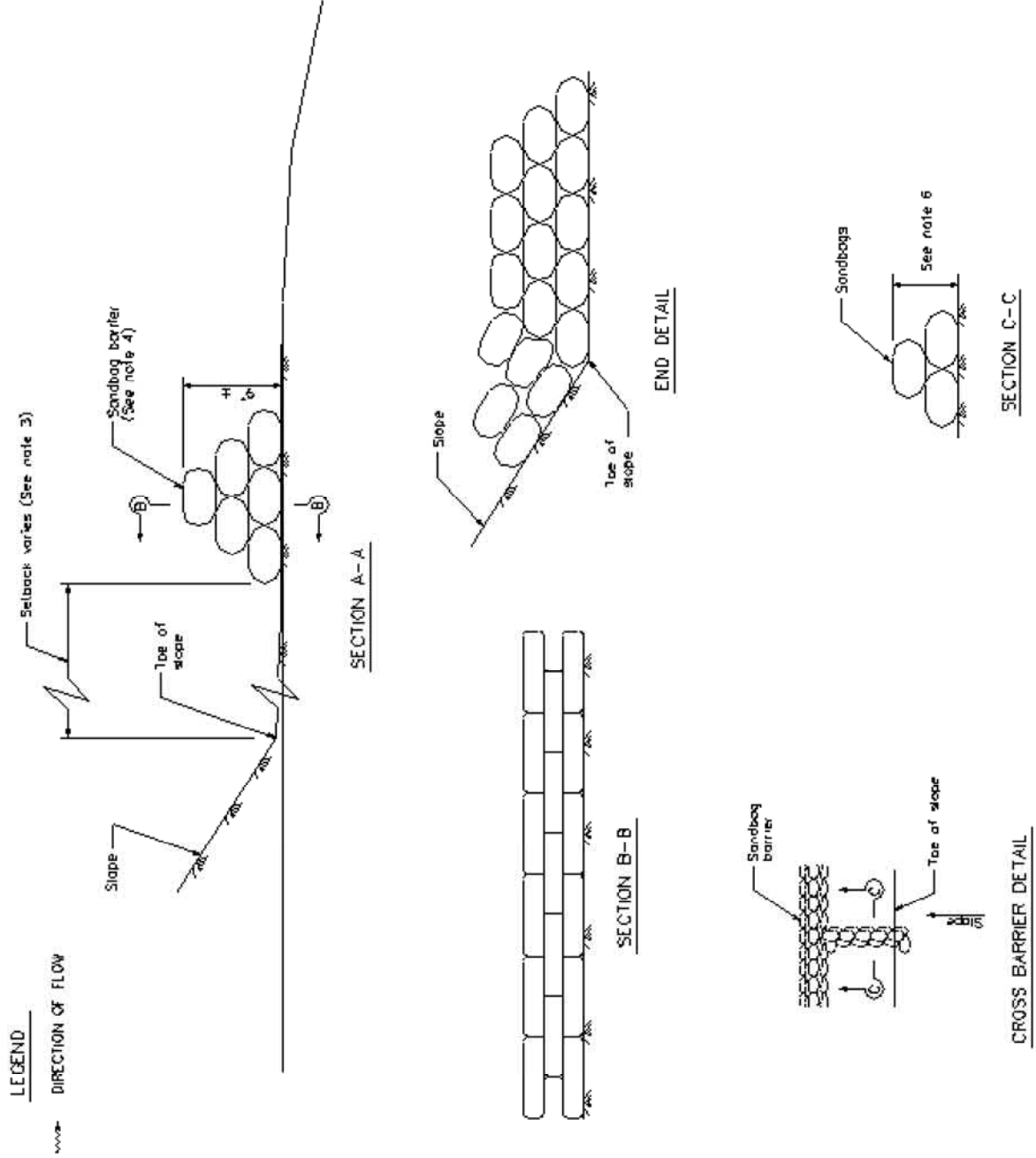
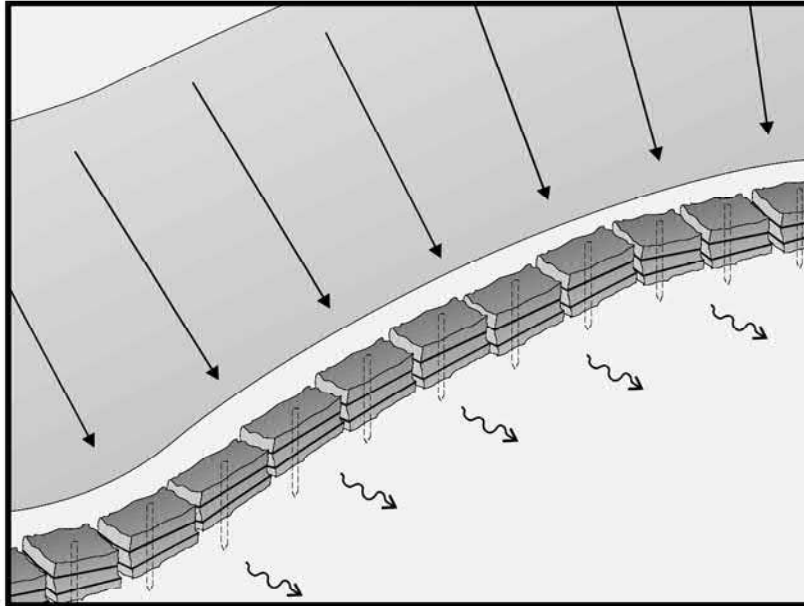


EXHIBIT "C" (Stormwater Pollution Prevention Plan)



Description and Purpose

A straw bale barrier is a series of straw bales placed on a level contour to intercept sheet flows. Straw bale barriers pond sheet-flow runoff, allowing sediment to settle out.

Suitable Applications

Straw bale barriers may be suitable:

- As a linear sediment control measure:
 - Below the toe of slopes and erodible slopes
 - As sediment traps at culvert/pipe outlets
 - Below other small cleared areas
 - Along the perimeter of a site
 - Down slope of exposed soil areas
 - Around temporary stockpiles and spoil areas
 - Parallel to a roadway to keep sediment off paved areas
 - Along streams and channels
- As linear erosion control measure:
 - Along the face and at grade breaks of exposed and erodible slopes to shorten slope length and spread runoff as sheet flow

Categories

EC	Erosion Control	<input checked="" type="checkbox"/>
SE	Sediment Control	<input checked="" type="checkbox"/>
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	

Legend:

- Primary Objective
- Secondary Objective

Targeted Constituents

Sediment	<input checked="" type="checkbox"/>
Nutrients	
Trash	
Metals	
Bacteria	
Oil and Grease	
Organics	

Potential Alternatives

- SE-1 Silt Fence
- SE-5 Fiber Rolls
- SE-6 Gravel Bag Berm
- SE-8 Sandbag Barrier
- SE-12 Temporary Silt Dike
- SE-14 Biofilter Bags

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- At the top of slopes to divert runoff away from disturbed slopes
- As check dams across mildly sloped construction roads

Limitations

Straw bale barriers:

- Are not to be used for extended periods of time because they tend to rot and fall apart
- Are suitable only for sheet flow on slopes of 10 % or flatter
- Are not appropriate for large drainage areas, limit to one acre or less
- May require constant maintenance due to rotting
- Are not recommended for concentrated flow, inlet protection, channel flow, and live streams
- Cannot be made of bale bindings of jute or cotton
- Require labor-intensive installation and maintenance
- Cannot be used on paved surfaces
- Should not to be used for drain inlet protection
- Should not be used on lined ditches
- May introduce undesirable non-native plants to the area

Implementation

General

A straw bale barrier consists of a row of straw bales placed on a level contour. When appropriately placed, a straw bale barrier intercepts and slows sheet flow runoff, causing temporary ponding. The temporary ponding provides quiescent conditions allowing sediment to settle. Straw bale barriers also interrupt the slope length and thereby reduce erosion by reducing the tendency of sheet flows to concentrate into rivulets, which erode rills, and ultimately gullies, into disturbed, sloped soils.

Straw bale barriers have not been as effective as expected due to improper use. These barriers have been placed in streams and drainage ways where runoff volumes and velocities have caused the barriers to wash out. In addition, failure to stake and entrench the straw bale has allowed undercutting and end flow. Use of straw bale barriers in accordance with this BMP should produce acceptable results.

Design and Layout

- Locate straw bale barriers on a level contour.
 - Slopes up to 10:1 (H:V): Straw bales should be placed at a maximum interval of 50 ft (a closer spacing is more effective), with the first row near the toe of slope.
 - Slopes greater than 10:1 (H:V): Not recommended.

EXHIBIT "C" (Stormwater Pollution Prevention Plan)

- Turn the ends of the straw bale barrier up slope to prevent runoff from going around the barrier.
- Allow sufficient space up slope from the barrier to allow ponding, and to provide room for sediment storage.
- For installation near the toe of the slope, consider moving the barrier away from the slope toe to facilitate cleaning. To prevent flow behind the barrier, sand bags can be placed perpendicular to the barrier to serve as cross barriers.
- Drainage area should not exceed 1 acre, or 0.25 acre per 100 ft of barrier.
- Maximum flow path to the barrier should be limited to 100 ft.
- Straw bale barriers should consist of two parallel rows.
 - Butt ends of bales tightly
 - Stagger butt joints between front and back row
 - Each row of bales must be trenched in and firmly staked
- Straw bale barriers are limited in height to one bale laid on its side.
- Anchor bales with either two wood stakes or four bars driven through the bale and into the soil. Drive the first stake towards the butt joint with the adjacent bale to force the bales together.
- See attached figure for installation details.

Materials

- **Straw Bale Size:** Each straw bale should be a minimum of 14 in. wide, 18 in. in height, 36 in. in length and should have a minimum mass of 50 lbs. The straw bale should be composed entirely of vegetative matter, except for the binding material.
- **Bale Bindings:** Bales should be bound by steel wire, nylon or polypropylene string placed horizontally. Jute and cotton binding should not be used. Baling wire should be a minimum diameter of 14 gauge. Nylon or polypropylene string should be approximately 12 gauge in diameter with a breaking strength of 80 lbs force.
- **Stakes:** Wood stakes should be commercial quality lumber of the size and shape shown on the plans. Each stake should be free from decay, splits or cracks longer than the thickness of the stake, or other defects that would weaken the stakes and cause the stakes to be structurally unsuitable. Steel bar reinforcement should be equal to a #4 designation or greater. End protection should be provided for any exposed bar reinforcement.

Costs

Straw bales cost \$5 - \$7 each. Adequate labor should be budgeted for installation and maintenance.

EXHIBIT "C" (Stormwater Pollution Prevention Plan)

Inspection and Maintenance

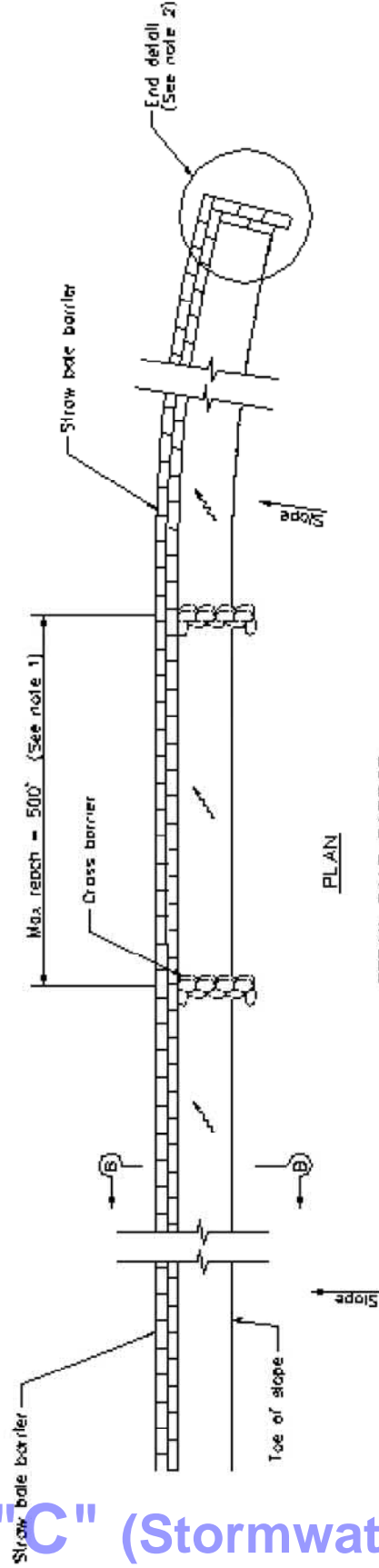
Maintenance

- Inspect BMPs in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- Straw bales degrade, especially when exposed to moisture. Rotting bales will need to be replaced on a regular basis.
- Replace or repair damaged bales as needed.
- Repair washouts or other damages as needed.
- Sediment that accumulates in the BMP must be periodically removed in order to maintain BMP effectiveness. Sediment should be removed when the sediment accumulation reaches one-third of the barrier height. Sediment removed during maintenance may be incorporated into earthwork on the site or disposed at an appropriate location.
- Remove straw bales when no longer needed. Remove sediment accumulation, and clean, re-grade, and stabilize the area. Removed sediment should be incorporated in the project or disposed of.

References

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.

EXHIBIT "C" (Stormwater Pollution Prevention Plan)



STRAW BALE BARRIER

NOTES

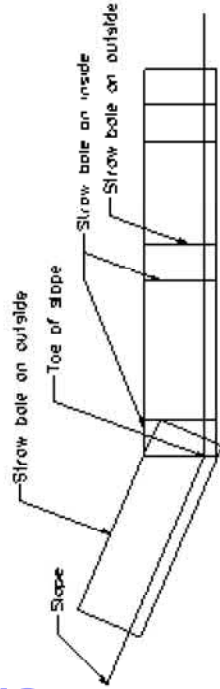
1. Construct the length of each reach so that the change in base elevation along the reach does not exceed 1/2 the height of the linear barrier. In no case shall the reach length exceed 500'.
2. The end of barrier shall be turned up slope.
3. Dimension may vary to fit field condition.
4. Stake dimensions are nominal.
5. Place straw bales tightly together.
6. Tamp embedment spalls against sides of installed bales.
7. Drive angled wood stake before vertical stake to ensure tight abutment to adjacent bale.
8. Sandbag cross barriers should be a min of 1/2 and a max of 2/3 the height of the linear barrier.
9. Sandbag rows and layers should be offset to eliminate gaps.

LEGEND

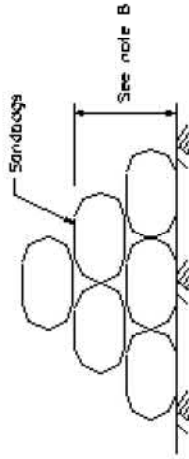
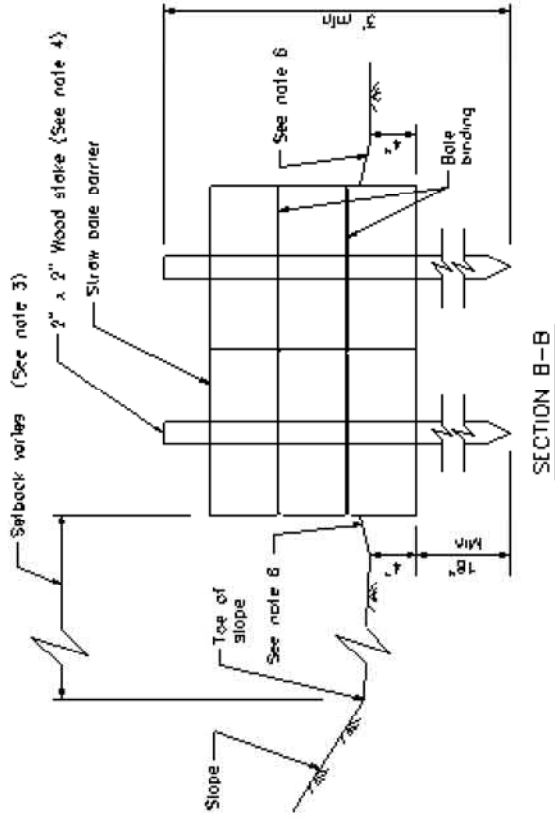
---> DIRECTION OF FLOW

LEGEND

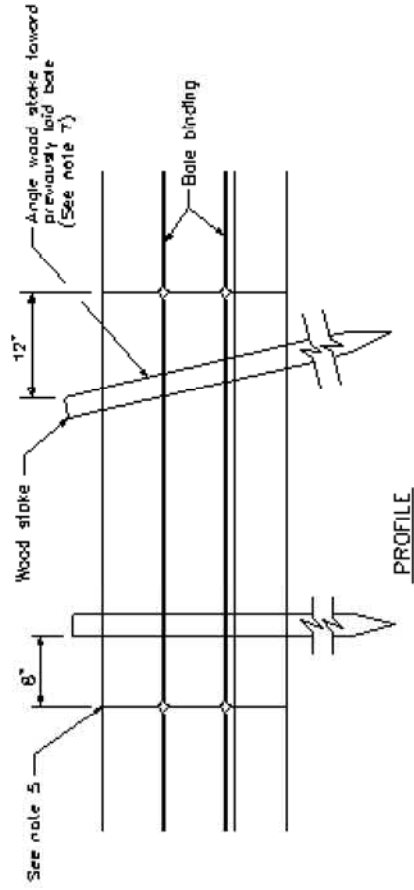
~ ~ ~ DIRECTION OF FLOW



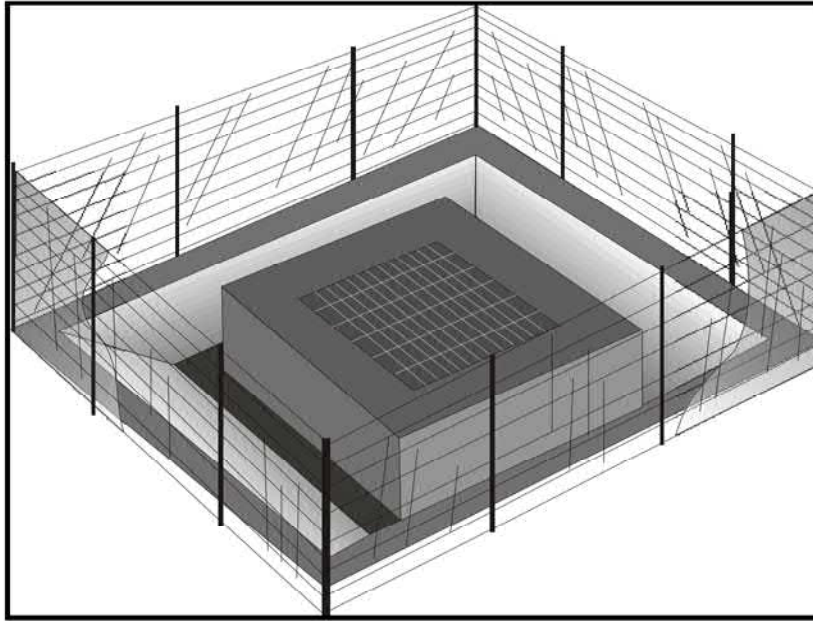
END DETAIL



SANDBAG CROSS BARRIER



PROFILE



Description and Purpose

Storm drain inlet protection consists of a sediment filter or an impounding area in, around or upstream of a storm drain, drop inlet, or curb inlet. Storm drain inlet protection measures temporarily pond runoff before it enters the storm drain, allowing sediment to settle. Some filter configurations also remove sediment by filtering, but usually the ponding action results in the greatest sediment reduction. Temporary geotextile storm drain inserts attach underneath storm drain grates to capture and filter storm water.

Suitable Applications

- Every storm drain inlet receiving runoff from unstabilized or otherwise active work areas should be protected. Inlet protection should be used in conjunction with other erosion and sediment controls to prevent sediment-laden stormwater and non-stormwater discharges from entering the storm drain system.

Limitations

- Drainage area should not exceed 1 acre.
- In general straw bales should not be used as inlet protection.
- Requires an adequate area for water to pond without encroaching into portions of the roadway subject to traffic.
- Sediment removal may be inadequate to prevent sediment discharges in high flow conditions or if runoff is heavily sediment laden. If high flow conditions are expected, use

Categories

EC	Erosion Control	
SE	Sediment Control	<input checked="" type="checkbox"/>
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	

Legend:

- Primary Category
- Secondary Category

Targeted Constituents

Sediment	<input checked="" type="checkbox"/>
Nutrients	
Trash	<input checked="" type="checkbox"/>
Metals	
Bacteria	
Oil and Grease	
Organics	

Potential Alternatives

- SE-1 Silt Fence
- SE-5 Fiber Rolls
- SE-6 Gravel Bag Berm
- SE-8 Sandbag Barrier
- SE-14 Biofilter Bags
- SE-13 Compost Socks and Berms

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other onsite sediment trapping techniques in conjunction with inlet protection.

- Frequent maintenance is required.
- Limit drainage area to 1 acre maximum. For drainage areas larger than 1 acre, runoff should be routed to a sediment-trapping device designed for larger flows. See BMPs SE-2, Sediment Basin, and SE-3, Sediment Traps.
- Excavated drop inlet sediment traps are appropriate where relatively heavy flows are expected, and overflow capability is needed.

Implementation

General

Inlet control measures presented in this handbook should not be used for inlets draining more than one acre. Runoff from larger disturbed areas should be first routed through SE-2, Sediment Basin or SE-3, Sediment Trap and/or used in conjunction with other drainage control, erosion control, and sediment control BMPs to protect the site. Different types of inlet protection are appropriate for different applications depending on site conditions and the type of inlet. Alternative methods are available in addition to the methods described/shown herein such as prefabricated inlet insert devices, or gutter protection devices.

Design and Layout

Identify existing and planned storm drain inlets that have the potential to receive sediment-laden surface runoff. Determine if storm drain inlet protection is needed and which method to use.

- The key to successful and safe use of storm drain inlet protection devices is to know where runoff that is directed toward the inlet to be protected will pond or be diverted as a result of installing the protection device.
 - Determine the acceptable location and extent of ponding in the vicinity of the drain inlet. The acceptable location and extent of ponding will influence the type and design of the storm drain inlet protection device.
 - Determine the extent of potential runoff diversion caused by the storm drain inlet protection device. Runoff ponded by inlet protection devices may flow around the device and towards the next downstream inlet. In some cases, this is acceptable; in other cases, serious erosion or downstream property damage can be caused by these diversions. The possibility of runoff diversions will influence whether or not storm drain inlet protection is suitable; and, if suitable, the type and design of the device.
- The location and extent of ponding, and the extent of diversion, can usually be controlled through appropriate placement of the inlet protection device. In some cases, moving the inlet protection device a short distance upstream of the actual inlet can provide more efficient sediment control, limit ponding to desired areas, and prevent or control diversions.
- Seven types of inlet protection are presented below. However, it is recognized that other effective methods and proprietary devices exist and may be selected.

EXHIBIT "C" (Stormwater Pollution Prevention Plan)

- Silt Fence: Appropriate for drainage basins with less than a 5% slope, sheet flows, and flows under 0.5 cfs.
 - Excavated Drop Inlet Sediment Trap: An excavated area around the inlet to trap sediment (SE-3).
 - Gravel bag barrier: Used to create a small sediment trap upstream of inlets on sloped, paved streets. Appropriate for sheet flow or when concentrated flow may exceed 0.5 cfs, and where overtopping is required to prevent flooding.
 - Block and Gravel Filter: Appropriate for flows greater than 0.5 cfs.
 - Temporary Geotextile Storm drain Inserts: Different products provide different features. Refer to manufacturer details for targeted pollutants and additional features.
 - Biofilter Bag Barrier: Used to create a small retention area upstream of inlets and can be located on pavement or soil. Biofilter bags slowly filter runoff allowing sediment to settle out. Appropriate for flows under 0.5 cfs.
 - Compost Socks: Allow filtered run-off to pass through the compost while retaining sediment and potentially other pollutants (SE-13). Appropriate for flows under 1.0 cfs.
- Select the appropriate type of inlet protection and design as referred to or as described in this fact sheet.
 - Provide area around the inlet for water to pond without flooding structures and property.
 - Grates and spaces around all inlets should be sealed to prevent seepage of sediment-laden water.
 - Excavate sediment sumps (where needed) 1 to 2 ft with 2:1 side slopes around the inlet.

Installation

- **DI Protection Type 1 - Silt Fence** - Similar to constructing a silt fence; see BMP SE-1, Silt Fence. Do not place fabric underneath the inlet grate since the collected sediment may fall into the drain inlet when the fabric is removed or replaced and water flow through the grate will be blocked resulting in flooding. See typical Type 1 installation details at the end of this fact sheet.
 1. Excavate a trench approximately 6 in. wide and 6 in. deep along the line of the silt fence inlet protection device.
 2. Place 2 in. by 2 in. wooden stakes around the perimeter of the inlet a maximum of 3 ft apart and drive them at least 18 in. into the ground or 12 in. below the bottom of the trench. The stakes should be at least 48 in.
 3. Lay fabric along bottom of trench, up side of trench, and then up stakes. See SE-1, Silt Fence, for details. The maximum silt fence height around the inlet is 24 in.
 4. Staple the filter fabric (for materials and specifications, see SE-1, Silt Fence) to wooden stakes. Use heavy-duty wire staples at least 1 in. in length.

5. Backfill the trench with gravel or compacted earth all the way around.

- **DI Protection Type 2 - Excavated Drop Inlet Sediment Trap** - Install filter fabric fence in accordance with DI Protection Type 1. Size excavated trap to provide a minimum storage capacity calculated at the rate 67 yd³/acre of drainage area. See typical Type 2 installation details at the end of this fact sheet.
- **DI Protection Type 3 - Gravel bag** - Flow from a severe storm should not overtop the curb. In areas of high clay and silts, use filter fabric and gravel as additional filter media. Construct gravel bags in accordance with SE-6, Gravel Bag Berm. Gravel bags should be used due to their high permeability. See typical Type 3 installation details at the end of this fact sheet.
 1. Construct on gently sloping street.
 2. Leave room upstream of barrier for water to pond and sediment to settle.
 3. Place several layers of gravel bags – overlapping the bags and packing them tightly together.
 4. Leave gap of one bag on the top row to serve as a spillway. Flow from a severe storm (e.g., 10-year storm) should not overtop the curb.
- **DI Protection Type 4 – Block and Gravel Filter** - Block and gravel filters are suitable for curb inlets commonly used in residential, commercial, and industrial construction. See typical Type 4 installation details at the end of this fact sheet.
 1. Place hardware cloth or comparable wire mesh with 0.5 in. openings over the drop inlet so that the wire extends a minimum of 1 ft beyond each side of the inlet structure. If more than one strip is necessary, overlap the strips. Place woven geotextile over the wire mesh.
 2. Place concrete blocks lengthwise on their sides in a single row around the perimeter of the inlet, so that the open ends face outward, not upward. The ends of adjacent blocks should abut. The height of the barrier can be varied, depending on design needs, by stacking combinations of blocks that are 4 in., 8 in., and 12 in. wide. The row of blocks should be at least 12 in. but no greater than 24 in. high.
 3. Place wire mesh over the outside vertical face (open end) of the concrete blocks to prevent stone from being washed through the blocks. Use hardware cloth or comparable wire mesh with 0.5 in. opening.
 4. Pile washed stone against the wire mesh to the top of the blocks. Use 0.75 to 3 in.
- **DI Protection Type 5 – Temporary Geotextile Insert (proprietary)** – Many types of temporary inserts are available. Most inserts fit underneath the grate of a drop inlet or inside of a curb inlet and are fastened to the outside of the grate or curb. These inserts are removable, and many can be cleaned and reused. Installation of these inserts differs between manufacturers. Please refer to manufacturer instruction for installation of proprietary devices.

EXHIBIT "C" (Stormwater Pollution Prevention Plan)

- **DI Protection Type 6 - Biofilter bags** – Biofilter bags may be used as a substitute for gravel bags in low-flow situations. Biofilter bags should conform to specifications detailed in SE-14, Biofilter bags.
 1. Construct in a gently sloping area.
 2. Biofilter bags should be placed around inlets to intercept runoff flows.
 3. All bag joints should overlap by 6 in.
 4. Leave room upstream for water to pond and for sediment to settle out.
 5. Stake bags to the ground as described in the following detail. Stakes may be omitted if bags are placed on a paved surface.
- **DI Protection Type 7 – Compost Socks** – A compost sock can be assembled on site by filling a mesh sock (e.g., with a pneumatic blower). Compost socks do not require special trenching compared to other sediment control methods (e.g., silt fence). Compost socks should conform to specification detailed in SE-13, Compost Socks and Berms.

Costs

- Average annual cost for installation and maintenance of DI Type 1-4 and 6 (one-year useful life) is \$200 per inlet.
- Temporary geotextile inserts are proprietary, and cost varies by region. These inserts can often be reused and may have greater than 1 year of use if maintained and kept undamaged. Average cost per insert ranges from \$50-75 plus installation, but costs can exceed \$100. This cost does not include maintenance.
- See SE-13 for Compost Sock cost information.

Inspection and Maintenance

- BMPs must be inspected in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- Silt Fences. If the fabric becomes clogged, torn, or degrades, it should be replaced. Make sure the stakes are securely driven in the ground and are in good shape (i.e., not bent, cracked, or splintered, and are reasonably perpendicular to the ground). Replace damaged stakes. At a minimum, remove the sediment behind the fabric fence when accumulation reaches one-third the height of the fence or barrier height.
- Gravel Filters. If the gravel becomes clogged with sediment, it should be carefully removed from the inlet and either cleaned or replaced. Since cleaning gravel at a construction site may be difficult, consider using the sediment-laden stone as fill material and put fresh stone around the inlet. Inspect bags for holes, gashes, and snags, and replace bags as needed. Check gravel bags for proper arrangement and displacement.

EXHIBIT "C" (Stormwater Pollution Prevention Plan)

- Sediment that accumulates in the BMP should be periodically removed in order to maintain BMP effectiveness. Sediment should be removed when the sediment accumulation reaches one-third of the barrier height.
- Inspect and maintain temporary geotextile insert devices according to manufacturer's specifications.
- Remove storm drain inlet protection once the drainage area is stabilized.
 - Clean and regrade area around the inlet and clean the inside of the storm drain inlet, as it should be free of sediment and debris at the time of final inspection.

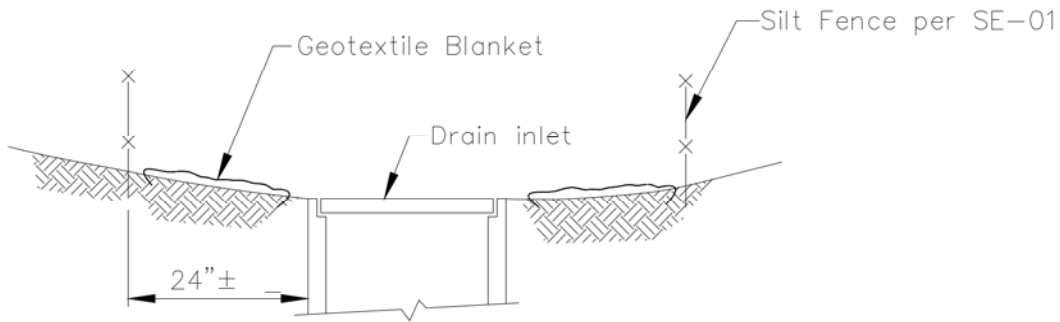
References

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), March 2003.

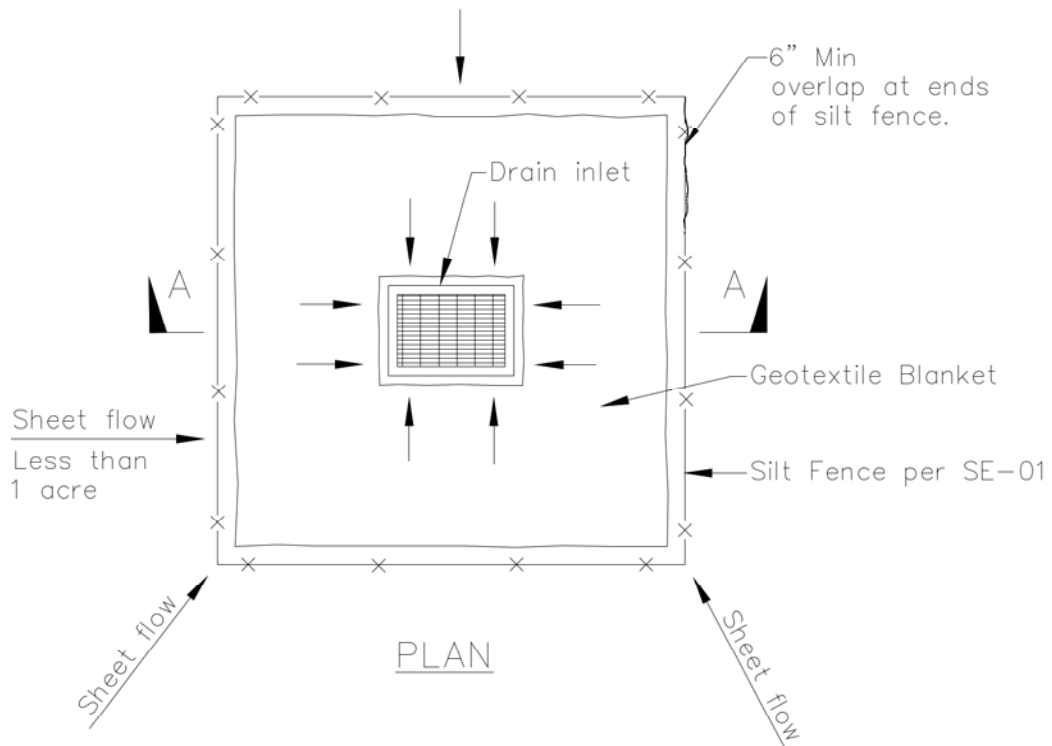
Stormwater Management Manual for The Puget Sound Basin, Washington State Department of Ecology, Public Review Draft, 1991.

Erosion and Sediment Control Manual, Oregon Department of Environmental Quality, February 2005.

EXHIBIT "C" (Stormwater Pollution Prevention Plan)



SECTION A-A



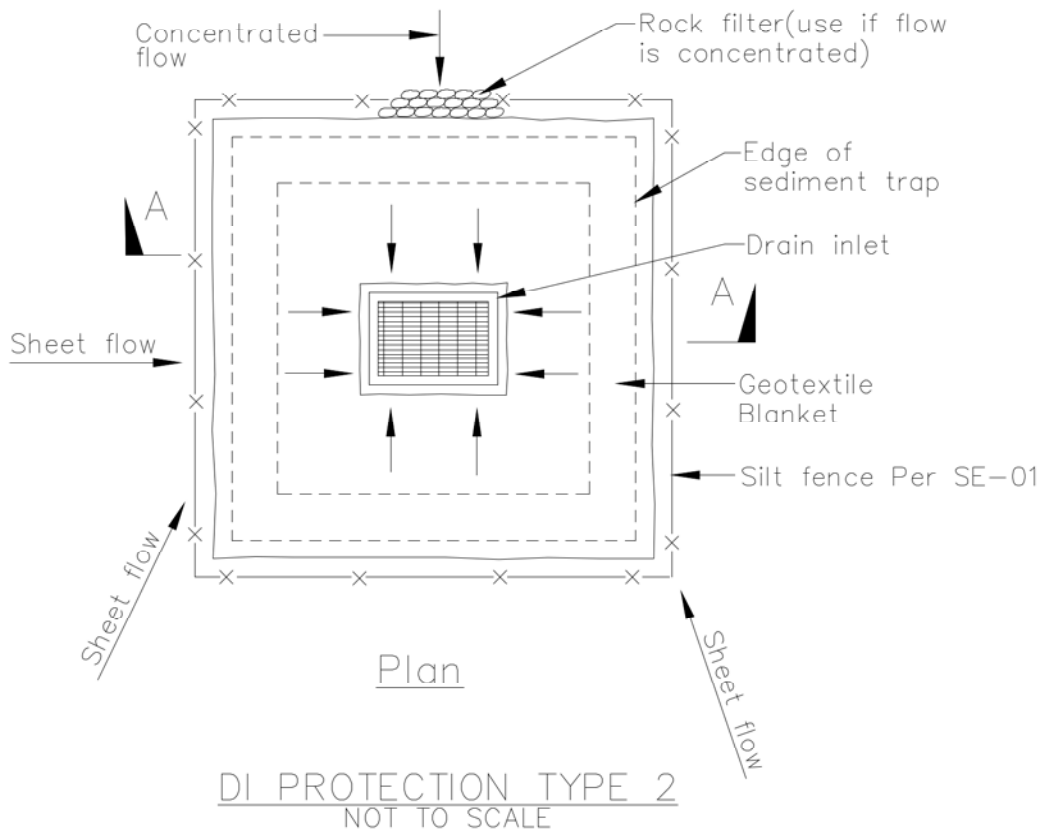
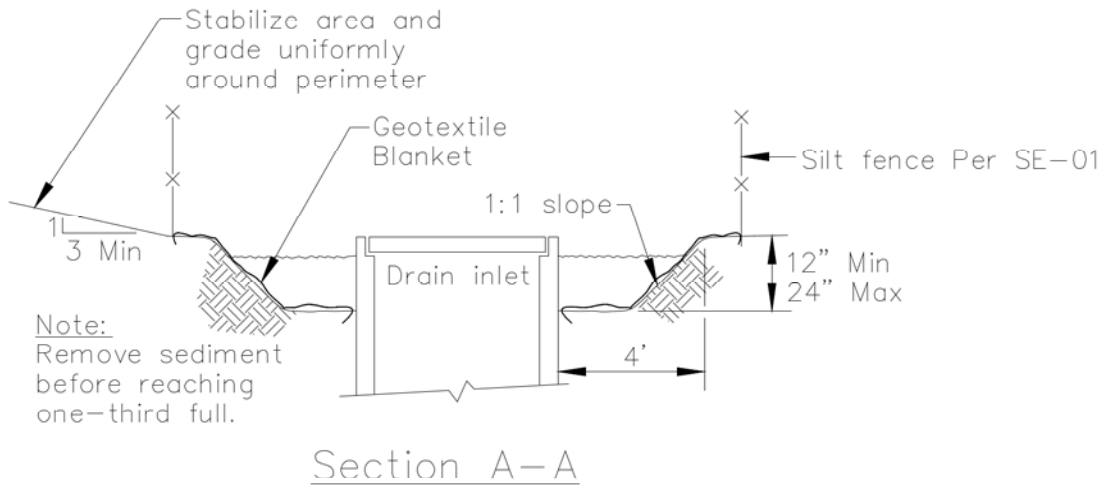
PLAN

DI PROTECTION TYPE 1
NOT TO SCALE

NOTES:

1. For use in areas where grading has been completed and final soil stabilization and seeding are pending.
2. Not applicable in paved areas.
3. Not applicable with concentrated flows.

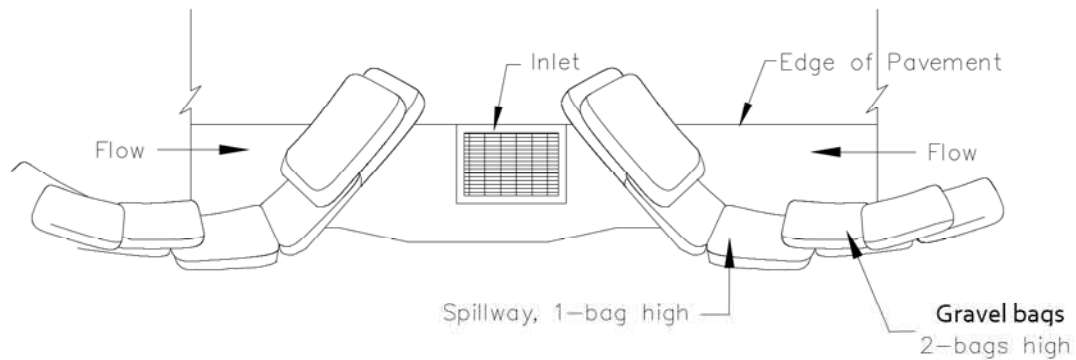
EXHIBIT "C" (Stormwater Pollution Prevention Plan)



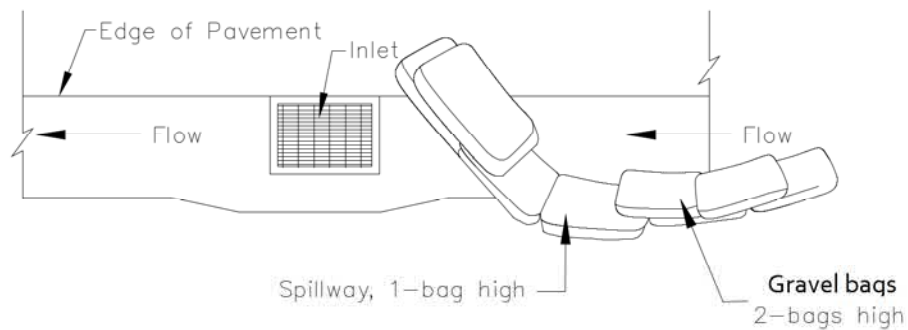
Notes

1. For use in cleared and grubbed and in graded areas.
2. Shape basin so that longest inflow area faces longest length of trap.
3. For concentrated flows, shape basin in 2:1 ratio with length oriented towards direction of flow.

EXHIBIT "C" (Stormwater Pollution Prevention Plan)



TYPICAL PROTECTION FOR INLET ON SUMP



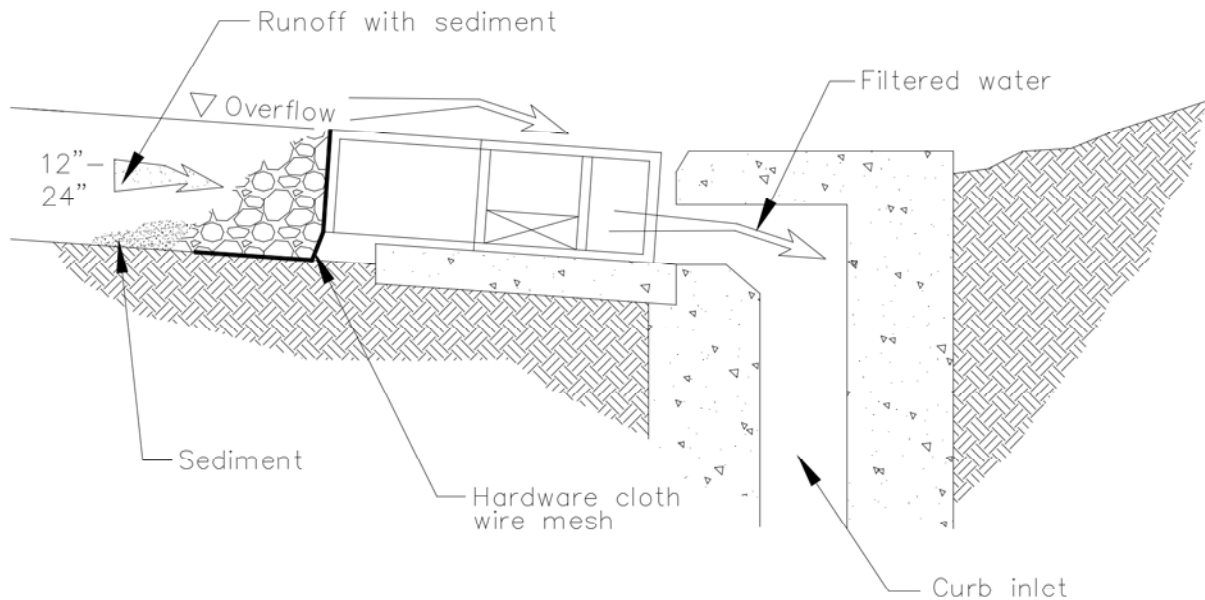
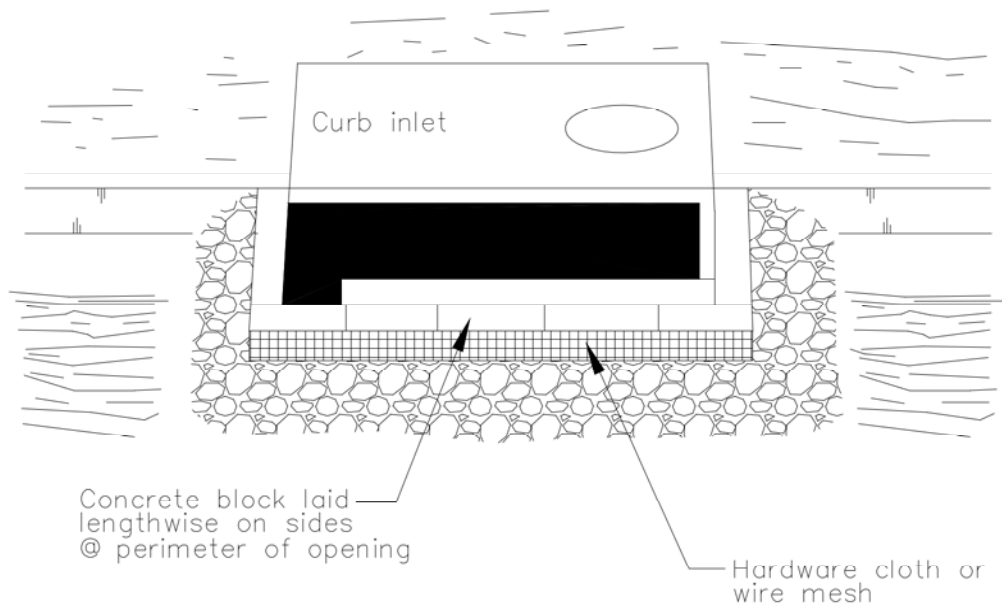
TYPICAL PROTECTION FOR INLET ON GRADE

NOTES:

1. Intended for short-term use.
2. Use to inhibit non-storm water flow.
3. Allow for proper maintenance and cleanup.
4. Bags must be removed after adjacent operation is completed
5. Not applicable in areas with high silts and clays without filter fabric.
6. Protection can be effective even if it is not immediately adjacent to the inlet provided that the inlet is protected from potential sources of pollution.

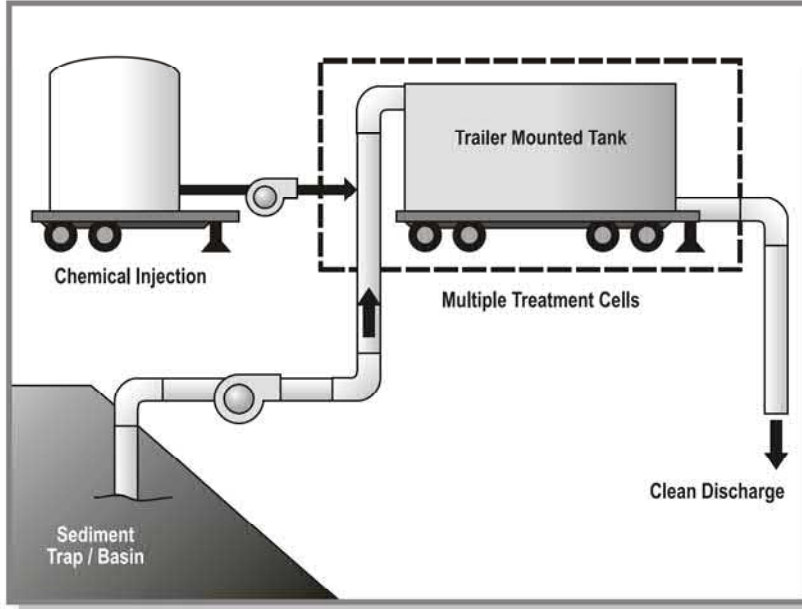
DI PROTECTION TYPE 3
NOT TO SCALE

EXHIBIT "C" (Stormwater Pollution Prevention Plan)



DI PROTECTION – TYPE 4
NOT TO SCALE

EXHIBIT "C" (Stormwater Pollution Prevention Plan)



Categories

EC	Erosion Control	<input checked="" type="checkbox"/>
SE	Sediment Control	<input type="checkbox"/>
TC	Tracking Control	<input type="checkbox"/>
WE	Wind Erosion Control	<input type="checkbox"/>
NS	Non-Stormwater Management Control	<input type="checkbox"/>
WM	Waste Management and Materials Pollution Control	<input type="checkbox"/>

Legend:

- Primary Category
- Secondary Category

Targeted Constituents

Sediment	<input checked="" type="checkbox"/>
Nutrients	<input type="checkbox"/>
Trash	<input type="checkbox"/>
Metals	<input type="checkbox"/>
Bacteria	<input type="checkbox"/>
Oil and Grease	<input type="checkbox"/>
Organics	<input type="checkbox"/>

Potential Alternatives

None

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Description and Purpose

Active Treatment Systems (ATS) reduce turbidity of construction site runoff by introducing chemicals to stormwater through direct dosing or an electrical current to enhance flocculation, coagulation, and settling of the suspended sediment. Coagulants and flocculants are used to enhance settling and removal of suspended sediments and generally include inorganic salts and polymers (USACE, 2001). The increased flocculation aids in sedimentation and ability to remove fine suspended sediments, thus reducing stormwater runoff turbidity and improving water quality.

Suitable Applications

ATS can reliably provide exceptional reductions of turbidity and associated pollutants and should be considered where turbid discharges to sediment and turbidity sensitive waters cannot be avoided using traditional BMPs. Additionally, it may be appropriate to use an ATS when site constraints inhibit the ability to construct a correctly sized sediment basin, when clay and/or highly erosive soils are present, or when the site has very steep or long slope lengths.

Limitations

Dischargers choosing to utilize chemical treatment in an ATS must follow all guidelines of the Construction General Permit Attachment F – Active Treatment System Requirements. General limitations are as follows:

- Numeric Effluent Limit (NEL) for all discharges (10 NTU daily flow-weighted average)
- Limited availability of chemical residual testing procedures that meet permit requirements for flow-through treatment
- Specific field and classroom ATS training required to operate equipment
- Batch treatment requires extensive toxicity testing of effluent
- Batch treatment requires large footprint to accommodate treatment cells
- Requires additional filtration to remove residual floc and treatment chemicals prior to discharge
- Petroleum based polymers should not be used
- Requires site-specific design and equipment
- Limited discharge rates depending on receiving water body
- Labor intensive operation and maintenance
- ATS costs are higher on a unit basis for smaller sites that would be expected to have a lower volume of treated runoff
- ATS costs are seasonably variable due to increases or decreases in rainfall volumes

Implementation

Turbidity is difficult to control once fine particles are suspended in stormwater runoff from a construction site. Sedimentation ponds are effective at removing larger particulate matter by gravity settling but are ineffective at removing smaller particulates such as clay and fine silt. Sediment ponds are typically designed to remove sediment no smaller than medium silt (0.02 mm). ATS may be used to reduce the turbidity of stormwater runoff. With an ATS, very high turbidities can be reduced to levels comparable to what is found in streams during dry weather.

Criteria for ATS Product Use

Chemically treated stormwater discharged from construction sites must be non-toxic to aquatic organisms. The following protocol should be used to evaluate chemicals proposed for stormwater treatment at construction sites. Authorization to use a chemical in the field based on this protocol does not relieve the applicant from responsibility for meeting all discharge and receiving water criteria applicable to a site.

- An ATS Plan, which includes an Operation and Maintenance component, a Monitoring, Sampling and Reporting component, a Health and Safety component, and a Spill Prevention component must be prepared and submitted to the Regional Water Quality Control Board (RWQCB).

EXHIBIT "C" (Stormwater Pollution Prevention Plan)

- Treatment chemicals should be approved by EPA for potable water use or otherwise be demonstrated to be protective of human health and the environment. Chemical residual or whole effluent toxicity testing is required.
- Prior to field use of chemical treatment, jar tests are to be conducted to demonstrate that turbidity reduction necessary to meet the NELs and receiving water criteria can be achieved. Test conditions, including but not limited to raw water quality and jar test procedures, should be indicative of field conditions. Although these small-scale tests cannot be expected to reproduce performance under field conditions, they are indicative of treatment capability. A minimum of six site-specific jar tests must be conducted per chemical.
- The proposed maximum dosage should be at least a factor of five lower than the no observed effects concentration (NOEC).
- Effluent discharge from an ATS to a receiving water is conditional upon the favorable results of full-scale whole effluent bioassay/toxicity testing for batch treatment systems and upon chemical residuals testing for flow-through systems.
- Contact the RWQCB for a list of treatment chemicals that may be pre-approved for use.

Active Treatment System Design Considerations

The design and operation of an ATS should take into consideration the factors that determine optimum, cost-effective performance. While site characteristics will influence system design, it is important to recognize the following overriding considerations:

- The right chemical must be used at the right dosage. A dosage that is either too low or too high will not produce the lowest turbidity. There is an optimum dosage rate. This is a situation where the adage “adding more is always better” is not the case.
- The coagulant must be mixed rapidly into the water to insure proper dispersion.
- The mixing system for batch treatment must be sized to provide adequate mixing for the design storage volume. Lack of adequate mixing during the flocculation phase results in flocs that are too small and/or insufficiently dense. Too much mixing can rapidly destroy floc as it is formed.
- Care must be taken in the design of the withdrawal system to minimize outflow velocities and to prevent floc discharge. The discharge should be directed through a filtration system such as sand, bag, or cartridge filter that would catch any unintended floc discharge.
- ATS is also regulated for pH of the discharge. A pH-adjusting chemical should be added into the treated water to control pH if the selected coagulant requires alteration of the pH of the discharge outside of the acceptable range.

Active Treatment System Design

ATS can be designed as batch treatment systems using either ponds or portable trailer-mounted tanks, or as flow-through systems using any number of proprietary designed systems.

EXHIBIT "C" (Stormwater Pollution Prevention Plan)

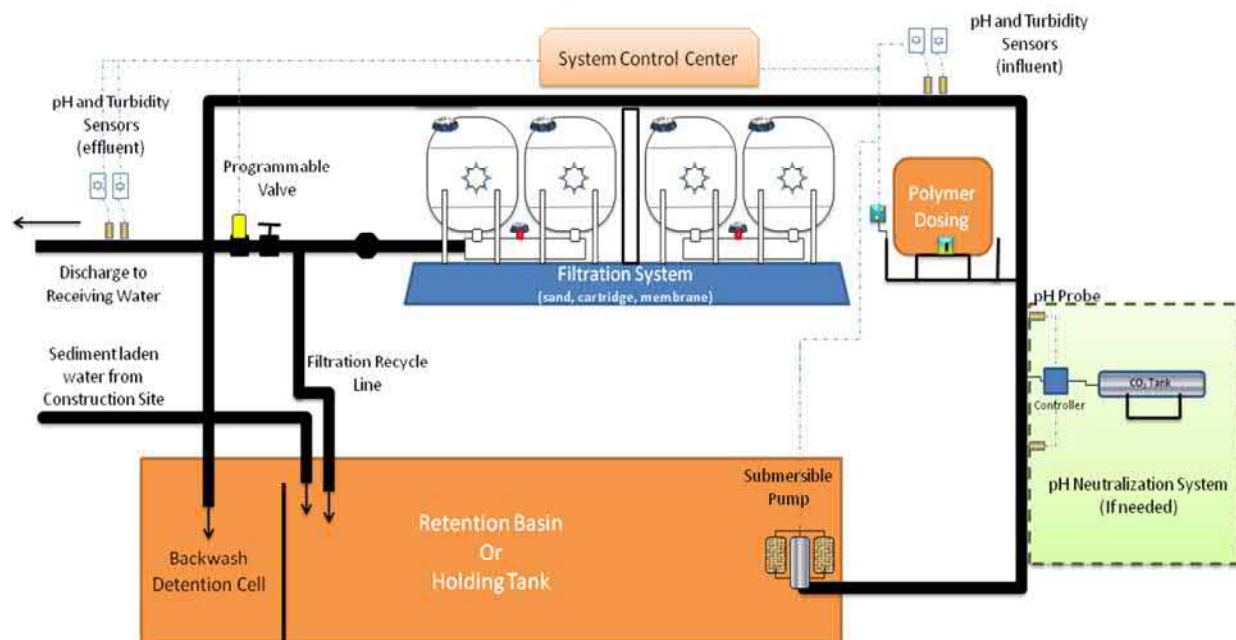


Figure has been adapted from Port of Seattle response to Washington Dept. of Ecology Action Order 2948

Batch Treatment

Batch Treatment systems consist of the stormwater collection system (either temporary diversion or the permanent site drainage system); a sediment basin, trap or holding tanks; pumps; a chemical feed system; treatment cells; and, interconnecting piping.

Batch treatment systems should use a minimum of two lined treatment cells. Multiple treatment cells allow for clarification of treated water while other cells are being filled or emptied. Treatment cells may be basins, traps, or tanks. Portable tanks may also be suitable for some sites.

The following equipment should be located in a secured, covered location:

- The chemical injector
- Secondary containment for acid, caustic, buffering compound, and treatment chemical
- Emergency shower and eyewash
- Monitoring equipment which consists of a pH meter and a turbidimeter (if not already within the instrumentation panel of the chemical injector)

Flow-through Treatment

At a minimum, a flow-through ATS system consists of the stormwater collection system (either temporary diversion or the permanent site drainage system), an untreated stormwater storage pond or holding tank, and a chemically enhanced filtration system.

Stormwater is collected at interception point(s) on the site and is diverted by gravity or by pumping to an untreated stormwater storage pond or other untreated stormwater holding area.

EXHIBIT C (Stormwater Pollution Prevention Plan)

The stormwater is stored until treatment occurs. It is important that the holding pond be large enough to provide adequate storage.

Stormwater is then pumped from the untreated stormwater storage pond to the chemically enhanced filtration system where polymer is added. Adjustments to pH may be necessary before chemical addition. The filtration system continually monitors the stormwater for turbidity and pH. If the discharge water is out of the acceptable turbidity or pH range, the water is recycled to the untreated stormwater pond (or holding tank) where it can be retreated. Flow through systems must ensure that:

- Cumulative flow volume shall be recorded daily. The data recording system shall have the capacity to record a minimum of seven days of continuous data.
- Instrumentation systems are interfaced with system control to provide auto shutoff or recirculation in the event that effluent measurements exceed turbidity or pH.
- Upon system upset, power failure, or other catastrophic event, the ATS will default to a recirculation mode or safe shut down.
- The instrumentation system provides a method for controlling coagulant dose, to prevent potential overdosing.

Sizing Criteria

An ATS shall be designed and approved by a Certified Professional in Erosion and Sediment Control (CPESC), a Certified Professional in Storm Water Quality (CPSWQ); a California registered civil engineer; or any other California registered engineer.

ATS must be designed to capture and treat (within 72 hours) runoff from the 10-year 24-hour storm event. The runoff volume of the watershed area to be treated from this size storm event is required to be calculated using the Rational Method with a runoff coefficient of 1.

If sediment basins are used to capture flow-through or batch treatment, see SE-2, Sediment Basin, for design criteria. Bypass should be provided around the ATS to accommodate extreme storm events. Primary settling should be encouraged in the sediment basin/storage pond. A forebay with access for maintenance may be beneficial.

The permissible discharge rate governed by potential downstream effect should be used to calculate the recommended size of the treatment cells. Local requirements related to Phase I or Phase II NPDES permit thresholds should be considered in developing maximum discharge rates the ATS Plan.

Costs

Costs for ATS may be significant due to equipment rental requirements and cost of chemicals. ATS cost is lower on a treated unit-basis for large construction sites with large volumes of runoff.

Inspection and Maintenance

ATS must be operated and maintained by individuals with experience in their use and trained in accordance with training requirements below. ATS should be monitored continuously while in

use. A designated responsible person shall be on site daily at all times during treatment operations. Daily on-site visual monitoring of the system for proper performance shall be conducted and recorded in the project data log. The name, phone number, and training documentation of the person responsible for system operation and monitoring shall be included in the project data log.

The following monitoring requirements and results should be recorded in the data log:

Operational and Compliance Monitoring

- Effluent flow rate and volume shall be continuously monitored and recorded at 15- minute or less intervals.
- Influent and effluent pH must be continuously monitored and recorded at 15-minute or less intervals.
- Influent and effluent turbidity (expressed in NTU) must be continuously monitored and recorded at 15-minute or less intervals.
- The type and amount of chemical used for pH adjustment, if any, shall be monitored and recorded.
- Dose rate of chemical used in the ATS system (expressed in mg/L) shall be monitored and reported 15-minutes after startup and every 8 hours of operation.
- Laboratory duplicates – monthly laboratory duplicates for residual coagulant analysis must be performed and records shall be maintained onsite.
- Effluent shall be monitored and recorded for residual chemical/additive levels.
- If a residual chemical/additive test does not exist and the ATS is operating in a batch treatment mode of operation refer to the toxicity monitoring requirements below.

Toxicity Monitoring

Batch Treatment

Toxicity testing for systems operated in batch treatment mode should be made in accordance with the following:

- Acute toxicity testing on effluent samples representing effluent from each batch prior to discharge shall be undertaken. All bioassays shall be sent to a laboratory certified by the Department of Health Services (DHS) Environmental Laboratory Accreditation Program (ELAP). The required field of testing number for Whole Effluent Toxicity (WET) testing is E113.
- Acute toxicity tests shall be conducted with the following species and protocols. The methods to be used in the acute toxicity testing shall be those outlined for a 96-hour acute test in “Methods for Measuring the Acute Toxicity of Effluents and Receiving Water to Freshwater and Marine Organisms, USEPA-841-R-02-012” for Fathead minnow, *Pimephales promelas*. Rainbow trout, *Oncorhynchus mykiss*, may be used as a substitute for fathead minnow.

All toxicity tests shall meet quality assurance criteria and test acceptability criteria in the most recent versions of the EPA test method for WET testing.

Flow-through Treatment

Toxicity testing for systems operated in flow-through treatment mode should be made in accordance with the following:

- A residual chemical test method shall be used that has a method detection limit (MDL) of 10% or less than the maximum allowable threshold concentration (MATC) for the specific coagulant in use and for the most sensitive species of the chemical used. The MATC is equal to the geometric mean of the No Observed Effect Concentration (NOEC) and Lowest Observed Effect Concentration (LOEC) Acute and Chronic toxicity results for most sensitive species determined for the specific coagulant.
- The residual chemical test method shall produce a result within one hour of sampling.
- A California State certified laboratory shall validate the selected residual chemical test. Specifically, the lab will review the test protocol, test parameters, and the detection limit of the coagulant. The discharger shall electronically submit this documentation as part of the ATS Plan.

Numeric Effluent Limit (NEL) Compliance:

All chemically treated stormwater must be sampled and tested for compliance with pH and turbidity limits. These limits have been established by the Construction General Permit. Sampling and testing for other pollutants may also be necessary at some sites. Turbidity limits have been set as 10 NTU as a daily flow-weighted average or 20 NTU from a single sample. pH must be within the range of 6.0 to 9.0 standard units. It is often possible to discharge treated stormwater that has a lower turbidity than the receiving water and that matches the pH.

Treated stormwater samples and measurements should be taken from the discharge pipe or another location representative of the nature of the treated stormwater discharge. Samples used for determining compliance with the water quality standards in the receiving water should not be taken from the treatment pond prior to decanting. Compliance with the water quality standards is determined in the receiving water.

Operator Training:

Operators shall have training specific to using an ATS and liquid coagulants for stormwater discharges in California. The training shall be in the form of a formal class with a certificate and requirements for testing and certificate renewal. Training shall include a minimum of eight hours classroom and 32 hours field training.

Standard BMPs:

Erosion and sediment control BMPs should be implemented throughout the site to prevent erosion and discharge of sediment to the ATS. Some types of chemical coagulation and flocculation are only achievable in water below a certain turbidity; therefore, minimizing the amount of sediment reaching the system will increase the likelihood of meeting effluent limits and will potentially lower costs of chemical dosing.

Sediment Removal and Disposal

- Sediment shall be removed from the storage or treatment cells as necessary to ensure that the cells maintain their required water storage (i.e., volume) capability.
- Handling and disposal of all solids generated during ATS operations shall be done in accordance with all local, state, and federal laws and regulations.
- If sediment is determined to be non-toxic, it may be incorporated into the site away from drainages.

References

Engineering and Design – Precipitation/Coagulation/Flocculation. United States Army Corps of Engineers, EM 1110-1-4012, 2001.

Evaluation of Active Treatment Systems (ATS) for Construction Site Runoff. California Building and Industry Association (prepared by Geosyntec Consultants), 2008.

Stormwater Management Manual for Western Washington, Volume II – Construction Stormwater Pollution Prevention, Washington State Department of Ecology, August 2001.

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.

EXHIBIT "C" (Stormwater Pollution Prevention Plan)

Manufactured Linear Sediment Controls (MLSC) SE-12



Description and Purpose

Manufactured linear sediment controls (MLSC) are pre-manufactured devices that are typically specified and installed for drainage and sediment control on the perimeter of disturbed sites or stockpiles and as check dams within channels. Typically, MLSCs can be reused.

This fact sheet is intended to provide guidance on BMP selection and implementation of proprietary or vendor-supplied products, for sediment control. Products should be evaluated for project-specific implementation and used if determined to be appropriate by the SWPPP Preparer.

Suitable Applications

MLSCs are generally used in areas as a substitute for fiber rolls and silt fences in sediment control applications to slow down runoff water, divert drainage or contain fines and sediment. MLSCs are a linear control and application suitability varies based on the specific product type. They may be suitable:

- On paved surfaces for perimeter protection.
- As check structures in channels.
- Along the perimeter of disturbed sites in lieu of silt fence.

Categories

EC	Erosion Control	<input checked="" type="checkbox"/>
SE	Sediment Control	<input checked="" type="checkbox"/>
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	<input checked="" type="checkbox"/>

Legend:

- Primary Category
- Secondary Category

Targeted Constituents

Sediment	<input checked="" type="checkbox"/>
Nutrients	
Trash	<input checked="" type="checkbox"/>
Metals	
Bacteria	
Oil and Grease	
Organics	

Potential Alternatives

- SE-1 Silt Fence
- SE-5 Fiber Roll
- SE-6 Gravel Bag Berm
- SE-8 Sandbag Barrier

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EXHIBIT "C" (Stormwater Pollution Prevention Plan)



Manufactured Linear Sediment Controls (MLSC)

SE-12

- At operational storm drains as a form of inlet protection.
- Around temporary stockpiles or material/equipment storage areas.
- At the interface between graveled driveways and pavement.
- Along the toe of exposed and erodible slopes.

Limitations

- Limitations vary by product. Product manufacturer's printed product use instructions should be reviewed by the SWPPP Preparer to determine the project-specific applicability of MLSCs.

Implementation

General

When appropriately placed, MLSCs intercept and slow sheet flow runoff, causing temporary ponding. The temporary ponding provides quiescent conditions allowing sediment to settle. The device is porous, which allows the ponded runoff to flow slowly through the device, releasing the runoff as sheet flows. Generally, MLSCs should be used in conjunction with temporary soil stabilization controls up-slope to provide an effective combination of erosion and sediment control.

Design and Layout

- MLSCs used on soil should be trenched or attached to the ground per manufacturer specifications in a manner that precludes runoff or ponded water from flowing around or under the device.
- MLSCs designed for use on asphalt or concrete may be attached using a variety of methods, including nailing the device to the pavement, or using a high strength adhesive.
- Follow manufacturer written specifications when installing MLSCs.
- Allow sufficient space up-slope from the silt dike to allow ponding, and to provide room for sediment storage.
- For installation near the toe of the slope, MLSCs should be set back 3 feet from the slope toe to facilitate cleaning. Where site conditions do not allow set back, the sediment control may be constructed on the toe of the slope. To prevent flows behind the barrier, sand or gravel bags can be placed perpendicular and between the sediment control and slope to serve as a barrier to parallel flow.
- Drainage area should not exceed 5 acres.

Materials

- Several manufactured products are available. The following search terms or combination of terms can be used with an internet search engine to find manufactured linear sediment controls:

EXHIBIT "C" (Stormwater Pollution Prevention Plan)

Manufactured Linear Sediment Controls (MLSC)

SE-12

- “silt barrier”
- “reusable silt fence”
- “silt fence alternative” or
- “perimeter sediment control”

Costs

Manufacturers should be contacted directly for current pricing.

Inspection and Maintenance

- BMPs must be inspected in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- Reshape or replace sections of damaged MLSCs as needed.
- Repair washouts or other damage as needed.
- Sediment that accumulates behind the BMP should be periodically removed in order to maintain BMP effectiveness. Sediment should be removed when the sediment accumulation reaches one-third of the barrier height.
- Remove MLSCs when no longer needed. Remove sediment accumulation and clean, re-grade, and stabilize the area. Removed sediment should be incorporated in the project or disposed of properly.

References

City of Elko Construction Site Best Management Practices Handbook, December 2005.

Construction Site Best Management Practices Handbook, June 2008 Update, Truckee Meadows Regional Stormwater Quality Management Program, June 2008.

Complying with the Edwards Aquifer Rules Technical Guidance on Best Management Practices, Texas Commission on Environmental Quality, Revised July 2005, Addendum Sheet, January 26, 2011.

Stormwater Management Manual for Western Washington Volume II, Construction Stormwater Pollution Prevention, Washington State Department of Ecology, February 2005.

EXHIBIT "C" (Stormwater Pollution Prevention Plan)



Description and Purpose

Compost socks and berms act as three-dimensional biodegradable filtering structures to intercept runoff where sheet flow occurs and are generally placed at the site perimeter or at intervals on sloped areas. Compost socks are generally a mesh sock containing compost and a compost berm is a dike of compost, trapezoidal in cross section. When employed to intercept sheet flow, both BMPs are placed perpendicular to the flow of runoff, allowing filtered runoff to pass through the compost and retaining sediment (and potentially other pollutants). A compost sock can be assembled on site by filling a mesh sock (e.g. with a pneumatic blower). The compost berm should be constructed using a backhoe or equivalent and/or a pneumatic delivery (blower) system and should be properly compacted. Compost socks and berms act as filters, reduce runoff velocities, and in some cases, aid in establishing vegetation.

Compost is organic, biodegradable, and renewable. Compost provides soil structure that allows water to infiltrate the compost medium which helps prevent rill erosion and the retained moisture promotes seed germination and vegetation growth, in addition to providing organic matter and nutrients important for fostering vegetation. Compost improves soil quality and productivity, as well as erosion and sediment control.

Categories

EC	Erosion Control	<input checked="" type="checkbox"/>
SE	Sediment Control	<input checked="" type="checkbox"/>
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	

Legend:

- Primary Category
- Secondary Category

Targeted Constituents

Sediment	<input checked="" type="checkbox"/>
Nutrients	
Trash	
Metals	<input checked="" type="checkbox"/>
Bacteria	<input checked="" type="checkbox"/>
Oil and Grease	<input checked="" type="checkbox"/>
Organics	

Potential Alternatives

- SE-1 Silt Fence
- SE-5 Fiber Roll
- SE-6 Gravel Bag Berm
- SE-8 Sandbag Barrier
- SE-14 Biofilter Bags

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The compost of the compost sock or berm can be selected that targets site specific objectives in capturing sediment and other pollutants, supporting vegetation, or additional erosion control.

Compost is typically derived from combinations of feedstocks, biosolids, leaf and yard trimmings, manure, wood, or mixed solid waste. Many types of compost are products of municipal recycle or "Green waste" programs. Compost is organic and biodegradable and can be left onsite. There are many types of compost with a variety of properties with specific functions, and accordingly compost selection is an important design consideration in the application of this type of erosion and sediment control.

Suitable Applications

- Along the toe, top, face, and at grade breaks of exposed and erodible slopes to shorten slope length and spread runoff as sheet flow (compost berms should only be used at the top of slopes or on slopes 4:1 (H:V) or flatter, all other slope applications should use compost socks)
- Along the perimeter of a project
- As check dams in unlined ditches (compost socks only)
- Down-slope of exposed soil areas
- At operational storm drains as a form of inlet protection (compost socks only)
- Around temporary stockpiles

Compost socks and berms do not require special trenching or BMP removal compared to other sediment control methods (e.g. silt fence or fiber rolls). Compost socks and berms can remain in place after earth disturbing activities are completed or the compost components can be spread over the site providing nutrients for plant growth and augmenting soil structure. BMPs that remain in place are particularly advantageous below embankments, especially adjacent streams, by limiting re-entry and the disturbance to sensitive areas.

Compost can be pre-seeded prior to application (recommended by the EPA for construction site stormwater runoff control and required for compost socks) or seeded after installation (for compost berms only). The compost medium can also remove pollutants in stormwater including heavy metals; oil and grease; and hydrocarbons.

Limitations

- Compost can potentially leach nutrients (dissolved phosphorus and nitrogen) into runoff and potentially impact water quality. Compost should not be used directly upstream from nutrient impaired waterbodies (Adams et. al, 2008).
- Compost may also contain other undesirable constituents that are detrimental to water quality. Compost should be obtained from a supplier certified by the California Integrated Waste Management Board or compost should otherwise meet the environmental health standards of Title 14, California Code of Regulations, Division 7, Chapter 3.1, Article 7. Carefully consider the qualifications and experience of any compost producer/supplier.

EXHIBIT "C" (Stormwater Pollution Prevention Plan)

- Application by hand is more time intensive and potentially costly. Using a pneumatic blower truck is the recommended cost-effective method of assembly.
- Compost socks and berms should not be employed at the base of slopes greater than 2:1 (H:V). They can be employed with other erosion control methods for steeper slopes.
- Difficult to move once saturated.
- Compost berms should not be applied in areas of concentrated flows.
- Compost socks and berms are easy to fix; however, they are susceptible to damage by frequent traffic. Compost socks can be used around heavy machinery, but regular disturbance decreases sock performance.

Implementation

Compost Materials

- California Compost Regulations (Title 14, California Code of Regulations, Division 7, Chapter 3.1, Article 7, Section 17868.3) define and require a quality of compost for application. Compost should comply with all physical and chemical requirements. Specific requirements are provided in **Table 1**, taken from Caltrans *Standard Specifications* (2015).
- The Caltrans SSP, Section 21-2.02Q, *Compost Socks*, states that the sock used to retain the compost must be composed of natural, biodegradable products, such as cotton, jute, sisal, burlap or coir.
- The compost producer should be fully permitted as specified under the California Integrated Waste Management Board, Local Enforcement Agencies and any other State and Local Agencies that regulate Solid Waste Facilities. If exempt from State permitting requirements, the composting facility should certify that it follows guidelines and procedures for production of compost meeting the environmental health standards of Title 14, California Code of Regulations, Division 7, Chapter 3.1, Article 7.
- The compost producer should be a participant in United States Composting Council's Seal of Testing Assurance program.
- Compost medium parameter specifications for compost socks and berms have been developed to assist in compost selection, such as those provided by the American Association of State Highway Transportation Officials (AASHTO).
- Particle size is important parameter for selecting compost. Well consolidated, coarser grades of compost (e.g., small and large pieces) perform better for filtration objectives, while finer grades better support vegetation. Particle size of the compost should be selected based on site conditions, such as expected precipitation, and filtration goals and / or long-term plant nutrients.
- Compost moisture should be considered for composition quality and application purposes. A range of 30-50% is typical. Compost that is too dry is hard to apply and compost that is too wet is more difficult (and more expensive) to transport. For arid or semi-arid areas, or for application during the dry season, use compost with greater moisture content than areas with wetter climates. For wetter or more humid climates or for application during the wet

season, drier composts can be used as the compost will absorb moisture from the ambient air.

- If vegetation establishment is a desired function of the compost, a compost sample should be inspected by a qualified individual. Vegetation has different nutrient and moisture needs.
- Organic content of the compost is also important and should range from 30 to 65% depending on site conditions.
- Compost should not be derived from mixed municipal solid waste and should be reasonably free of visible contaminants.
- Compost should not contain paint, petroleum products, pesticides or any other chemical residues harmful to animal life or plant growth. Metal concentrations in compost should not exceed the maximum metal concentrations listed under Title 14, California Code of Regulations, Division 7, Chapter 3.1, Section 17868.2.
- Compost should not possess objectionable odors.
- Compost should be weed free.

EXHIBIT "C" (Stormwater Pollution Prevention Plan)

Table 1. Physical/Chemical Requirements of Compost
Reference - Caltrans SSP-10 Erosion Control Blanket (Compost)

Property	Test Method	Requirement
pH	TMECC 04.11-A	6.0–8.5
Soluble Salts	TMECC 04.10-A	0–10.0
Moisture Content	TMECC 03.09-A	30–60
Organic Matter Content	TMECC 05.07-A	30–100
Maturity	TMECC 05.05-A	80 or Above 80 or Above
Stability	TMECC 05.08-B	8 or below
Particle size for fine compost: dry weight Pass 5/8-inch sieve (min, %) Pass 3/8-inch sieve (min, %)	TMECC 02.02-B	95 70
Particle size for medium compost: dry weight Pass 2-inch sieve (min, %) Pass 1-inch sieve (max, %)	TMECC 02.02-B	95 30
Particle size for coarse compost: dry weight Pass 2-1/2-inch sieve (min, %) Pass 3/8-inch sieve (max, %)	TMECC 02.02-B	99 40
Pathogen Fecal Coliform Bacteria MPN/1-gram dry wt.	TMECC 07.01-B	< 1,000
Pathogen Salmonella MPN/4 grams dry wt.	TMECC 07.01-B	< 3
Physical Contaminants (% dry weight) Plastics, glass, and metal	TMECC 02.02-C	Combined Total: < 1.0
Physical Contaminants (% dry weight) Sharps	TMECC 02.02-C	None Detected

*TMECC refers to "Test Methods for the Examination of Composting and Compost," published by the United States Department of Agriculture and the United States Compost Council (USCC).

Installation

- Prior to application, prepare locations for socks and berms by removing brush and thick vegetation. The compost of the sock and/or berm should be allowed to come in full contact with the ground surface.
- Select method to apply the compost sock or berm. A pneumatic blower is most cost effective and most adaptive in applying compost to steep, rough terrain, and hard to reach locations.
- The compost of the berm should be distributed evenly to the surface, compacted, and shaped trapezoidal in cross section. Berm design is generally consisting of a base two times the height. AASHTO specification MP 9-03 provides compost berm dimensions based on anticipated site precipitation (AASHTO, 2003 and USEPA, 2009). State agencies, such as Oregon Department of Environmental Quality (ODEQ) have developed berm dimension based on slope steepness and length (ODEQ, 2004).

EXHIBIT "C" (Stormwater Pollution Prevention Plan)

- Compost socks can be assembled on site by filling mesh socks with the selected compost. Mesh socks can be tied at one end, filled, and then tied at the other end. The ends of socks can be interlocked until the desired length is achieved. The sock diameter is a function of slope steepness and length. Again, ASSHTO provides specifications for various parameters. Compost socks range from 8" to 18" but are typically 12" to 18" in diameter.
- Compost socks are typically placed in contours perpendicular to sheet flow. They can also be placed in V formation on a slope. Compost socks need to be anchored, typically stakes, through the center of the sock. To prevent water flowing around them, the ends of compost socks should be placed upslope.
- Locate compost socks and berms on level contours spaced as follows:
 - Slope inclination of 4:1 (H:V) or flatter: Socks and/or berms should be placed at a maximum interval of 20 ft.
 - Slope inclination between 4:1 and 2:1 (H:V): Socks should be placed at a maximum interval of 15 ft. (a closer spacing is more effective).
 - Slope inclination 2:1 (H:V) or greater: Socks should be placed at a maximum interval of 10 ft. (a closer spacing is more effective).
- Place perimeter socks and berms using a j-hook installation. Use of vegetation will also provide additional anchoring.
- Compost socks and berms can be placed around the perimeter of an affected area, like a silt fence, if the area is flat or on a contour. Do not place these socks and berms where ponded water could become an issue.
- If used at the toe of slopes, the compost sock or berm should be at a minimum of 5 to 10 feet away.
- Use additional anchoring and erosion control BMPs in conjunction of the compost socks and berms as needed.
- Consider using compost berms or socks as necessary at the top and/or bottom of the slope for additional erosion control performance.
- Compost socks and berms can also be effective over rocky and frozen ground if installed properly.
- It is recommended that the drainage areas of these compost BMPs do not exceed 0.25 acre per 100 feet placement interval and runoff does not exceed 1 cubic foot per second.

EXHIBIT "C" (Stormwater Pollution Prevention Plan)

Costs

Recently obtained vendor costs indicated \$4.50 per linear foot for compost berm application and \$2.50 per linear foot for 8" socks and \$3.20 per linear foot for 12" socks (Adjusted for inflation, 2016 dollars, by Tetra Tech, Inc.). Costs do not include final compost sock or berm functions at the end of construction activities, including spreading or removal, if required. ODEQ estimates that compost berms cost 30 percent less than silt fences to install.

Inspection and Maintenance

- BMPs must be inspected in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- Once damage is identified, mend or reapply the sock or berm as needed. Washed out areas should be replaced. If the sock or berm height is breached during a storm, an additional sock can be stacked to increase the sock height and similarly the berm dimensions can be increased, as applicable. An additional sock or berm may be installed upslope, as needed. It may be necessary to apply an additional type of stormwater BMP, such as a compost blanket.
- Sediment contained by the sock or berm should be removed prior reaching 1/3 of the exposed height of the BMP. The sediment can be stabilized with the compost sock or berm with vegetation at the end of construction activities.
- Care should be exercised to minimize the damage to protected areas while making repairs, as any area damaged will require reapplication of BMPs.
- Limit traffic to minimize damage to BMPs or impede vegetation establishment.

References

An analysis of Composting as an Environmental Remediation Technology, U.S. Environmental Protection Agency (USEPA), Solid Waste and Emergency Response (5305W), EPA530-R-8-008, 1998.

Characteristics of Compost: Moisture Holding and Water Quality Improvement, Center for Research in Water Resources, Kirchoff, C., Malina, J., and Barrett, M., 2003.

Compost Utilization for Erosion Control, The University of Georgia College of Agricultural and Environmental Sciences, pubs.caes.uga.edu/caespubs/pubcd/B1200.htm, Faucette, B. and Risse, M., 2001.

Erosion and Sediment Control Manual, Oregon Department of Environmental Quality, February 2005.

Standard Specifications, State of California, California State Transportation Agency, Department of Transportation (Caltrans), 2015. Available online at: http://www.dot.ca.gov/hq/esc/oe/construction_contract_standards/std_specs/2015_StdSpecs/2015_StdSpecs.pdf.

EXHIBIT "C" (Stormwater Pollution Prevention Plan)

Evaluation of Environmental Benefits and Impacts of Compost and Industry Standard Erosion and Sediment Controls Measures Used in Construction Activities, Dissertation, Institute of Ecology, University of Georgia, Faucette, B., 2004.

National Pollutant Discharge Elimination System (NPDES), Compost Blankets, U.S. Environmental Protection Agency (USEPA).

http://cfpub.epa.gov/npdes/stormwater/menuofbmps/index.cfm?action=factsheet_results&view=specific&bmp=118, 2009.

Standard Specifications for Transportation Materials and Methods of Sampling and Testing, Designation MP-9, Compost for Erosion/Sediment Control (Filter Berms), Provisional, American Association of State Highway Transportation Officials (AASHTO), 2003.

Stormwater Best Management Practices (BMPs) Field Trials of Erosion Control Compost in Reclamation of Rock Quarry Operations, Nonpoint Source Protection Program CWA §319(h), Texas Commission on Environmental Quality, Adams, T., McFarland, A., Hauck, L., Barrett, M., and Eck, B., 2008.

EXHIBIT "C" (Stormwater Pollution Prevention Plan)



Description and Purpose

Biofilter bags, or bio-bags, are a multi-purpose sediment control BMP consisting of a plastic mesh bag filled with 100% recycled wood product waste. Biofilter bags come in a variety of sizes (30" x 18" and 30" x 9" being common) and generally have between 1-2 cubic yards of recycled wood waste (or wood chips). Biofilter bags work by detaining flow and allowing a slow rate of discharge through the wood media. This action removes suspended sediment through gravity settling of the detained water and filtration within the bag.

Suitable Applications

Biofilter bags are a short-term BMP that can be rapidly deployed, maintained, and replaced. Biofilter bags can be an effective short-term solution to place in developed rills to prevent further erosion until permanent measures can be established. Suitable short-term applications include:

- As a linear sediment control measure:
 - Below the toe of slopes and erodible slopes
 - Below other small cleared areas
 - Along the perimeter of a site (with low-expected flow)
 - Down slope of exposed soil areas
 - Around temporary stockpiles and spoil areas

Parallel to a roadway to keep sediment off paved areas

Categories

EC	Erosion Control	
SE	Sediment Control	<input checked="" type="checkbox"/>
TR	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	

Legend:

- Primary Category
- Secondary Category

Targeted Constituents

Sediment	<input checked="" type="checkbox"/>
Nutrients	
Trash	
Metals	
Bacteria	
Oil and Grease	
Organics	

Potential Alternatives

- SE-1 Silt Fence
- SE-4 Check Dams
- SE-5 Fiber Roll
- SE-6 Gravel Bag Berm
- SE-8 Sandbag Barrier
- SE-10 Storm Drain Inlet Protection

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- Along streams and channels
- As linear erosion control measure:
 - Along the face and at grade breaks of exposed and erodible slopes to shorten slope length and spread runoff as sheet flow
 - At the top of slopes to divert runoff away from disturbed slopes
 - As check dams across mildly sloped construction roads
- Inlet Protection (See SE-10)
- Supplement to silt fences or other sediment control devices

Limitations

- Short life-span (maximum usefulness of 2-3 months and should be replaced more frequently if needed); regular maintenance and replacement required to ensure effectiveness. Bags will rapidly fill with sediment and reduce permeability.
- Easily damaged by construction vehicles.
- If not properly staked, will fail on slope applications.
- If improperly installed can allow undercutting or side-cutting flow.
- Not effective where water velocities or volumes are high.
- Potentially buoyant and easily displaced if not properly installed.

Implementation

General

Biofilter bags are a relatively low cost temporary BMP that are easily deployed and have a simple installation that can be performed by hand. Without proper installation, however, biofilter bags can fail due to their light weight, potential displacement, and multiple joint locations. One of the benefits of utilizing biofilter bags is that the media (wood-product) can be recycled or used onsite when no longer needed (where acceptable).

Design and Layout – Linear control

- Locate biofilter bags on level contours.
 - Slopes between 20:1 and 4:1 (H:V): Biofilter bags should be placed at a maximum interval of 20 ft, with the first row near the slope toe.
 - Slopes between 4:1 and 2:1 (H:V): Biofilter bags should be placed at a maximum interval of 15 ft, with the first row near the slope toe.
 - Slopes 2:1 (H:V) or steeper: Biofilter bags should be placed at a maximum interval of 10 ft, with the first row placed the slope toe.

- Turn the ends of the biofilter bag barriers up slope to prevent runoff from going around the berm.
- Allow sufficient space up slope from the biofilter bag berm to allow ponding, and to provide room for sediment storage.
- Stake biofilter bags into a 1 to 2 in. deep trench with a width equal to the bag.
 - Drive one stake at each end of the bag.
 - Use wood stakes with a nominal classification of 0.75 by 0.75 in. and minimum length of 24 in.
- Biofilter bags should be overlapped (6 in.), not abutted.

Costs

Pre-filled biofilter bags cost approximately \$3.20-\$4.50 per bag, dependent upon size (Adjusted for inflation, 2016 dollars, by Tetra Tech, Inc.).

Inspection and Maintenance

- BMPs must be inspected in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- Biofilter bags exposed to sunlight will need to be replaced every two to three months due to degrading of the bags.
- Reshape or replace biofilter bags as needed.
- Repair washouts or other damage as needed.
- Sediment that is retained by the BMP should be periodically removed in order to maintain BMP effectiveness. Sediment should be removed when the sediment accumulation reaches one-third of the barrier height.
- Remove biofilter bag berms when no longer needed. Remove sediment accumulation and clean, re-grade, and stabilize the area. Biofilter media may be used on-site, if allowed.

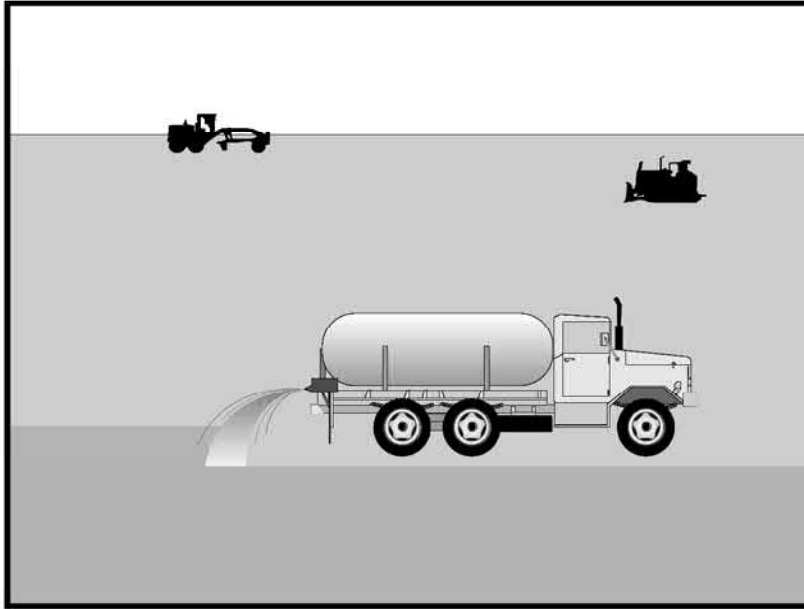
References

Catalog of Stormwater Best Management Practices for Idaho Cities and Counties. Volume 2, Section 7, BMP 34 – Biofilter Bags, Idaho Department of Environmental Quality, 2005.

Erosion and Sediment Control Manual, Oregon Department of Environmental Quality, February 2005.

Stormwater Quality Handbooks Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), March 2003.

EXHIBIT "C" (Stormwater Pollution Prevention Plan)



Description and Purpose

Wind erosion or dust control consists of applying water or other chemical dust suppressants as necessary to prevent or alleviate dust nuisance generated by construction activities. Covering small stockpiles or areas is an alternative to applying water or other dust palliatives.

California's Mediterranean climate, with a short "wet" season and a typically long, hot "dry" season, allows the soils to thoroughly dry out. During the dry season, construction activities are at their peak, and disturbed and exposed areas are increasingly subject to wind erosion, sediment tracking, and dust generated by construction equipment. Site conditions and climate can make dust control more of an erosion problem than water-based erosion. Additionally, many local agencies, including Air Quality Management Districts, require dust control and/or dust control permits in order to comply with local nuisance laws, opacity laws (visibility impairment) and the requirements of the Clean Air Act. Wind erosion control is required to be implemented at all construction sites greater than 1 acre by the General Permit.

Suitable Applications

Most BMPs that provide protection against water-based erosion will also protect against wind-based erosion and dust control requirements required by other agencies will generally meet wind erosion control requirements for water quality protection. Wind erosion control BMPs are suitable during the following construction activities:

Categories

EC	Erosion Control	
SE	Sediment Control	<input checked="" type="checkbox"/>
TC	Tracking Control	
WE	Wind Erosion Control	<input checked="" type="checkbox"/>
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	

Legend:

- Primary Category
- Secondary Category

Targeted Constituents

Sediment	<input checked="" type="checkbox"/>
Nutrients	
Trash	
Metals	
Bacteria	
Oil and Grease	
Organics	

Potential Alternatives

EC-5 Soil Binders

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- Construction vehicle traffic on unpaved roads
- Drilling and blasting activities
- Soils and debris storage piles
- Batch drop from front-end loaders
- Areas with unstabilized soil
- Final grading/site stabilization

Limitations

- Watering prevents dust only for a short period (generally less than a few hours) and should be applied daily (or more often) to be effective.
- Over watering may cause erosion and track-out.
- Oil or oil-treated subgrade should not be used for dust control because the oil may migrate into drainageways and/or seep into the soil.
- Chemical dust suppression agents may have potential environmental impacts. Selected chemical dust control agents should be environmentally benign.
- Effectiveness of controls depends on soil, temperature, humidity, wind velocity and traffic.
- Chemical dust suppression agents should not be used within 100 feet of wetlands or water bodies.
- Chemically treated subgrades may make the soil water repellent, interfering with long-term infiltration and the vegetation/re-vegetation of the site. Some chemical dust suppressants may be subject to freezing and may contain solvents and should be handled properly.
- In compacted areas, watering and other liquid dust control measures may wash sediment or other constituents into the drainage system.
- If the soil surface has minimal natural moisture, the affected area may need to be pre-wetted so that chemical dust control agents can uniformly penetrate the soil surface.

Implementation

Dust Control Practices

Dust control BMPs generally stabilize exposed surfaces and minimize activities that suspend or track dust particles. The following table presents dust control practices that can be applied to varying site conditions that could potentially cause dust. For heavily traveled and disturbed areas, wet suppression (watering), chemical dust suppression, gravel asphalt surfacing, temporary gravel construction entrances, equipment wash-out areas, and haul truck covers can be employed as dust control applications. Permanent or temporary vegetation and mulching can be employed for areas of occasional or no construction traffic. Preventive measures include minimizing surface areas to be disturbed, limiting onsite vehicle traffic to 15 mph or less, and controlling the number and activity of vehicles on a site at any given time.

Chemical dust suppressants include: mulch and fiber based dust palliatives (e.g. paper mulch with gypsum binder), salts and brines (e.g. calcium chloride, magnesium chloride), non-petroleum based organics (e.g. vegetable oil, lignosulfonate), petroleum based organics (e.g. asphalt emulsion, dust oils, petroleum resins), synthetic polymers (e.g. polyvinyl acetate, vinyl, acrylic), clay additives (e.g. bentonite, montmorillonite) and electrochemical products (e.g. enzymes, ionic products).

Site Condition	Dust Control Practices							
	Permanent Vegetation	Mulching	Wet Suppression (Watering)	Chemical Dust Suppression	Gravel or Asphalt	Temporary Gravel Construction Entrances/Equipment Wash Down	Synthetic Covers	Minimize Extent of Disturbed Area
Disturbed Areas not Subject to Traffic	X	X	X	X	X			X
Disturbed Areas Subject to Traffic			X	X	X	X		X
Material Stockpiles		X	X	X			X	X
Demolition			X			X	X	
Clearing/Excavation			X	X				X
Truck Traffic on Unpaved Roads			X	X	X	X	X	
Tracking					X	X		

Additional preventive measures include:

- Schedule construction activities to minimize exposed area (see EC-1, Scheduling).
- Quickly treat exposed soils using water, mulching, chemical dust suppressants, or stone/gravel layering.
- Identify and stabilize key access points prior to commencement of construction.
- Minimize the impact of dust by anticipating the direction of prevailing winds.
- Restrict construction traffic to stabilized roadways within the project site, as practicable.
- Water should be applied by means of pressure-type distributors or pipelines equipped with a spray system or hoses and nozzles that will ensure even distribution.
- All distribution equipment should be equipped with a positive means of shutoff.
- Unless water is applied by means of pipelines, at least one mobile unit should be available at all times to apply water or dust palliative to the project.
- If reclaimed waste water is used, the sources and discharge must meet California Department of Health Services water reclamation criteria and the Regional Water Quality

Control Board (RWQCB) requirements. Non-potable water should not be conveyed in tanks or drain pipes that will be used to convey potable water and there should be no connection between potable and non-potable supplies. Non-potable tanks, pipes, and other conveyances should be marked, "NON-POTABLE WATER - DO NOT DRINK."

- Pave or chemically stabilize access points where unpaved traffic surfaces adjoin paved roads.
- Provide covers for haul trucks transporting materials that contribute to dust.
- Provide for rapid clean up of sediments deposited on paved roads. Furnish stabilized construction road entrances and wheel wash areas.
- Stabilize inactive areas of construction sites using temporary vegetation or chemical stabilization methods.

For chemical stabilization, there are many products available for chemically stabilizing gravel roadways and stockpiles. If chemical stabilization is used, the chemicals should not create any adverse effects on stormwater, plant life, or groundwater and should meet all applicable regulatory requirements.

Costs

Installation costs for water and chemical dust suppression vary based on the method used and the length of effectiveness. Annual costs may be high since some of these measures are effective for only a few hours to a few days.

Inspection and Maintenance

- Inspect and verify that activity-based BMPs are in place prior to the commencement of associated activities.
- BMPs must be inspected in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- Check areas protected to ensure coverage.
- Most water-based dust control measures require frequent application, often daily or even multiple times per day. Obtain vendor or independent information on longevity of chemical dust suppressants.

References

Best Management Practices and Erosion Control Manual for Construction Sites, Flood Control District of Maricopa County, Arizona, September 1992.

California Air Pollution Control Laws, California Air Resources Board, updated annually.

Construction Manual, Chapter 4, Section 10, "Dust Control"; Section 17, "Watering"; and Section 18, "Dust Palliative", California Department of Transportation (Caltrans), July 2001.

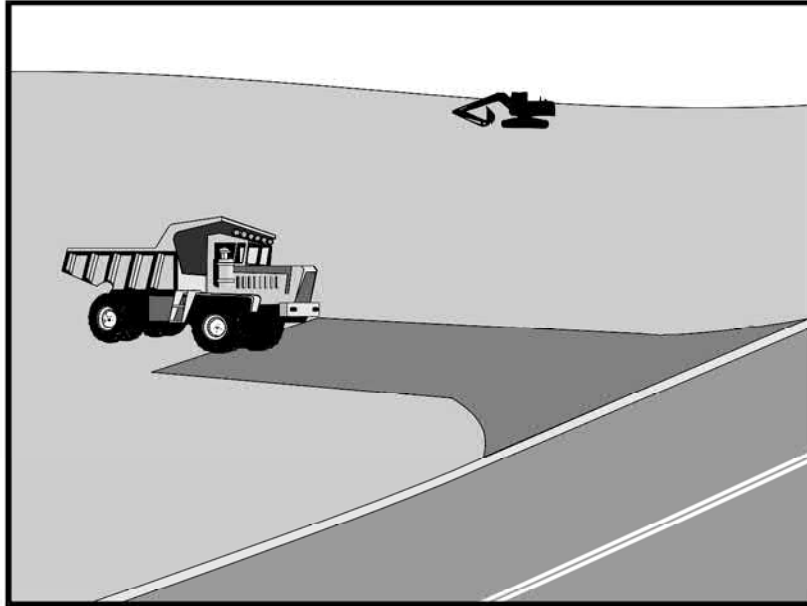
EXHIBIT "C" (Stormwater Pollution Prevention Plan)

Prospects for Attaining the State Ambient Air Quality Standards for Suspended Particulate Matter (PM₁₀), Visibility Reducing Particles, Sulfates, Lead, and Hydrogen Sulfide, California Air Resources Board, April 1991.

Stormwater Quality Handbooks Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), March 2003.

EXHIBIT "C" (Stormwater Pollution Prevention Plan)

Stabilized Construction Entrance/Exit TC-1



Description and Purpose

A stabilized construction access is defined by a point of entrance/exit to a construction site that is stabilized to reduce the tracking of mud and dirt onto public roads by construction vehicles.

Suitable Applications

Use at construction sites:

- Where dirt or mud can be tracked onto public roads.
- Adjacent to water bodies.
- Where poor soils are encountered.
- Where dust is a problem during dry weather conditions.

Limitations

- Entrances and exits require periodic top dressing with additional stones.
- This BMP should be used in conjunction with street sweeping on adjacent public right of way.
- Entrances and exits should be constructed on level ground only.
- Stabilized construction entrances are rather expensive to construct and when a wash rack is included, a sediment trap of some kind must also be provided to collect wash water runoff.

Categories

EC	Erosion Control	<input checked="" type="checkbox"/>
SE	Sediment Control	<input checked="" type="checkbox"/>
TC	Tracking Control	<input checked="" type="checkbox"/>
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	

Legend:

- Primary Objective
- Secondary Objective

Targeted Constituents

Sediment	<input checked="" type="checkbox"/>
Nutrients	
Trash	
Metals	
Bacteria	
Oil and Grease	
Organics	

Potential Alternatives

None

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EXHIBIT "C" (Stormwater Pollution Prevention Plan)

Stabilized Construction Entrance/Exit TC-1

Implementation

General

A stabilized construction entrance is a pad of aggregate underlain with filter cloth located at any point where traffic will be entering or leaving a construction site to or from a public right of way, street, alley, sidewalk, or parking area. The purpose of a stabilized construction entrance is to reduce or eliminate the tracking of sediment onto public rights of way or streets. Reducing tracking of sediments and other pollutants onto paved roads helps prevent deposition of sediments into local storm drains and production of airborne dust.

Where traffic will be entering or leaving the construction site, a stabilized construction entrance should be used. NPDES permits require that appropriate measures be implemented to prevent tracking of sediments onto paved roadways, where a significant source of sediments is derived from mud and dirt carried out from unpaved roads and construction sites.

Stabilized construction entrances are moderately effective in removing sediment from equipment leaving a construction site. The entrance should be built on level ground. Advantages of the Stabilized Construction Entrance/Exit is that it does remove some sediment from equipment and serves to channel construction traffic in and out of the site at specified locations. Efficiency is greatly increased when a washing rack is included as part of a stabilized construction entrance/exit.

Design and Layout

- Construct on level ground where possible.
- Select 3 to 6 in. diameter stones.
- Use minimum depth of stones of 12 in. or as recommended by soils engineer.
- Construct length of 50 ft or maximum site will allow, and 10 ft minimum width or to accommodate traffic.
- Rumble racks constructed of steel panels with ridges and installed in the stabilized entrance/exit will help remove additional sediment and to keep adjacent streets clean.
- Provide ample turning radii as part of the entrance.
- Limit the points of entrance/exit to the construction site.
- Limit speed of vehicles to control dust.
- Properly grade each construction entrance/exit to prevent runoff from leaving the construction site.
- Route runoff from stabilized entrances/exits through a sediment trapping device before discharge.
- Design stabilized entrance/exit to support heaviest vehicles and equipment that will use it.

EXHIBIT "C" (Stormwater Pollution Prevention Plan)

Stabilized Construction Entrance/Exit TC-1

- Select construction access stabilization (aggregate, asphaltic concrete, concrete) based on longevity, required performance, and site conditions. Do not use asphalt concrete (AC) grindings for stabilized construction access/roadway.
- If aggregate is selected, place crushed aggregate over geotextile fabric to at least 12 in. depth, or place aggregate to a depth recommended by a geotechnical engineer. A crushed aggregate greater than 3 in. but smaller than 6 in. should be used.
- Designate combination or single purpose entrances and exits to the construction site.
- Require that all employees, subcontractors, and suppliers utilize the stabilized construction access.
- Implement SE-7, Street Sweeping and Vacuuming, as needed.
- All exit locations intended to be used for more than a two-week period should have stabilized construction entrance/exit BMPs.

Inspection and Maintenance

- Inspect and verify that activity-based BMPs are in place prior to the commencement of associated activities. While activities associated with the BMPs are under way, inspect BMPs in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- Inspect local roads adjacent to the site daily. Sweep or vacuum to remove visible accumulated sediment.
- Remove aggregate, separate and dispose of sediment if construction entrance/exit is clogged with sediment.
- Keep all temporary roadway ditches clear.
- Check for damage and repair as needed.
- Replace gravel material when surface voids are visible.
- Remove all sediment deposited on paved roadways within 24 hours.
- Remove gravel and filter fabric at completion of construction

Costs

Average annual cost for installation and maintenance may vary from \$1,500 to \$6,100 each, averaging \$3,100 per entrance. Costs will increase with addition of washing rack and sediment trap. With wash rack, costs range from \$1,500 - \$7,700 each, averaging \$4,600 per entrance (All costs adjusted for inflation, 2016 dollars, by Tetra Tech Inc.

References

Manual of Standards of Erosion and Sediment Control Measures, Association of Bay Area Governments, May 1995.

EXHIBIT "C" (Stormwater Pollution Prevention Plan)

Stabilized Construction Entrance/Exit TC-1

National Management Measures to Control Nonpoint Source Pollution from Urban Areas, USEPA Agency, 2002.

Proposed Guidance Specifying Management Measures for Sources of Nonpoint Pollution in Coastal Waters, Work Group Working Paper, USEPA, April 1992.

Stormwater Quality Handbooks Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.

Stormwater Management of the Puget Sound Basin, Technical Manual, Publication #91-75, Washington State Department of Ecology, February 1992.

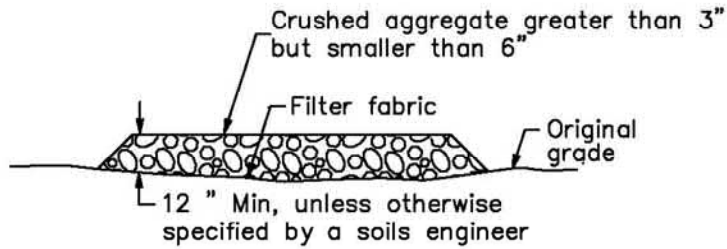
Virginia Erosion and Sedimentation Control Handbook, Virginia Department of Conservation and Recreation, Division of Soil and Water Conservation, 1991.

Guidance Specifying Management Measures for Nonpoint Pollution in Coastal Waters, EPA 840-B-9-002, USEPA, Office of Water, Washington, DC, 1993.

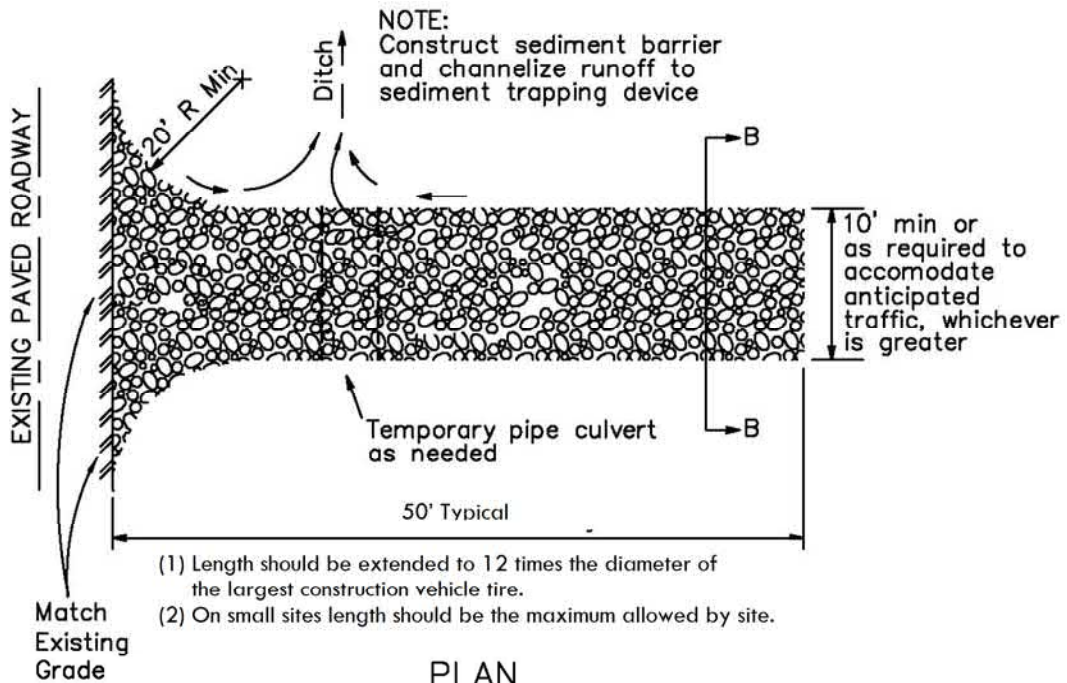
Water Quality Management Plan for the Lake Tahoe Region, Volume II, Handbook of Management Practices, Tahoe Regional Planning Agency, November 1988.

EXHIBIT "C" (Stormwater Pollution Prevention Plan)

Stabilized Construction Entrance/Exit TC-1



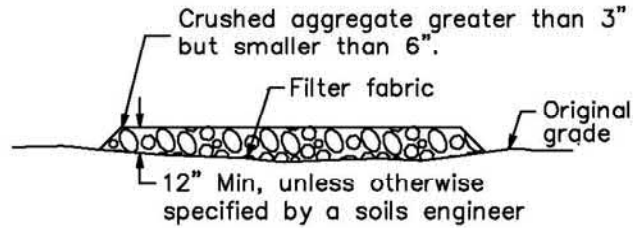
SECTION B-B
NTS



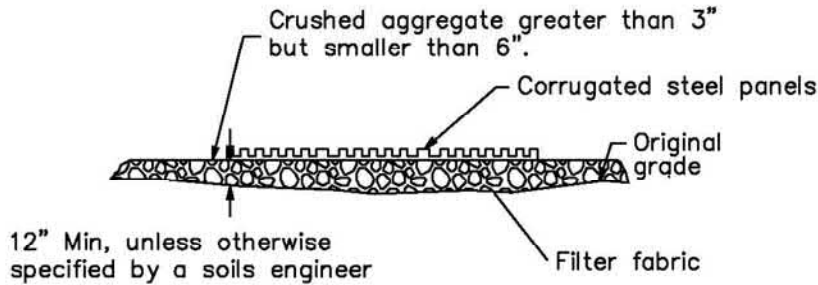
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Stabilized Construction Entrance/Exit TC-1

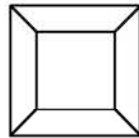


SECTION B-B
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SECTION A-A
NOT TO SCALE

NOTE:
Construct sediment barrier and channelize runoff to sediment trapping device



Sediment trapping device

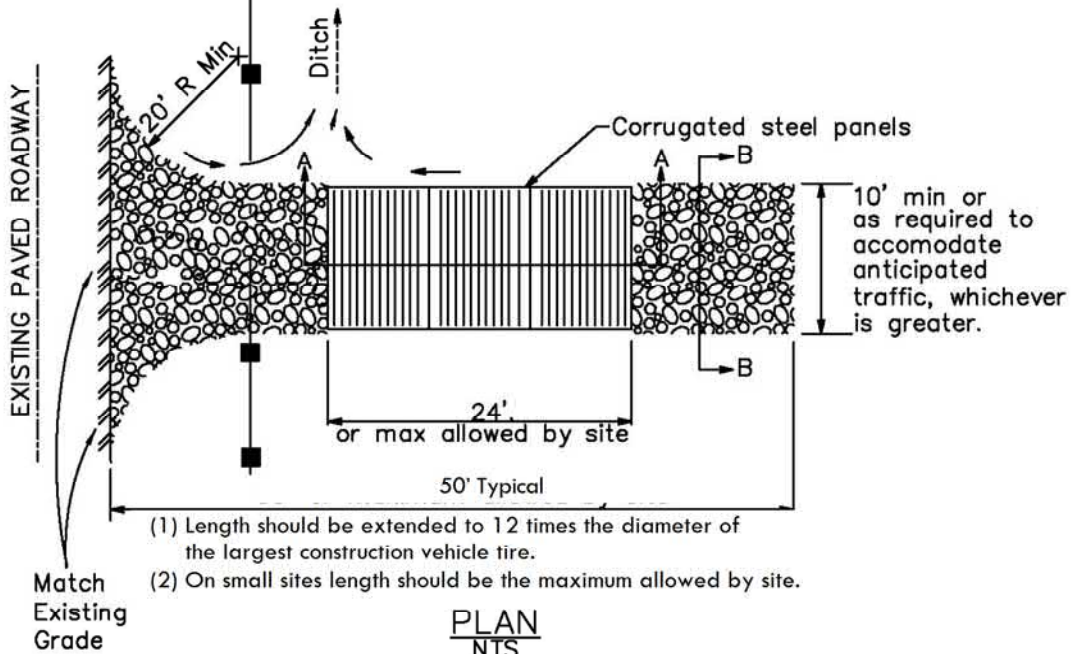
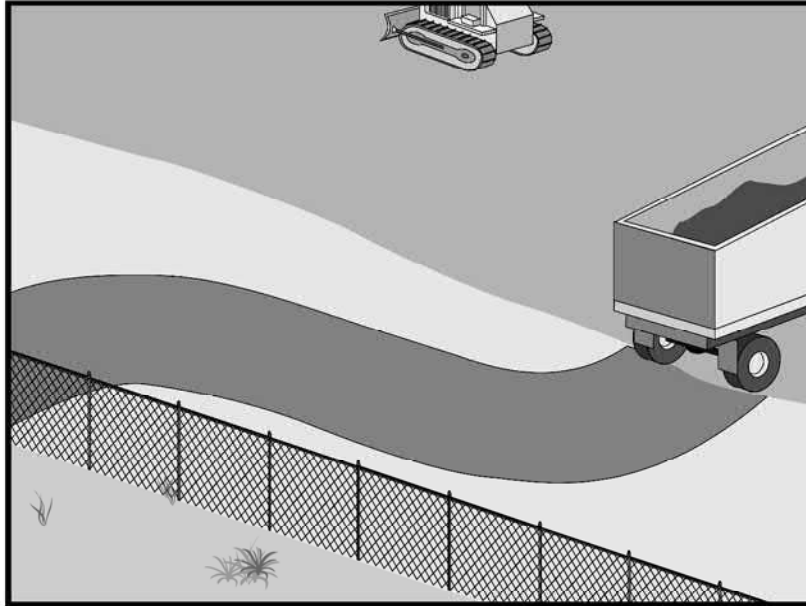


EXHIBIT "C" (Stormwater Pollution Prevention Plan)



Categories

EC	Erosion Control	<input checked="" type="checkbox"/>
SE	Sediment Control	<input checked="" type="checkbox"/>
TC	Tracking Control	<input checked="" type="checkbox"/>
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	

Legend:

- Primary Objective
- Secondary Objective

Targeted Constituents

Sediment	<input checked="" type="checkbox"/>
Nutrients	
Trash	
Metals	
Bacteria	
Oil and Grease	
Organics	

Potential Alternatives

None

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Description and Purpose

Access roads, subdivision roads, parking areas, and other onsite vehicle transportation routes should be stabilized immediately after grading, and frequently maintained to prevent erosion and control dust.

Suitable Applications

This BMP should be applied for the following conditions:

- Temporary Construction Traffic:
 - Phased construction projects and offsite road access
 - Construction during wet weather
- Construction roadways and detour roads:
 - Where mud tracking is a problem during wet weather
 - Where dust is a problem during dry weather
 - Adjacent to water bodies
 - Where poor soils are encountered

Limitations

- The roadway must be removed or paved when construction is complete.



- Certain chemical stabilization methods may cause stormwater or soil pollution and should not be used. See WE-1, Wind Erosion Control.
- Management of construction traffic is subject to air quality control measures. Contact the local air quality management agency.
- Materials will likely need to be removed prior to final project grading and stabilization.
- Use of this BMP may not be applicable to very short duration projects.

Implementation

General

Areas that are graded for construction vehicle transport and parking purposes are especially susceptible to erosion and dust. The exposed soil surface is continually disturbed, leaving no opportunity for vegetative stabilization. Such areas also tend to collect and transport runoff waters along their surfaces. During wet weather, they often become muddy quagmires that generate significant quantities of sediment that may pollute nearby streams or be transported offsite on the wheels of construction vehicles. Dirt roads can become so unstable during wet weather that they are virtually unusable.

Efficient construction road stabilization not only reduces onsite erosion but also can significantly speed onsite work, avoid instances of immobilized machinery and delivery vehicles, and generally improve site efficiency and working conditions during adverse weather

Installation/Application Criteria

Permanent roads and parking areas should be paved as soon as possible after grading. As an alternative where construction will be phased, the early application of gravel or chemical stabilization may solve potential erosion and stability problems. Temporary gravel roadway should be considered during the rainy season and on slopes greater than 5%.

Temporary roads should follow the contour of the natural terrain to the maximum extent possible. Slope should not exceed 15%. Roadways should be carefully graded to drain transversely. Provide drainage swales on each side of the roadway in the case of a crowned section or one side in the case of a super elevated section. Simple gravel berms without a trench can also be used.

Installed inlets should be protected to prevent sediment laden water from entering the storm sewer system (SE-10, Storm Drain Inlet Protection). In addition, the following criteria should be considered.

- Road should follow topographic contours to reduce erosion of the roadway.
- The roadway slope should not exceed 15%.
- Chemical stabilizers or water are usually required on gravel or dirt roads to prevent dust (WE-1, Wind Erosion Control).
- Properly grade roadway to prevent runoff from leaving the construction site.
- Design stabilized access to support heaviest vehicles and equipment that will use it.

- Stabilize roadway using aggregate, asphalt concrete, or concrete based on longevity, required performance, and site conditions. The use of cold mix asphalt or asphalt concrete (AC) grindings for stabilized construction roadway is not allowed.
- Coordinate materials with those used for stabilized construction entrance/exit points.
- If aggregate is selected, place crushed aggregate over geotextile fabric to at least 12 in. depth. A crushed aggregate greater than 3 in. but smaller than 6 in. should be used.

Inspection and Maintenance

- Inspect and verify that activity-based BMPs are in place prior to the commencement of associated activities. While activities associated with the BMP are under way, inspect BMPs in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- Keep all temporary roadway ditches clear.
- When no longer required, remove stabilized construction roadway and re-grade and repair slopes.
- Periodically apply additional aggregate on gravel roads.
- Active dirt construction roads are commonly watered three or more times per day during the dry season.

Costs

Gravel construction roads are moderately expensive, but cost is often balanced by reductions in construction delay. No additional costs for dust control on construction roads should be required above that needed to meet local air quality requirements.

References

Blueprint for a Clean Bay: Best Management Practices to Prevent Stormwater Pollution from Construction Related Activities; Santa Clara Valley Nonpoint Source Pollution Control Program, 1995.

Coastal Nonpoint Pollution Control Program; Program Development and Approval Guidance, Working Group, Working Paper; USEPA, April 1992.

Manual of Standards of Erosion and Sediment Control Measures, Association of Bay Area Governments, May 1995.

Stormwater Quality Handbooks Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.

Stormwater Management for Construction Activities, Developing Pollution Prevention Plans and Best Management Practices, EPA 832-R-92005; USEPA, April 1992.

Stormwater Management of the Puget Sound Basin, Technical Manual, Publication #91-75, Washington State Department of Ecology, February 1992.

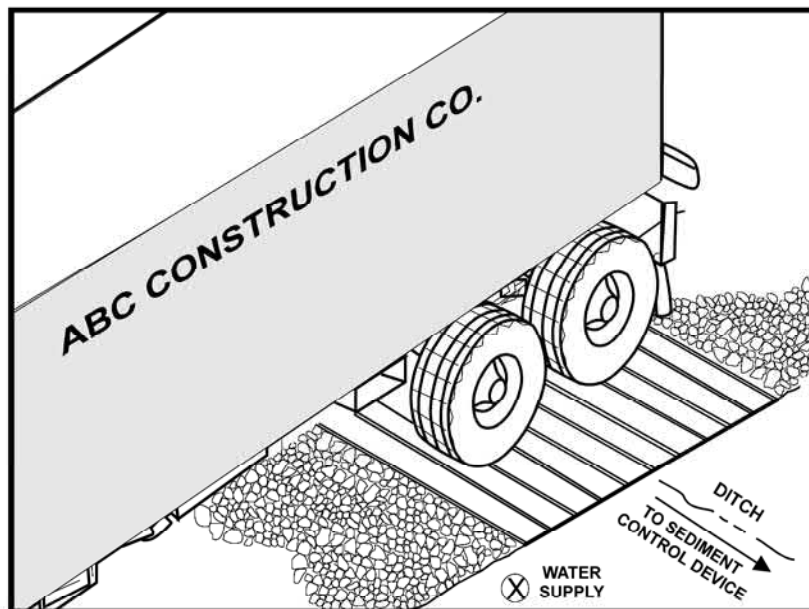
EXHIBIT "C" (Stormwater Pollution Prevention Plan)

Stabilized Construction Roadway **TC-2**

Virginia Erosion and Sedimentation Control Handbook, Virginia Department of Conservation and Recreation, Division of Soil and Water Conservation, 1991.

Water Quality Management Plan for the Lake Tahoe Region, Volume II, Handbook of Management Practices, Tahoe Regional Planning Agency, November 1988.

EXHIBIT "C" (Stormwater Pollution Prevention Plan)



Description and Purpose

A tire wash is an area located at stabilized construction access points to remove sediment from tires and undercarriages and to prevent sediment from being transported onto public roadways.

Suitable Applications

Tire washes may be used on construction sites where dirt and mud tracking onto public roads by construction vehicles may occur.

Limitations

- The tire wash requires a supply of wash water.
- A turnout or doublewide exit is required to avoid having entering vehicles drive through the wash area.
- Do not use where wet tire trucks leaving the site leave the road dangerously slick.

Implementation

- Incorporate with a stabilized construction entrance/exit. See TC-1, Stabilized Construction Entrance/Exit.
- Construct on level ground when possible, on a pad of coarse aggregate greater than 3 in. but smaller than 6 in. A geotextile fabric should be placed below the aggregate.
- Wash rack should be designed and constructed/manufactured for anticipated traffic loads.

Categories

EC	Erosion Control	
SE	Sediment Control	<input checked="" type="checkbox"/>
TC	Tracking Control	<input checked="" type="checkbox"/>
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	

Legend:

- Primary Objective
- Secondary Objective

Targeted Constituents

Sediment	<input checked="" type="checkbox"/>
Nutrients	
Trash	
Metals	
Bacteria	
Oil and Grease	
Organics	

Potential Alternatives

TC-1 Stabilized Construction Entrance/Exit

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- Provide a drainage ditch that will convey the runoff from the wash area to a sediment trapping device. The drainage ditch should be of sufficient grade, width, and depth to carry the wash runoff.
- Use hoses with automatic shutoff nozzles to prevent hoses from being left on.
- Require that all employees, subcontractors, and others that leave the site with mud caked tires and undercarriages to use the wash facility.
- Implement SC-7, Street Sweeping and Vacuuming, as needed.

Costs

Costs are low for installation of wash rack.

Inspection and Maintenance

- Inspect and verify that activity-based BMPs are in place prior to the commencement of associated activities. While activities associated with the BMP are under way, inspect BMPs in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- Inspect BMPs subject to non-stormwater discharge daily while non-stormwater discharges occur.
- Remove accumulated sediment in wash rack and/or sediment trap to maintain system performance.
- Inspect routinely for damage and repair as needed.

References

Blueprint for a Clean Bay: Best Management Practices to Prevent Stormwater Pollution from Construction Related Activities; Santa Clara Valley Nonpoint Source Pollution Control Program, 1995.

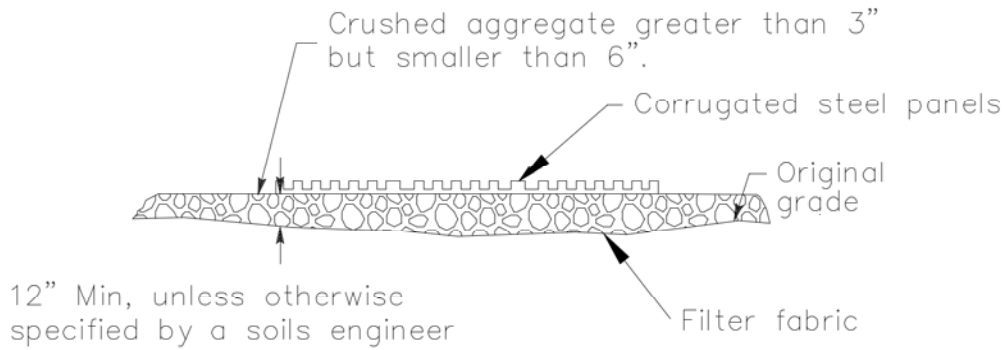
Coastal Nonpoint Pollution Control Program; Program Development and Approval Guidance, Working Group, Working Paper; USEPA, April 1992.

Manual of Standards of Erosion and Sediment Control Measures, Association of Bay Area Governments, May 1995.

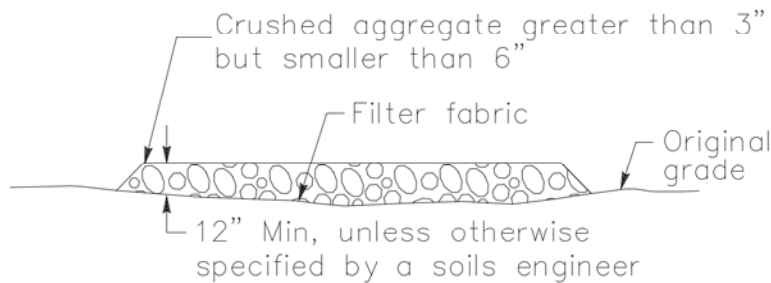
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Stormwater Management for Construction Activities, Developing Pollution Prevention Plans and Best Management Practices, EPA 832-R-92005; USEPA, April 1992.

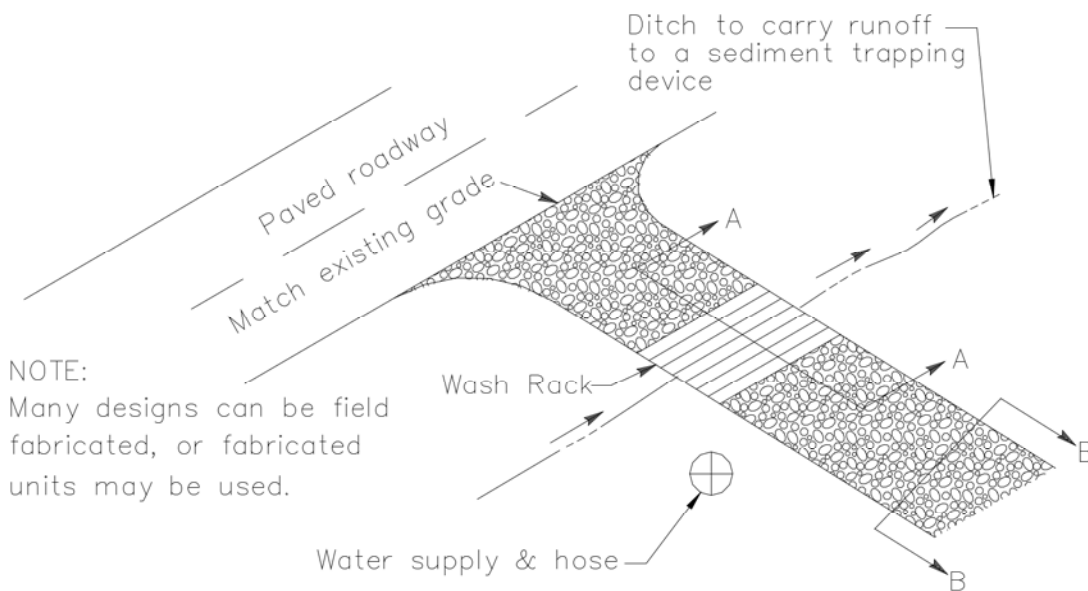
EXHIBIT "C" (Stormwater Pollution Prevention Plan)



SECTION A-A
NOT TO SCALE



SECTION B-B
NTS



TYPICAL TIRE WASH
NOT TO SCALE

EXHIBIT "C" (Stormwater Pollution Prevention Plan)

Section 4 Non-Stormwater Management and Material Management BMPs

4.1 Non-Stormwater Management BMPs

The [discharge](#) of materials other than [stormwater](#) and authorized [non-stormwater discharges](#) is prohibited by NPDES regulations as well as other local codes and ordinances. It is recognized that certain authorized non-stormwater discharges may be necessary for the completion of construction projects. Such discharges include, but are not limited to, irrigation of vegetative [erosion control](#) measures, and pipe flushing and testing.

Non-stormwater management [BMPs](#) are [source control BMPs](#) that prevent pollution by limiting or reducing potential [pollutants](#) at their source or eliminating off-site discharge. These practices involve day-to-day operations of the construction site and are usually under the control of the contractor. These BMPs are also referred to as “good housekeeping practices,” which involve keeping a clean, orderly construction site.

Non-stormwater management BMPs also include procedures and practices designed to minimize or eliminate the discharge of pollutants from vehicle and equipment cleaning, fueling, and maintenance operations to stormwater drainage systems or to watercourses.

Table 4-1 of this handbook lists the non-stormwater management BMPs. All these BMPs must be implemented depending on the conditions and applicability of deployment described as part of the BMP. The key to implementing these BMPs is to maintain a clean site and keep water, runoff, and run-on away from potential pollutants, including bare soil. In general, conduct construction activities so that: potential pollutants are not discharged directly to drainage systems; generation of potential pollutants is limited; and pollutants that are generated are contained and cleaned up immediately and are therefore not available for later discharge. These BMPs are fundamental to water quality protection and all sites must implement non-stormwater BMPs appropriate for the construction activities being performed.

Table 4-1 Non-Stormwater Management BMPs

BMP#	BMP Name
NS-1	Water Conservation Practices ²
NS-2	Dewatering Operations ^{1,3}
NS-3	Paving and Grinding Operations ^{1,3}
NS-4	Temporary Stream Crossing ^{1,2}
NS-5	Clear Water Diversion ²
NS-6	Illicit Connection/Discharge ^{1,2}
NS-7	Potable Water/Irrigation ^{1,2}
NS-8	Vehicle and Equipment Cleaning ^{1,2}
NS-9	Vehicle and Equipment Fueling ^{1,2}
NS-10	Vehicle and Equipment Maintenance ^{1,2}
NS-11	Pile Driving Operations ^{1,2}
NS-12	Concrete Curing ^{1,3}
NS-13	Concrete Finishing ^{1,3}
NS-14	Material Over Water ^{1,2}
NS-15	Demolition Adjacent to Water ^{1,2}
NS-16	Temporary Batch Plants ^{1,3}
1) BMP fact sheet updated in 2009	
2) BMP fact sheet updated in 2011	
3) BMP fact sheet updated in 2012	

It is recommended that owners and contractors be vigilant regarding implementation of these BMPs, including making their implementation a condition of continued employment, and part of all prime and subcontract agreements. By doing so, the chance of inadvertent violation by an uncaring individual can be prevented, potentially saving thousands of dollars in fines and project delays. Also, if procedures are not properly implemented and/or if BMPs are compromised then the discharge may be subject to additional sampling and analysis requirements for non-visible pollutants contained in the [General Permit](#). (See Section 2.5.4.2. of this handbook)

4.2 Waste Management and Materials Pollution Control BMPs

[Waste management](#) and materials pollution control BMPs, like non-stormwater management BMPs, are source control BMPs that prevent pollution by limiting or reducing potential pollutants at their source before they come in contact with stormwater. These BMPs also involve day-to-day operations of the construction site, and are under the control of the contractor, and are additional “good housekeeping practices,” which involve keeping a clean, orderly construction site. These BMPs are fundamental to water quality protection and all sites must implement waste management and/or materials pollution control non-stormwater BMPs appropriate for the construction activities being performed.

Waste management consists of implementing procedural and structural BMPs for handling, storing, and disposing of wastes generated by a construction project to prevent the release of waste materials into stormwater runoff or discharges through proper management of the following types of wastes:

- Solid
- Sanitary
- Concrete
- Hazardous
- Equipment-related wastes

Materials pollution control (also called materials handling) consists of implementing procedural and structural BMPs in the handling of, storing, and the using of construction materials. The BMPs are intended to prevent the release of pollutants during stormwater and non-stormwater

Table 4-2 Waste Management and Materials Pollution Control BMPs

BMP#	BMP Name
WM-1	Material Delivery and Storage ¹
WM-2	Material Use ¹
WM-3	Stockpile Management ^{1, 2, 3}
WM-4	Spill Prevention and Control ^{1, 2}
WM-5	Solid Waste Management ^{1, 2}
WM-6	Hazardous Waste Management ^{1, 2}
WM-7	Contaminated Soil Management ^{1, 2}
WM-8	Concrete Waste Management ^{1, 3}
WM-9	Sanitary/ Sceptic Waste Management ¹
WM-10	Liquid Waste Management ¹
1) BMP fact sheet updated in 2009	
2) BMP fact sheet updated in 2011	
3) BMP fact sheet updated in 2012	

discharges. The objective is to prevent or reduce the opportunity for contamination of stormwater runoff from construction materials by covering and/or providing [secondary containment](#) of storage areas and/or by taking adequate precautions when handling materials. These controls must be implemented for all applicable activities, material usage, and site conditions. The discharge of construction materials or wastes from a site is prohibited.

Table 4-2 of this handbook lists the waste management and materials pollution control BMPs. It is important to note that these BMPs should be implemented depending on the conditions/applicability of deployment described as part of the BMP.

4.3 Fact Sheet Format

A BMP fact sheet is a short document that presents detailed information about a particular BMP. Typically, each fact sheet contains the information outlined in Figure 4-1 of this handbook. Completed fact sheets for each of the above activities are provided in Section 4.4 of this handbook.

The fact sheets also contain side bar presentations with information on BMP categories, targeted constituents, removal effectiveness, and potential alternatives.

Example NS-xx Fact Sheet

Description and Purpose

Suitable Applications

Limitations

Implementation

Costs

Inspection and Maintenance

References

*Figure 4-1
Example Fact Sheet*

4.4 BMP Fact Sheets

BMP fact sheets for non-stormwater management and waste management and materials pollution control follow. The BMP fact sheets are individually page numbered and are suitable for inclusions in SWPPPs. Copies of the fact sheets can be individually downloaded from the CASQA Online BMP Handbook at <http://www.casqa.org>.

BMP fact sheets are guidance and intended to provide a range of information about the BMPs. The BMP fact sheets should not be interpreted as General Permit requirements. CASQA recognizes that there may be alternative public domain and/or proprietary practices performing similar function. Alternative products should be evaluated for project-specific implementation and used if determined to be appropriate by the QSD. Fact sheets do not address site-specific implementation application needs and modifications. The QSD should provide site specific implementation requirements in the SWPPP.

EXHIBIT "C" (Stormwater Pollution Prevention Plan)



Description and Purpose

Water conservation practices are activities that use water during the construction of a project in a manner that avoids causing erosion and the transport of pollutants offsite. These practices can reduce or eliminate non-stormwater discharges.

Suitable Applications

Water conservation practices are suitable for all construction sites where water is used, including piped water, metered water, trucked water, and water from a reservoir.

Limitations

- None identified.

Implementation

- Keep water equipment in good working condition.
- Stabilize water truck filling area.
- Repair water leaks promptly.
- Washing of vehicles and equipment on the construction site is discouraged.
- Avoid using water to clean construction areas. If water must be used for cleaning or surface preparation, surface should be swept and vacuumed first to remove dirt. This will minimize amount of water required.

Categories

EC	Erosion Control	<input checked="" type="checkbox"/>
SE	Sediment Control	<input checked="" type="checkbox"/>
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	<input checked="" type="checkbox"/>
WM	Waste Management and Materials Pollution Control	

Legend:

- Primary Objective
- Secondary Objective

Targeted Constituents

Sediment	<input checked="" type="checkbox"/>
Nutrients	
Trash	
Metals	
Bacteria	
Oil and Grease	
Organics	

Potential Alternatives

None

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- Direct construction water runoff to areas where it can soak into the ground or be collected and used.
- Authorized non-stormwater discharges to the storm drain system, channels, or receiving waters are acceptable with the implementation of appropriate BMPs.
- Lock water tank valves to prevent unauthorized use.

Costs

The cost is small to none compared to the benefits of conserving water.

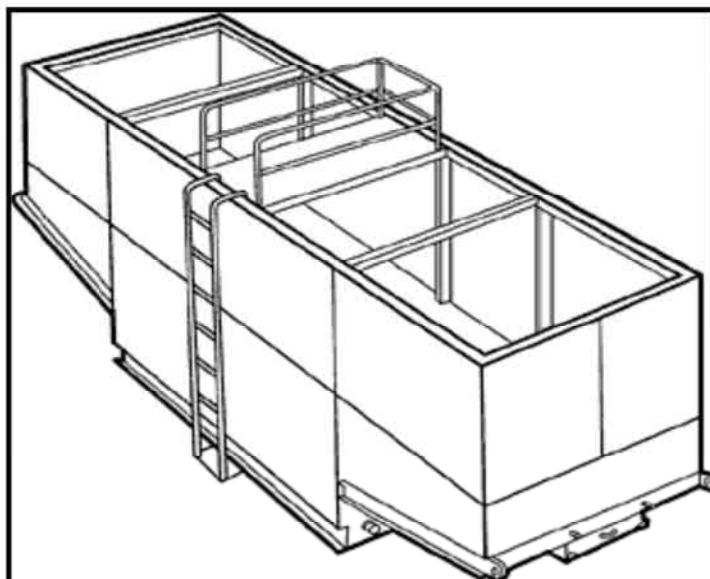
Inspection and Maintenance

- Inspect and verify that activity based BMPs are in place prior to the commencement of authorized non-stormwater discharges.
- Inspect BMPs in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- Inspect BMPs subject to non-stormwater discharges daily while non-stormwater discharges are occurring.
- Repair water equipment as needed to prevent unintended discharges.
 - Water trucks
 - Water reservoirs (water buffalos)
 - Irrigation systems
 - Hydrant connections

References

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.

EXHIBIT "C" (Stormwater Pollution Prevention Plan)



Categories

EC	Erosion Control	
SE	Sediment Control	<input checked="" type="checkbox"/>
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	<input checked="" type="checkbox"/>
WM	Waste Management and Materials Pollution Control	

Legend:

- Primary Category
- Secondary Category

Targeted Constituents

Sediment	<input checked="" type="checkbox"/>
Nutrients	
Trash	
Metals	
Bacteria	
Oil and Grease	<input checked="" type="checkbox"/>
Organics	

Potential Alternatives

- SE-5: Fiber Roll
- SE-6: Gravel Bag Berm

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Description and Purpose

Dewatering operations are practices that manage the discharge of pollutants when non-stormwater and accumulated precipitation (stormwater) must be removed from a work location to proceed with construction work or to provide vector control.

The General Permit incorporates Numeric Action Levels (NAL) for turbidity (see Section 2 of this handbook to determine your project's risk level and if you are subject to these requirements).

Discharges from dewatering operations can contain high levels of fine sediment that, if not properly treated, could lead to exceedances of the General Permit requirements or Basin Plan standards.

The dewatering operations described in this fact sheet are not Active Treatment Systems (ATS) and do not include the use of chemical coagulations, chemical flocculation or electrocoagulation.

Suitable Applications

These practices are implemented for discharges of non-stormwater from construction sites. Non-stormwaters include, but are not limited to, groundwater, water from cofferdams, water diversions, and waters used during construction activities that must be removed from a work area to facilitate construction.

Practices identified in this section are also appropriate for implementation when managing the removal of accumulated

precipitation (stormwater) from depressed areas at a construction site.

Stormwater mixed with non-stormwater should be managed as non-stormwater.

Limitations

- Dewatering operations will require and should comply with applicable local and project-specific permits and regulations. In some areas, all dewatering activities, regardless of the discharge volume, require a dewatering permit.
- Site conditions will dictate design and use of dewatering operations.
- The controls discussed in this fact sheet primarily address sediment. Other secondary pollutant removal benefits are discussed where applicable.
- The controls detailed in this fact sheet only allow for minimal settling time for sediment particles. Use only when site conditions restrict the use of the other control methods.
- Avoid dewatering discharges where possible by using the water for dust control.

Implementation

- A Construction Site Monitoring Plan (CSMP) should be included in the project Stormwater Pollution Prevention Plan (SWPPP).
- Regional Water Quality Control Board (RWQCB) Regions may require notification and approval prior to any discharge of water from construction sites.
- The destination of discharge from dewatering activities will typically determine the type of permit required for the discharge. For example, when discharging to a water of the U.S., a dewatering permit may be required through the site's governing RWQCB. When discharging to a sanitary sewer or Municipal Separate Storm Sewer System (MS4), a permit may need to be obtained from the owner of the sanitary sewer or MS4 in addition to obtaining an RWQCB dewatering permit. Additional permits or permissions from other agencies may be required for dewatering cofferdams or diversions.
- Dewatering discharges should not cause erosion at the discharge point. Appropriate BMPs should be implemented to maintain compliance with all applicable permits.
- Maintain dewatering records in accordance with all local and project-specific permits and regulations.

Sediment Treatment

A variety of methods can be used to treat water during dewatering operations. Several devices are presented below and provide options to achieve sediment removal. The sediment particle size and permit or receiving water limitations on sediment or turbidity are key considerations for selecting sediment treatment option(s); in some cases, the use of multiple devices may be appropriate. Use of other enhanced treatment methods (i.e., introduction of chemicals or electric current to enhance flocculation and removal of sediment) must comply with: 1) for storm drain or surface water discharges, the requirements for Active Treatment Systems (see SE-11); or 2) for sanitary sewer discharges, the requirements of applicable sanitary sewer discharge permits.

EXHIBIT "C" (Stormwater Pollution Prevention Plan)

Sediment Basin (see also SE-2)

Description:

- A sediment basin is a temporary basin with a controlled release structure that is formed by excavation or construction of an embankment to detain sediment-laden runoff and allow sediment to settle out before discharging. Sediment basins are generally larger than Sediment Traps (SE-3) and have a designed outlet structure.

Appropriate Applications:

- Effective for the removal of trash, gravel, sand, silt, some metals that settle out with the sediment.

Implementation:

- Excavation and construction of related facilities is required.
- Temporary sediment basins should be fenced if safety is a concern.
- Outlet protection is required to prevent erosion at the outfall location.

Maintenance:

- Maintenance is required for safety fencing, vegetation, embankment, inlet and outlet, as well as other features.
- Removal of sediment is required when the storage volume is reduced by one-third.

Sediment Trap (See also SE-3)

Description:

- A sediment trap is a temporary basin formed by excavation and/or construction of an earthen embankment across a waterway or low drainage area to detain sediment-laden runoff and allow sediment to settle out before discharging. Sediment traps are generally smaller than Sediment Basins (SE-2) and do not have a designed outlet (but do have a spillway or overflow).

Appropriate Applications:

Effective for the removal of large and medium sized particles (sand and gravel) and some metals that settle out with the sediment.

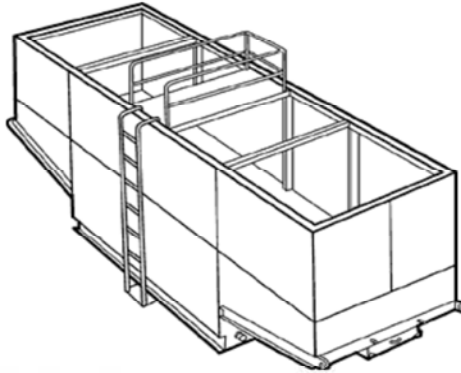
Implementation:

- Excavation and construction of related facilities is required.
- Trap inlets should be located to maximize the travel distance to the trap outlet.
- Use rock or vegetation to protect the trap outlets against erosion.

Maintenance:

- Maintenance is required for vegetation, embankment, inlet and outfall structures, as well as other features.
- Removal of sediment is required when the storage volume is reduced by one-third.

Weir Tanks



Description:

- A weir tank separates water and waste by using weirs. The configuration of the weirs (over and under weirs) maximizes the residence time in the tank and determines the waste to be removed from the water, such as oil, grease, and sediments.

Appropriate Applications:

- The tank removes trash, some settleable solids (gravel, sand, and silt), some visible oil and grease, and some metals (removed with sediment). To achieve high levels of flow, multiple tanks can be used in parallel. If additional treatment is desired, the tanks can be placed in series or as pre-treatment for other methods.

Implementation:

- Tanks are delivered to the site by the vendor, who can provide assistance with set-up and operation.
- Tank size will depend on flow volume, constituents of concern, and residency period required. Vendors should be consulted to appropriately size tank.
- Treatment capacity (i.e., volume and number of tanks) should provide at a minimum the required volume for discrete particle settling for treatment design flows.

Maintenance:

- Periodic cleaning is required based on visual inspection or reduced flow.
- Oil and grease disposal should be conducted by a licensed waste disposal company.

EXHIBIT "C" (Stormwater Pollution Prevention Plan)

Dewatering Tanks



Description:

- A dewatering tank removes debris and sediment. Flow enters the tank through the top, passes through a fabric filter, and is discharged through the bottom of the tank. The filter separates the solids from the liquids.

Appropriate Applications:

- The tank removes trash, gravel, sand, and silt, some visible oil and grease, and some metals (removed with sediment). To achieve high levels of flow, multiple tanks can be used in parallel. If additional treatment is desired, the tanks can be placed in series or as pre-treatment for other methods.

Implementation:

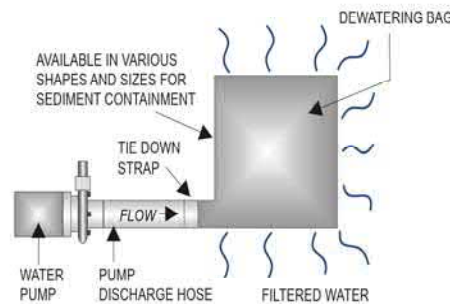
- Tanks are delivered to the site by the vendor, who can provide assistance with set-up and operation.
- Tank size will depend on flow volume, constituents of concern, and residency period required. Vendors should be consulted to appropriately size tank.

Maintenance:

- Periodic cleaning is required based on visual inspection or reduced flow.
- Oil and grease disposal should be conducted by licensed waste disposal company.

EXHIBIT "C" (Stormwater Pollution Prevention Plan)

Gravity Bag Filter



Description:

- A gravity bag filter, also referred to as a dewatering bag, is a square or rectangular bag made of non-woven geotextile fabric that collects gravel, sand, silt, and fines.

Appropriate Applications:

- Effective for the removal of sediments (gravel, sand, silt, and fines). Some metals are removed with the sediment.

Implementation:

- Water is pumped into one side of the bag and seeps through the top, bottom, and sides of the bag.
- Place filter bag on pavement or a gravel bed or paved surface. Avoid placing a dewatering bag on unprotected bare soil. If placing the bag on bare soil is unavoidable, a secondary barrier should be used, such as a rock filter bed placed beneath and beyond the edges of the bag to, prevent erosion and capture sediments that escape the bag.
- Perimeter control around the downstream end of the bag should be implemented. Secondary sediment controls are important especially in the initial stages of discharge, which tend to allow fines to pass through the bag.

Maintenance:

- Inspection of the flow conditions, bag condition, bag capacity, and the secondary barrier (as applicable) is required.
- Replace the bag when it no longer filters sediment or passes water at a reasonable rate.
- Caution should be taken when removing and disposing of the bag, to prevent the release of captured sediment
- Properly dispose of the bag offsite. If sediment is removed from the bag prior to disposal (bags can potentially be reused depending upon their condition), dispose of sediment in accordance with the general maintenance procedures described at the end of this BMP Fact Sheet.

EXHIBIT "C" (Stormwater Pollution Prevention Plan)

Sand Media Particulate Filter



Description:

- Water is treated by passing it through canisters filled with sand media. Generally, sand filters provide a final level of treatment. They are often used as a secondary or higher level of treatment after a significant amount of sediment and other pollutants have been removed using other methods.

Appropriate Applications:

- Effective for the removal of trash, gravel, sand, and silt and some metals, as well as the reduction of biochemical oxygen demand (BOD) and turbidity.
- Sand filters can be used for stand-alone treatment or in conjunction with bag and cartridge filtration if further treatment is required.
- Sand filters can also be used to provide additional treatment to water treated via settling or basic filtration.

Implementation:

- The filters require delivery to the site and initial set up. The vendor can provide assistance with installation and operation.

Maintenance:

- The filters require regular service to monitor and maintain the level of the sand media. If subjected to high loading rates, filters can plug quickly.
- Venders generally provide data on maximum head loss through the filter. The filter should be monitored daily while in use and cleaned when head loss reaches target levels.
- If cleaned by backwashing, the backwash water may need to be hauled away for disposal or returned to the upper end of the treatment train for another pass through the series of dewatering BMPs.

EXHIBIT "C" (Stormwater Pollution Prevention Plan)

Pressurized Bag Filter



Description:

- A pressurized bag filter is a unit composed of single filter bags made from polyester felt material. The water filters through the unit and is discharged through a header. Vendors provide bag filters in a variety of configurations. Some units include a combination of bag filters and cartridge filters for enhanced contaminant removal.

Appropriate Applications:

- Effective for the removal of sediment (sand and silt) and some metals, as well as the reduction of BOD, turbidity, and hydrocarbons. Oil absorbent bags are available for hydrocarbon removal.
- Filters can be used to provide secondary treatment to water treated via settling or basic filtration.

Implementation:

- The filters require delivery to the site and initial set up. The vendor can provide assistance with installation and operation.

Maintenance:

- The filter bags require replacement when the pressure differential equals or exceeds the manufacturer's recommendation.

EXHIBIT "C" (Stormwater Pollution Prevention Plan)

Cartridge Filter



Description:

- Cartridge filters provide a high degree of pollutant removal by utilizing a number of individual cartridges as part of a larger filtering unit. They are often used as a secondary or higher (polishing) level of treatment after a significant amount of sediment and other pollutants are removed. Units come with various cartridge configurations (for use in series with bag filters) or with a larger single cartridge filtration unit (with multiple filters within).

Appropriate Applications:

- Effective for the removal of sediment (sand, silt, and some clays) and metals, as well as the reduction of BOD, turbidity, and hydrocarbons. Hydrocarbons can effectively be removed with special resin cartridges.
- Filters can be used to provide secondary treatment to water treated via settling or basic filtration.

Implementation:

- The filters require delivery to the site and initial set up. The vendor can provide assistance.

Maintenance:

- The cartridges require replacement when the pressure differential equals or exceeds the manufacturer's recommendation.

Costs

- Sediment control costs vary considerably depending on the dewatering and sediment treatment system that is selected. Pressurized filters tend to be more expensive than gravity settling but are often more effective. Simple tanks are generally rented on a long-term basis (one or more months) and can range from \$460 per month for a 1,000-gallon tank to \$3,400 per month for a 10,000-gallon tank (adjusted for inflation, 2016 dollars, by Tetra Tech Inc.). Mobilization and demobilization costs vary considerably.

Inspection and Maintenance

- Inspect and verify that dewatering BMPs are in place and functioning prior to the commencement of activities requiring dewatering.
- Inspect dewatering BMPs daily while dewatering activities are being conducted.

EXHIBIT "C" (Stormwater Pollution Prevention Plan)

- Inspect all equipment before use. Monitor dewatering operations to ensure they do not cause offsite discharge or erosion.
- Sample dewatering discharges as required by the General Permit.
- Unit-specific maintenance requirements are included with the description of each unit.
- Sediment removed during the maintenance of a dewatering device may be either spread onsite and stabilized or disposed of at a disposal site as approved by the owner.
- Sediment that is commingled with other pollutants should be disposed of in accordance with all applicable laws and regulations and as approved by the owner.

References

Blueprint for a Clean Bay: Best Management Practices to Prevent Stormwater Pollution from Construction Related Activities; Santa Clara Valley Nonpoint Source Pollution Control Program, 1995.

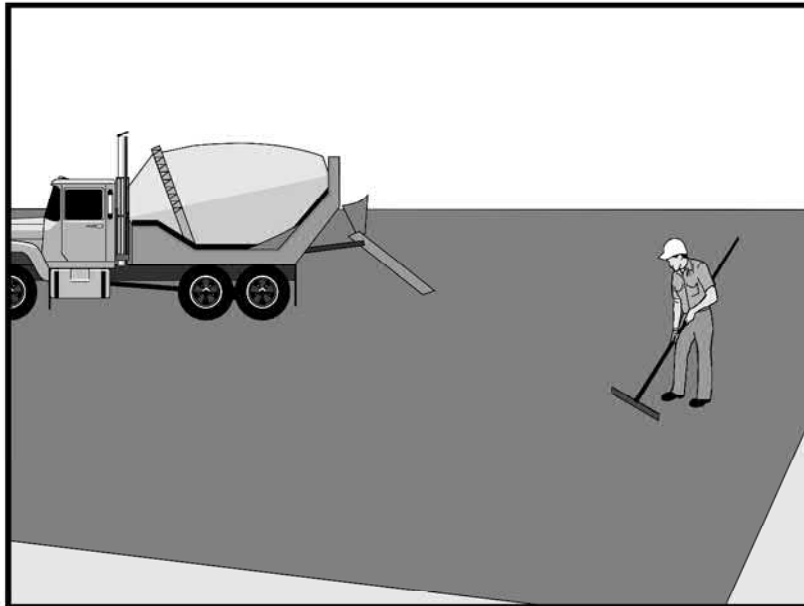
Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), March 2003; Updated March 2004.

Stormwater Management for Construction Activities, Developing Pollution Prevention Plans and Best Management Practices, EPA 832-R-92005; USEPA, April 1992.

Labor Surcharge & Equipment Rental Rates, April 1, 2002 through March 31, 2003, California Department of Transportation (Caltrans).

Erosion and Sediment Control Manual, Oregon Department of Environmental Quality, February 2005.

EXHIBIT "C" (Stormwater Pollution Prevention Plan)



Categories

EC	Erosion Control	
SE	Sediment Control	
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	<input checked="" type="checkbox"/>
WM	Waste Management and Materials Pollution Control	<input checked="" type="checkbox"/>

Legend:

- Primary Category
- Secondary Category

Targeted Constituents

Sediment	<input checked="" type="checkbox"/>
Nutrients	
Trash	
Metals	
Bacteria	
Oil and Grease	<input checked="" type="checkbox"/>
Organics	

Potential Alternatives

None

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Description and Purpose

Prevent or reduce the discharge of pollutants from paving operations, using measures to prevent runoff and runoff pollution, properly disposing of wastes, and training employees and subcontractors.

The General Permit incorporates Numeric Action Levels (NAL) for pH and turbidity (see Section 2 of this handbook to determine your project’s risk level and if you are subject to these requirements).

Many types of construction materials associated with paving and grinding operations, including mortar, concrete, and cement and their associated wastes have basic chemical properties that can raise pH levels outside of the permitted range. Additional care should be taken when managing these materials to prevent them from coming into contact with stormwater flows, which could lead to exceedances of the General Permit requirements.

Suitable Applications

These procedures are implemented where paving, surfacing, resurfacing, or sawcutting, may pollute stormwater runoff or discharge to the storm drain system or watercourses.

Limitations

- Paving opportunities may be limited during wet weather.

Discharges of freshly paved surfaces may raise pH to environmentally harmful levels and trigger permit violations.

EXHIBIT "C" (Stormwater Pollution Prevention Plan)



Implementation

General

- Avoid paving during the wet season when feasible.
- Reschedule paving and grinding activities if rain is forecasted.
- Train employees and sub-contractors in pollution prevention and reduction.
- Store materials away from drainage courses to prevent stormwater runoff (see WM-1, Material Delivery and Storage).
- Protect drainage courses, particularly in areas with a grade, by employing BMPs to divert runoff or to trap and filter sediment.
- Stockpile material removed from roadways away from drain inlets, drainage ditches, and watercourses. These materials should be stored consistent with WM-3, Stockpile Management.
- Disposal of PCC (Portland cement concrete) and AC (asphalt concrete) waste should be in conformance with WM-8, Concrete Waste Management.

Saw Cutting, Grinding, and Pavement Removal

- Shovel or vacuum saw-cut slurry and remove from site. Cover or barricade storm drains during saw cutting to contain slurry.
- When paving involves AC, the following steps should be implemented to prevent the discharge of grinding residue, uncompacted or loose AC, tack coats, equipment cleaners, or unrelated paving materials:
 - AC grindings, pieces, or chunks used in embankments or shoulder backing should not be allowed to enter any storm drains or watercourses. Install inlet protection and perimeter controls until area is stabilized (i.e. cutting, grinding or other removal activities are complete and loose material has been properly removed and disposed of) or permanent controls are in place. Examples of temporary perimeter controls can be found in EC-9, Earth Dikes and Drainage Swales; SE-1, Silt Fence; SE-5, Fiber Rolls, or SE-13 Compost Socks and Berms
 - Collect and remove all broken asphalt and recycle when practical. Old or spilled asphalt should be recycled or disposed of properly.
- Do not allow saw-cut slurry to enter storm drains or watercourses. Residue from grinding operations should be picked up by a vacuum attachment to the grinding machine, or by sweeping, should not be allowed to flow across the pavement, and should not be left on the surface of the pavement. See also WM-8, Concrete Waste Management, and WM-10, Liquid Waste Management.
- Pavement removal activities should not be conducted in the rain.
- Collect removed pavement material by mechanical or manual methods. This material may be recycled for use as shoulder backing or base material.

- If removed pavement material cannot be recycled, transport the material back to an approved storage site.

Asphaltic Concrete Paving

- If paving involves asphaltic cement concrete, follow these steps:
 - Do not allow sand or gravel placed over new asphalt to wash into storm drains, streets, or creeks. Vacuum or sweep loose sand and gravel and properly dispose of this waste by referring to WM-5, Solid Waste Management.
 - Old asphalt should be disposed of properly. Collect and remove all broken asphalt from the site and recycle whenever possible.

Portland Cement Concrete Paving

- Do not wash sweepings from exposed aggregate concrete into a storm drain system. Collect waste materials by dry methods, such as sweeping or shoveling, and return to aggregate base stockpile or dispose of properly. Allow aggregate rinse to settle. Then, either allow rinse water to dry in a temporary pit as described in WM-8, Concrete Waste Management, or pump the water to the sanitary sewer if authorized by the local wastewater authority.

Sealing Operations

- During chip seal application and sweeping operations, petroleum or petroleum covered aggregate should not be allowed to enter any storm drain or water courses. Apply temporary perimeter controls until structure is stabilized (i.e. all sealing operations are complete and cured and loose materials have been properly removed and disposed).
- Inlet protection (SE-10, Storm Drain Inlet Protection) should be used during application of seal coat, tack coat, slurry seal, and fog seal.
- Seal coat, tack coat, slurry seal, or fog seal should not be applied if rainfall is predicted to occur during the application or curing period.

Paving Equipment

- Leaks and spills from paving equipment can contain toxic levels of heavy metals and oil and grease. Place drip pans or absorbent materials under paving equipment when not in use. Clean up spills with absorbent materials and dispose of in accordance with the applicable regulations. See NS-10, Vehicle and Equipment Maintenance, WM-4, Spill Prevention and Control, and WM-10, Liquid Waste Management.
- Substances used to coat asphalt transport trucks and asphalt spreading equipment should not contain soap and should be non-foaming and non-toxic.
- Paving equipment parked onsite should be parked over plastic to prevent soil contamination.
- Clean asphalt coated equipment offsite whenever possible. When cleaning dry, hardened asphalt from equipment, manage hardened asphalt debris as described in WM-5, Solid Waste Management. Any cleaning onsite should follow NS-8, Vehicle and Equipment Cleaning.

EXHIBIT "C" (Stormwater Pollution Prevention Plan)

Thermoplastic Striping

- Thermoplastic striper and pre-heater equipment shutoff valves should be inspected to ensure that they are working properly to prevent leaking thermoplastic from entering drain inlets, the stormwater drainage system, or watercourses.
- Pre-heaters should be filled carefully to prevent splashing or spilling of hot thermoplastic. Leave six inches of space at the top of the pre-heater container when filling thermoplastic to allow room for material to move.
- Do not pre-heat, transfer, or load thermoplastic near drain inlets or watercourses.
- Clean truck beds daily of loose debris and melted thermoplastic. When possible, recycle thermoplastic material.

Raised/Recessed Pavement Marker Application and Removal

- Do not transfer or load bituminous material near drain inlets, the stormwater drainage system, or watercourses.
- Melting tanks should be loaded with care and not filled to beyond six inches from the top to leave room for splashing.
- When servicing or filling melting tanks, ensure all pressure is released before removing lids to avoid spills.
- On large-scale projects, use mechanical or manual methods to collect excess bituminous material from the roadway after removal of markers.

Costs

- All of the above are low cost measures.

Inspection and Maintenance

- Inspect and verify that activity-based BMPs are in place prior to the commencement of paving and grinding operations.
- BMPs must be inspected in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- Sample stormwater runoff required by the General Permit.
- Keep ample supplies of drip pans or absorbent materials onsite.
- Inspect and maintain machinery regularly to minimize leaks and drips.

References

Blueprint for a Clean Bay: Best Management Practices to Prevent Stormwater Pollution from Construction Related Activities; Santa Clara Valley Nonpoint Source Pollution Control Program, 1995.

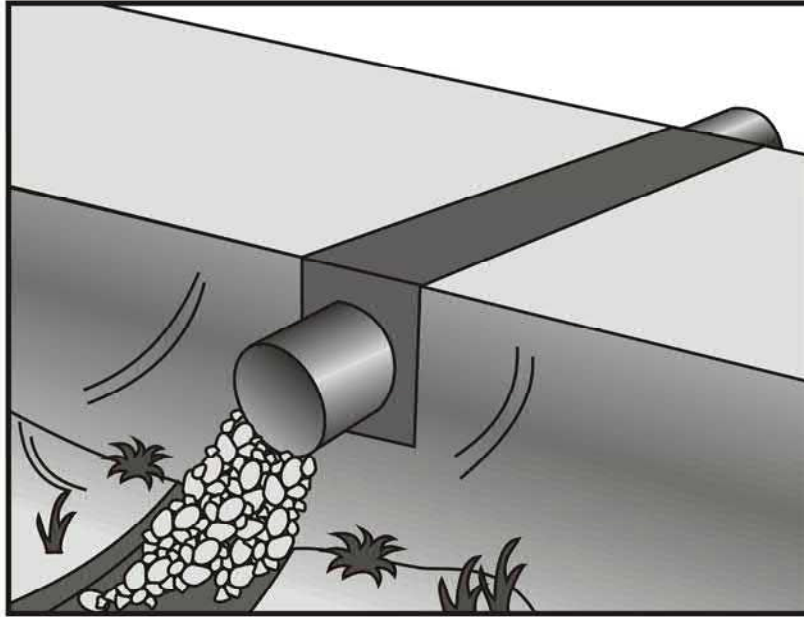
EXHIBIT "C" (Stormwater Pollution Prevention Plan)

Hot Mix Asphalt-Paving Handbook AC 150/5370-14, Appendix I, U.S. Army Corps of Engineers, July 1991.

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), March 2003.

Erosion and Sediment Control Manual, Oregon Department of Environmental Quality, February 2005.

EXHIBIT "C" (Stormwater Pollution Prevention Plan)



Description and Purpose

A temporary stream crossing is a temporary culvert, ford or bridge placed across a waterway to provide access for construction purposes for a period of less than one year. Temporary access crossings are not intended to maintain traffic for the public. The temporary access will eliminate erosion and downstream sedimentation caused by vehicles.

Suitable Applications

Temporary stream crossings should be installed at all designated crossings of perennial and intermittent streams on the construction site, as well as for dry channels that may be significantly eroded by construction traffic.

Temporary streams crossings are installed at sites:

- Where appropriate permits have been secured (404 Permits, and 401 Certifications)
- Where construction equipment or vehicles need to frequently cross a waterway
- When alternate access routes impose significant constraints
- When crossing perennial streams or waterways causes significant erosion
- Where construction activities will not last longer than one year

Categories

EC	Erosion Control	<input checked="" type="checkbox"/>
SE	Sediment Control	<input checked="" type="checkbox"/>
TC	Tracking Control	<input checked="" type="checkbox"/>
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	<input checked="" type="checkbox"/>
WM	Waste Management and Materials Pollution Control	

Legend:

- Primary Objective
- Secondary Objective

Targeted Constituents

Sediment	<input checked="" type="checkbox"/>
Nutrients	
Trash	
Metals	
Bacteria	
Oil and Grease	
Organics	

Potential Alternatives

None

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- Where appropriate permits have been obtained for the stream crossing

Limitations

The following limitations may apply:

- Installation and removal will usually disturb the waterway.
- Installation may require Regional Water Quality Control Board (RWQCB) 401 Certification, U.S. Army Corps of Engineers 404 permit and approval by California Department of Fish and Game. If numerical-based water quality standards are mentioned in any of these and other related permits, testing and sampling may be required.
- Installation may require dewatering or temporary diversion of the stream. See NS-2, Dewatering Operations and NS-5, Clear Water Diversion.
- Installation may cause a constriction in the waterway, which can obstruct flood flow and cause flow backups or washouts. If improperly designed, flow backups can increase the pollutant load through washouts and scouring.
- Use of natural or other gravel in the stream for construction of Cellular Confinement System (CCS) ford crossing will be contingent upon approval by fisheries agencies.
- Ford crossings may degrade water quality due to contact with vehicles and equipment.
- May be expensive for a temporary improvement.
- Requires other BMPs to minimize soil disturbance during installation and removal.
- Fords should only be used in dry weather.

Implementation

General

The purpose of this BMP is to provide a safe, erosion-free access across a stream for construction equipment. Minimum standards and specifications for the design, construction, maintenance, and removal of the structure should be established by an engineer registered in California. Temporary stream crossings may be necessary to prevent construction equipment from causing erosion of the stream and tracking sediment and other pollutants into the stream.

Temporary stream crossings are used as access points to construction sites when other detour routes may be too long or burdensome for the construction equipment. Often heavy construction equipment must cross streams or creeks, and detour routes may impose too many constraints such as being too narrow or poor soil strength for the equipment loadings. Additionally, the contractor may find a temporary stream crossing more economical for light-duty vehicles to use for frequent crossings and may have less environmental impact than construction of a temporary access road.

Location of the temporary stream crossing should address:

- Site selection where erosion potential is low.

- Areas where the side slopes from site runoff will not spill into the side slopes of the crossing.

The following types of temporary stream crossings should be considered:

- **Culverts** – A temporary culvert is effective in controlling erosion but will cause erosion during installation and removal. A temporary culvert can be easily constructed and allows for heavy equipment loads.
- **Fords** - Appropriate during the dry season in arid areas. Used on dry washes and ephemeral streams, and low-flow perennial streams. CCS, a type of ford crossing, is also appropriate for use in streams that would benefit from an influx of gravels. A temporary ford provides little sediment and erosion control and is ineffective in controlling erosion in the stream channel. A temporary ford is the least expensive stream crossing and allows for maximum load limits. It also offers very low maintenance. Fords are more appropriate during the dry ice season and in arid areas of California.
- **Bridges** - Appropriate for streams with high flow velocities, steep gradients and where temporary restrictions in the channel are not allowed.

Design

During the long summer construction season in much of California, rainfall is infrequent, and many streams are dry. Under these conditions, a temporary ford may be sufficient. A ford is not appropriate if construction will continue through the winter rainy season, if summer thunderstorms are likely, or if the stream flows during most of the year. Temporary culverts and bridges should then be considered and, if used, should be sized to pass a significant design storm (i.e., at least a 10-year storm). The temporary stream crossing should be protected against erosion, both to prevent excessive sedimentation in the stream and to prevent washout of the crossing.

Design and installation requires knowledge of stream flows and soil strength. Designs should be prepared under direction of, and approved by, a registered civil engineer and for bridges, a registered structural engineer. Both hydraulic and construction loading requirements should be considered with the following:

- Comply with any special requirements for culvert and bridge crossings, particularly if the temporary stream crossing will remain through the rainy season.
- Provide stability in the crossing and adjacent areas to withstand the design flow. The design flow and safety factor should be selected based on careful evaluation of the risks due to over topping, flow backups, or washout.
- Install sediment traps immediately downstream of crossings to capture sediments. See SE-3, Sediment Trap.
- Avoid oil or other potentially hazardous materials for surface treatment.
- Culverts are relatively easy to construct and able to support heavy equipment loads.
- Fords are the least expensive of the crossings, with maximum load limits.

- CCS crossing structures consist of clean, washed gravel and cellular confinement system blocks. CCS are appropriate for streams that would benefit from an influx of gravel; for example, salmonid streams, streams or rivers below reservoirs, and urban, channelized streams. Many urban stream systems are gravel-deprived due to human influences, such as dams, gravel mines, and concrete channels.
- CCS allow designers to use either angular or naturally occurring rounded gravel, because the cells provide the necessary structure and stability. In fact, natural gravel is optimal for this technique, because of the habitat improvement it will provide after removal of the CCS.
- A gravel depth of 6 to 12 in. for a CCS structure is sufficient to support most construction equipment.
- An advantage of a CCS crossing structure is that relatively little rock or gravel is needed, because the CCS provides the stability.
- Bridges are generally more expensive to design and construct but provide the least disturbance of the streambed and constriction of the waterway flows.

Construction and Use

- Stabilize construction roadways, adjacent work area, and stream bottom against erosion.
- Construct during dry periods to minimize stream disturbance and reduce costs.
- Construct at or near the natural elevation of the streambed to prevent potential flooding upstream of the crossing.
- Install temporary erosion control BMPs in accordance with erosion control BMP fact sheets to minimize erosion of embankment into flow lines.
- Any temporary artificial obstruction placed within flowing water should only be built from material, such as clean gravel or sandbags, that will not introduce sediment or silt into the watercourse.
- Temporary water body crossings and encroachments should be constructed to minimize scour. Cobbles used for temporary water body crossings or encroachments should be clean, rounded river cobble.
- Vehicles and equipment should not be driven, operated, fueled, cleaned, maintained, or stored in the wet or dry portions of a water body where wetland vegetation, riparian vegetation, or aquatic organisms may be destroyed.
- The exterior of vehicles and equipment that will encroach on the water body within the project should be maintained free of grease, oil, fuel, and residues.
- Drip pans should be placed under all vehicles and equipment placed on docks, barges, or other structures over water bodies when the vehicle or equipment is planned to be idle for more than one hour.

EXHIBIT "C" (Stormwater Pollution Prevention Plan)

- Disturbance or removal of vegetation should not exceed the minimum necessary to complete operations. Precautions should be taken to avoid damage to vegetation by people or equipment. Disturbed vegetation should be replaced with the appropriate soil stabilization measures.
- Riparian vegetation, when removed pursuant to the provisions of the work, should be cut off no lower than ground level to promote rapid re-growth. Access roads and work areas built over riparian vegetation should be covered by a sufficient layer of clean river run cobble to prevent damage to the underlying soil and root structure. The cobble must be removed upon completion of project activities.
- Conceptual temporary stream crossings are shown in the attached figures.

Costs

Caltrans Construction Cost index for temporary bridge crossings is \$58-\$122/ft² (costs adjusted for inflation, 2016 dollars, by Tetra Tech Inc.).

Inspection and Maintenance

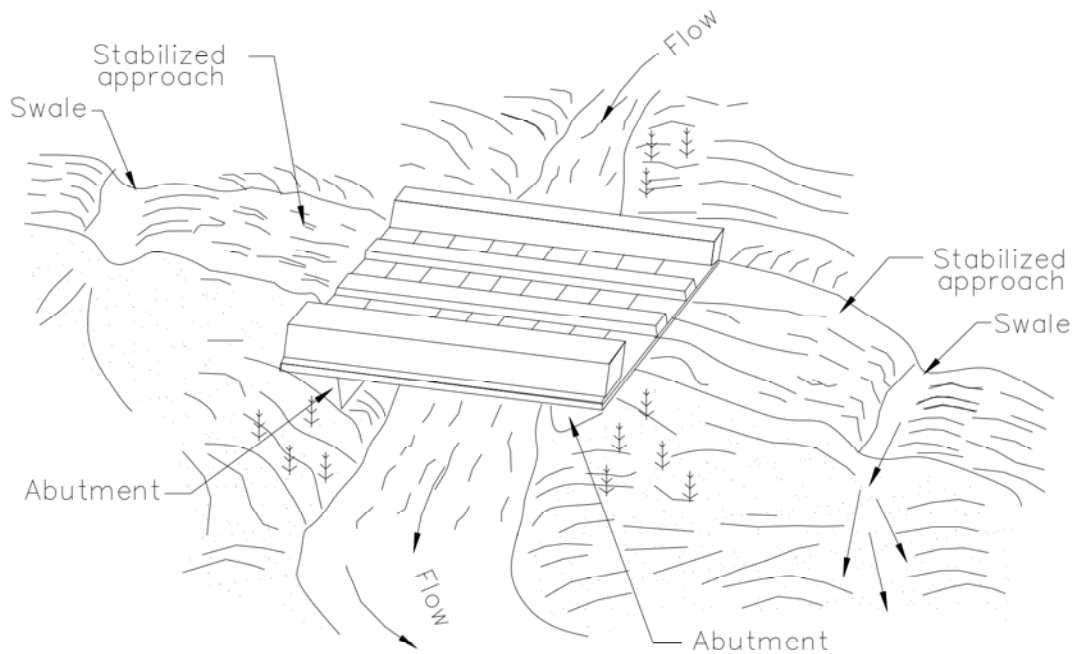
- Inspect and verify that activity-based BMPs are in place prior to the commencement of associated activities. While activities associated with the BMP are under way, inspect BMPs in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- Check for blockage in the channel, sediment buildup or trapped debris in culverts, blockage behind fords or under bridges.
- Check for erosion of abutments, channel scour, riprap displacement, or piping in the soil.
- Check for structural weakening of the temporary crossings, such as cracks, and undermining of foundations and abutments.
- Remove sediment that collects behind fords, in culverts, and under bridges periodically.
- Replace lost or displaced aggregate from inlets and outlets of culverts and cellular confinement systems.
- Remove temporary crossing promptly when it is no longer needed.

References

California Bank and Shore Rock Slope Protection Design – Practitioners Guide and Field Evaluations of Riprap Methods, Caltrans Study No. F90TLo3, October 2000.

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.

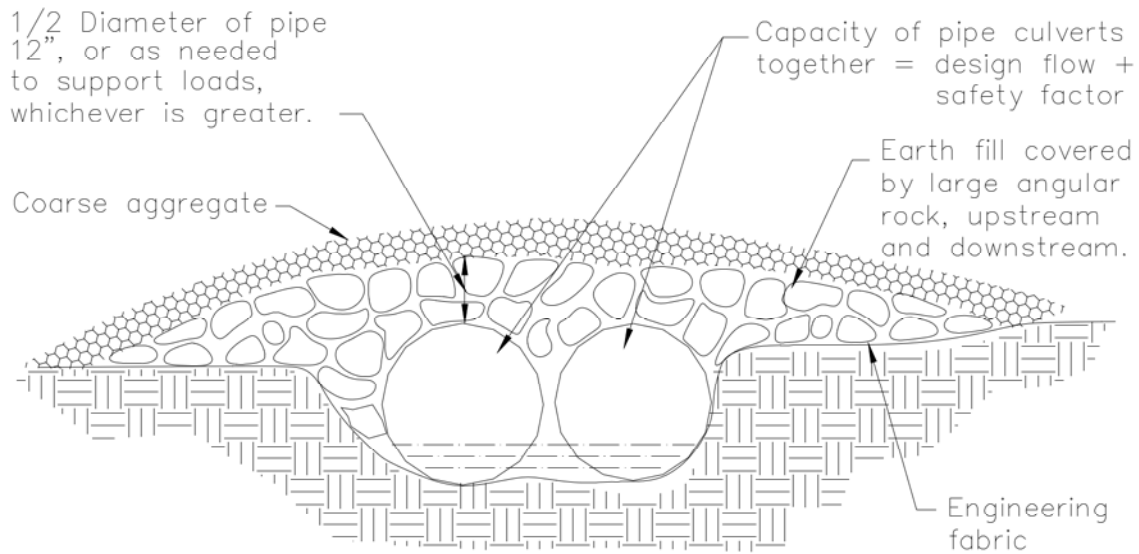
EXHIBIT "C" (Stormwater Pollution Prevention Plan)



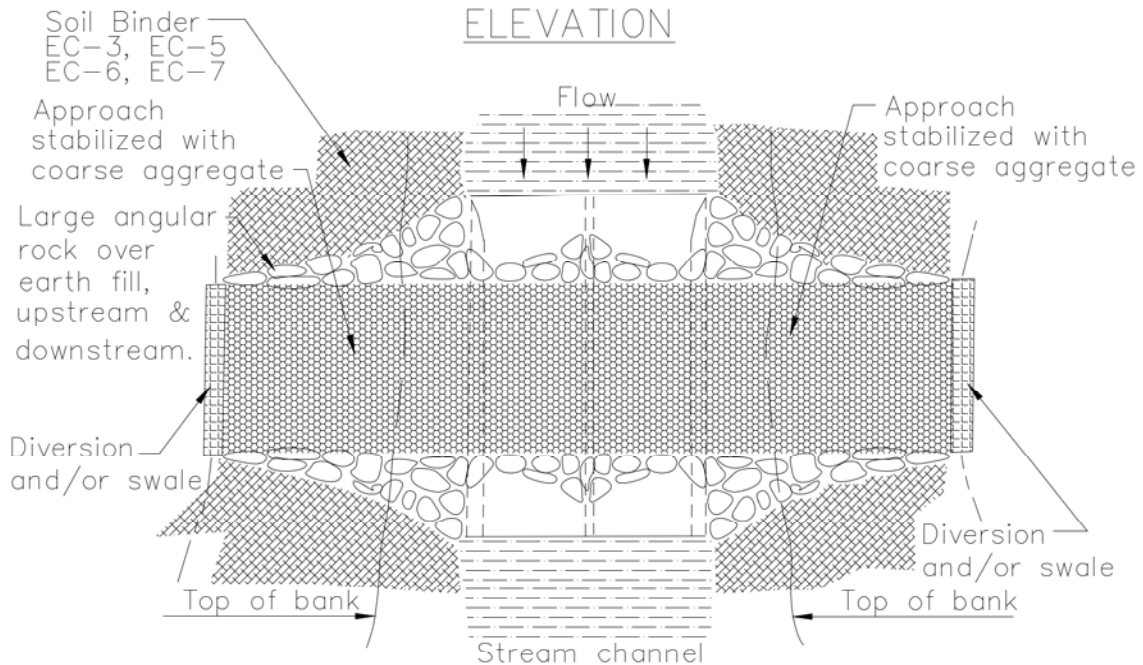
NOTE:
Surface flow of road diverted
by swale and/or dike.

TYPICAL BRIDGE CROSSING
NOT TO SCALE

EXHIBIT "C" (Stormwater Pollution Prevention Plan)



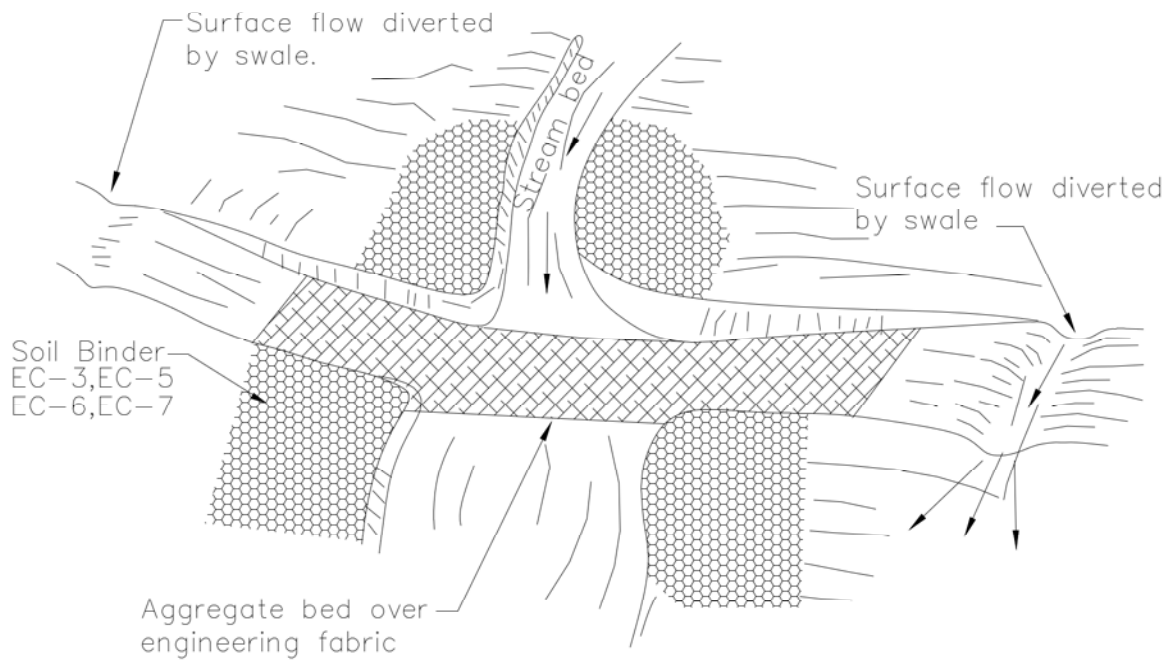
ELEVATION



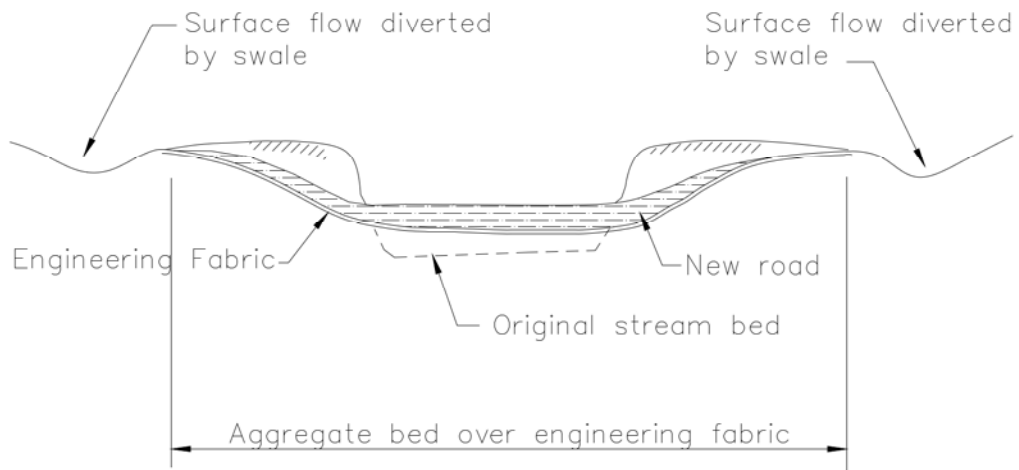
PLAN VIEW

TYPICAL CULVERT CROSSING
NOT TO SCALE

EXHIBIT "C" (Stormwater Pollution Prevention Plan)

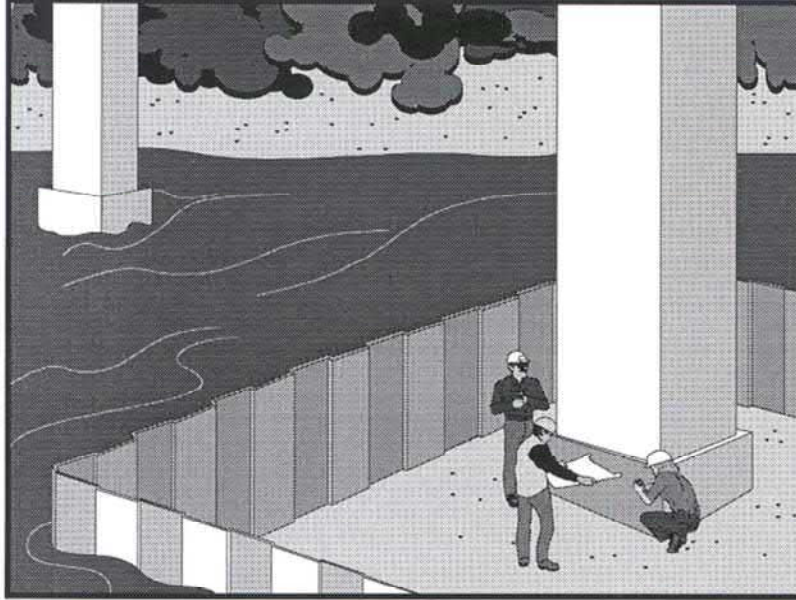


Aggregate approach
1:5 (V:H) Maximum slope on road



TYPICAL FORD CROSSING
NOT TO SCALE

EXHIBIT "C" (Stormwater Pollution Prevention Plan)



Description and Purpose

Clear water diversion consists of a system of structures and measures that intercept clear surface water runoff upstream of a project, transport it around the work area, and discharge it downstream with minimal water quality degradation from either the project construction operations or the construction of the diversion. Clear water diversions are used in a waterway to enclose a construction area and reduce sediment pollution from construction work occurring in or adjacent to water. Structures commonly used as part of this system include diversion ditches, berms, dikes, slope drains, rock, gravel bags, wood, aqua barriers, cofferdams, filter fabric or turbidity curtains, drainage and interceptor swales, pipes, or flumes.

Suitable Applications

A clear water diversion is typically implemented where appropriate permits (1601 Agreement) have been secured and work must be performed in a flowing stream or water body.

- Clear water diversions are appropriate for isolating construction activities occurring within or near a water body such as streambank stabilization, or culvert, bridge, pier or abutment installation. They may also be used in combination with other methods, such as clear water bypasses and/or pumps.
- Pumped diversions are suitable for intermittent and low flow streams.
- Excavation of a temporary bypass channel or passing the flow through a heavy pipe (called a "flume") with a trench

Categories

EC	Erosion Control	
SE	Sediment Control	
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	<input checked="" type="checkbox"/>
WM	Waste Management and Materials Pollution Control	

Legend:

- Primary Objective
- Secondary Objective

Targeted Constituents

Sediment	<input checked="" type="checkbox"/>
Nutrients	
Trash	
Metals	
Bacteria	
Oil and Grease	
Organics	

Potential Alternatives

None

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excavated under it, is appropriate for the diversion of streams less than 20 ft wide, with flow rates less than 100 cfs.

- Clear water diversions incorporating clean washed gravel may be appropriate for use in salmonid spawning streams.

Limitations

- Diversion and encroachment activities will usually disturb the waterway during installation and removal of diversion structures.
- Installation may require Regional Water Quality Control Board (RWQCB) 401 Certification, U.S. Army Corps of Engineers 404 permit and approval by California Department of Fish and Game. If numerical-based water quality standards are mentioned in any of these and other related permits, testing and sampling may be required.
- Diversion and encroachment activities may constrict the waterway, which can obstruct flood flows and cause flooding or washouts. Diversion structures should not be installed without identifying potential impacts to the stream channel.
- Diversion or isolation activities are not appropriate in channels where there is insufficient stream flow to support aquatic species in the area dewatered as a result of the diversion.
- Diversion or isolation activities are inappropriate in deep water unless designed or reviewed by an engineer registered in California.
- Diversion or isolation activities should not completely dam stream flow.
- Dewatering and removal may require additional sediment control or water treatment. See NS-2, Dewatering Operations.
- Not appropriate if installation, maintenance, and removal of the structures will disturb sensitive aquatic species of concern.

Implementation

General

- Implement guidelines presented in EC-12, Streambank Stabilization to minimize impacts to streambanks.
- Where working areas encroach on flowing streams, barriers adequate to prevent the flow of muddy water into streams should be constructed and maintained between working areas and streams. During construction of the barriers, muddying of streams should be held to a minimum.
- Diversion structures must be adequately designed to accommodate fluctuations in water depth or flow volume due to tides, storms, flash floods, etc.
- Heavy equipment driven in wet portions of a water body to accomplish work should be completely clean of petroleum residue, and water levels should be below the fuel tanks, gearboxes, and axles of the equipment unless lubricants and fuels are sealed such that inundation by water will not result in discharges of fuels, oils, greases, or hydraulic fluids.

- Excavation equipment buckets may reach out into the water for the purpose of removing or placing fill materials. Only the bucket of the crane/ excavator/backhoe may operate in a water body. The main body of the crane/excavator/backhoe should not enter the water body except as necessary to cross the stream to access the work site.
- Stationary equipment such as motors and pumps located within or adjacent to a water body, should be positioned over drip pans.
- When any artificial obstruction is being constructed, maintained, or placed in operation, sufficient water should, at all times, be allowed to pass downstream to maintain aquatic life.
- Equipment should not be parked below the high-water mark unless allowed by a permit.
- Disturbance or removal of vegetation should not exceed the minimum necessary to complete operations. Precautions should be taken to avoid damage to vegetation by people or equipment. Disturbed vegetation should be replaced with the appropriate erosion control measures.
- Riparian vegetation approved for trimming as part of the project should be cut off no lower than ground level to promote rapid re-growth. Access roads and work areas built over riparian vegetation should be covered by a sufficient layer of clean river run cobble to prevent damage to the underlying soil and root structure. The cobble should be removed upon completion of project activities.
- Drip pans should be placed under all vehicles and equipment placed on docks, barges, or other structures over water bodies when the vehicle or equipment is planned to be idle for more than 1 hour.
- Where possible, avoid or minimize diversion and encroachment impacts by scheduling construction during periods of low flow or when the stream is dry. Scheduling should also consider seasonal releases of water from dams, fish migration and spawning seasons, and water demands due to crop irrigation.
- Construct diversion structures with materials free of potential pollutants such as soil, silt, sand, clay, grease, or oil.

Temporary Diversions and Encroachments

- Construct diversion channels in accordance with EC-9, Earth Dikes and Drainage Swales.
- In high flow velocity areas, stabilize slopes of embankments and diversion ditches using an appropriate liner, in accordance with EC-7, Geotextiles and Mats, or use rock slope protection.
- Where appropriate, use natural streambed materials such as large cobbles and boulders for temporary embankment and slope protection, or other temporary soil stabilization methods.
- Provide for velocity dissipation at transitions in the diversion, such as the point where the stream is diverted to the channel and the point where the diverted stream is returned to its natural channel. See also EC-10, Velocity Dissipation Devices.

Temporary Dry Construction Areas

- When dewatering behind temporary structures to create a temporary dry construction area, such as cofferdams, pass pumped water through a sediment-settling device, such as a portable tank or settling basin, before returning water to the water body. See also NS-2, Dewatering Operations.
- Any substance used to assemble or maintain diversion structures, such as form oil, should be non-toxic and non-hazardous.
- Any material used to minimize seepage underneath diversion structures, such as grout, should be non-toxic, non-hazardous, and as close to a neutral pH as possible.

Comparison of Diversion and Isolation Techniques:

- Gravel bags are relatively inexpensive, but installation and removal can be labor intensive. It is also difficult to dewater the isolated area. Sandbags should not be used for this technique in rivers or streams, as sand should never be put into or adjacent to a stream, even if encapsulated in geotextile.
- Gravel Bag Berms (SE-6) used in conjunction with an impermeable membrane are cost effective and can be dewatered relatively easily. If spawning gravel is used, the impermeable membrane can be removed from the stream, and the gravel can be spread out and left as salmonid spawning habitat if approved in the permit. Only clean, washed gravel should be used for both the gravel bag and gravel berm techniques.
- Cofferdams are relatively expensive, but frequently allow full dewatering. Also, many options now available are relatively easy to install.
- Sheet pile enclosures are a much more expensive solution but do allow full dewatering. This technique is not well suited to small streams, but can be effective on large rivers or lakes, and where staging and heavy equipment access areas are available.
- K-rails are an isolation method that does not allow full dewatering, but can be used in small to large watercourses, and in fast-water situations.
- A relatively inexpensive isolation method is filter fabric isolation. This method involves placement of gravel bags or continuous berms to 'key-in' the fabric, and subsequently staking the fabric in place. This method should be used in relatively calm water and can be used in smaller streams. Note that this is not a dewatering method, but rather a sediment isolation method.
- Turbidity curtains should be used where sediment discharge to a stream is unavoidable. They can also be used for in-stream construction, when dewatering an area is not required.
- When used in watercourses or streams, cofferdams must be used in accordance with permit requirements.
- Manufactured diversion structures should be installed following manufacturer's specifications.

EXHIBIT "C" (Stormwater Pollution Prevention Plan)

- Filter fabric and turbidity curtain isolation installation methods can be found in the specific technique descriptions that follow.

Filter Fabric Isolation Technique

Definition and Purpose

A filter fabric isolation structure is a temporary structure built into a waterway to enclose a construction area and reduce sediment pollution from construction work in or adjacent to water. This structure is composed of filter fabric, gravel bags, and steel t-posts.

Appropriate Applications

- Filter fabric may be used for construction activities such as streambank stabilization, or culvert, bridge, pier or abutment installation. It may also be used in combination with other methods, such as clean water bypasses and/or pumps.
- Filter fabric isolation is relatively inexpensive. This method involves placement of gravel bags or continuous berms to 'key-in' the fabric, and subsequently staking the fabric in place.
- If spawning gravel is used, all other components of the isolation can be removed from the stream, and the gravel may be spread out and left as salmonid spawning habitat if approved in the permit. Whether spawning gravel or other types of gravel are used, only clean washed gravel should be used as infill for the gravel bags or continuous berm.
- This method should be used in relatively calm water and can be used in smaller streams. This is not a dewatering method, but rather a sediment isolation method.
- Water levels inside and outside the fabric curtain must be about the same, as differential heads will cause the curtain to collapse.

Limitations

- Do not use if the installation, maintenance and removal of the structures will disturb sensitive aquatic species of concern.
- Filter fabrics are not appropriate for projects where dewatering is necessary.
- Filter fabrics are not appropriate to completely dam stream flow.

Design and Installation

- For the filter fabric isolation method, a non-woven or heavy-duty fabric is recommended over standard silt fence. Using rolled geotextiles allows non-standard widths to be used.
- Anchor filter fabric with gravel bags filled with clean, washed gravel. Do not use sand. If a bag should split open, the gravel can be left in the stream, where it can provide aquatic habitat benefits. If a sandbag splits open in a watercourse, the sand could cause a decrease in water quality, and could bury sensitive aquatic habitat.
- Another anchor alternative is a continuous berm, made with the Continuous Berm Machine. This is a gravel-filled bag that can be made in very long segments. The length of the berms is usually limited to 18 ft for ease of handling (otherwise, it gets too heavy to move).

EXHIBIT "C" (Stormwater Pollution Prevention Plan)

- Place the fabric on the bottom of the stream, and place either a bag of clean, washed gravel or a continuous berm over the bottom of the silt fence fabric, such that a bag-width of fabric lies on the stream bottom. The bag should be placed on what will be the outside of the isolation area.
- Pull the fabric up and place a metal t-post immediately behind the fabric, on the inside of the isolation area; attach the silt fence to the post with three diagonal nylon ties.
- Continue placing fabric as described above until the entire work area has been isolated, staking the fabric at least every 6 ft.

Inspection and Maintenance

- Immediately repair any gaps, holes or scour.
- Remove and properly dispose of sediment buildup.
- Remove BMP upon completion of construction activity. Recycle or reuse if applicable.
- Revegetate areas disturbed by BMP removal if needed.

Turbidity Curtain Isolation Technique

Definition and Purpose

A turbidity curtain is a fabric barrier used to isolate the near shore work area. The barriers are intended to confine the suspended sediment. The curtain is a floating barrier, and thus does not prevent water from entering the isolated area; rather, it prevents suspended sediment from getting out.

Appropriate Applications

Turbidity curtains should be used where sediment discharge to a stream is unavoidable. They are used when construction activities adjoin quiescent waters, such as lakes, ponds, and slow flowing rivers. The curtains are designed to deflect and contain sediment within a limited area and provide sufficient retention time so that the sediment particles will fall out of suspension.

Limitations

- Turbidity curtains should not be used in flowing water; they are best suited for use in ponds, lakes, and very slow-moving rivers.
- Turbidity curtains should not be placed across the width of a channel.
- Removing sediment that has been deflected and settled out by the curtain may create a discharge problem through the resuspension of particles and by accidental dumping by the removal equipment.

Design and Installation

- Turbidity curtains should be oriented parallel to the direction of flow.
- The curtain should extend the entire depth of the watercourse in calm-water situations.
- In wave conditions, the curtain should extend to within 1 ft of the bottom of the watercourse, such that the curtain does not stir up sediment by hitting the bottom repeatedly. If it is

desirable for the curtain to reach the bottom in an active-water situation, a pervious filter fabric may be used for the bottom 1 ft.

- The top of the curtain should consist of flexible flotation buoys, and the bottom should be held down by a load line incorporated into the curtain fabric. The fabric should be a brightly colored impervious mesh.
- The curtain should be held in place by anchors placed at least every 100 ft.
- First, place the anchors, then tow the fabric out in a furled condition, and connect to the anchors. The anchors should be connected to the flotation devices, and not to the bottom of the curtain. Once in place, cut the furling lines, and allow the bottom of the curtain to sink.
- Consideration must be given to the probable outcome of the removal procedure. It must be determined if it will create more of a sediment problem through re-suspension of the particles or by accidental dumping of material during removal. It is recommended that the soil particles trapped by the turbidity curtain only be removed if there has been a significant change in the original contours of the affected area in the watercourse.
- Particles should always be allowed to settle for a minimum of 6 to 12 hours prior to their removal or prior to removal of the turbidity curtain.

Maintenance and Inspection:

- The curtain should be inspected for holes or other problems, and any repairs needed should be made promptly.
- Allow sediment to settle for 6 to 12 hours prior to removal of sediment or curtain. This means that after removing sediment, wait an additional 6 to 12 hours before removing the curtain.
- To remove, install furling lines along the curtain, detach from anchors, and tow out of the water.

K-rail River Isolation

Definition and Purpose

This temporary sediment control or stream isolation method uses K-rails to form the sediment deposition area, or to isolate the in-stream or near-bank construction area.

Barriers are placed end-to-end in a pre-designed configuration and gravel-filled bags are used at the toe of the barrier and at their abutting ends to seal and prevent movement of sediment beneath or through the barrier walls.

Appropriate Applications

The K-rail isolation can be used in streams with higher water velocities than many other isolation techniques.

- This technique is also useful at the toe of embankments and cut or fill slopes.

EXHIBIT "C" (Stormwater Pollution Prevention Plan)

Limitations

- The K-rail method should not be used to dewater a project site, as the barrier is not watertight.

Design and Installation

- To create a floor for the K-rail, move large rocks and obstructions. Place washed gravel and gravel-filled bags to create a level surface for K-rails to sit. Washed gravel should always be used.
- Place the bottom two K-rails adjacent to each other, and parallel to the direction of flow; fill the center portion with gravel bags. Then place the third K-rail on top of the bottom two. There should be sufficient gravel bags between the bottom K-rails such that the top rail is supported by the gravel. Place plastic sheeting around the K-rails, and secure at the bottom with gravel bags.
- Further support can be added by pinning and cabling the K-rails together. Also, large riprap and boulders can be used to support either side of the K-rail, especially where there is strong current.

Inspection and Maintenance:

- The barrier should be inspected, and any leaks, holes, or other problems should be addressed immediately.
- Sediment should be allowed to settle for at least 6 to 12 hours prior to removal of sediment, and for 6 to 12 hours prior to removal of the barrier.

Stream Diversions

The selection of which stream diversion technique to use will depend upon the type of work involved, physical characteristics of the site, and the volume of water flowing through the project.

Advantages of a Pumped Diversion

- Downstream sediment transport can be nearly eliminated.
- Dewatering of the work area is possible.
- Pipes can be moved around to allow construction operations.
- The dams can serve as temporary access to the site.
- Increased flows can be managed by adding more pumping capacity.

Disadvantages of a Pumped Diversion

- Flow volume is limited by pump capacity.
- A pumped diversion requires 24-hour monitoring of pumps.
- Sudden rain could overtop dams.
- Erosion at the outlet.

EXHIBIT "C" (Stormwater Pollution Prevention Plan)

- Minor in-stream disturbance is required to install and remove dams.

Advantages of Excavated Channels and Flumes

- Excavated channels isolate work from water flow and allow dewatering.
- Excavated channels can handle larger flows than pumps.

Disadvantages of Excavated Channels and Flumes

- Bypass channel or flume must be sized to handle flows, including possible floods.
- Channels must be protected from erosion.
- Flow diversion and re-direction with small dams involves in-stream disturbance and mobilization of sediment.

Design and Installation

- Installation guidelines will vary based on existing site conditions and type of diversion used.
- Pump capacity must be sufficient for design flow.
- A standby pump is required in case a primary pump fails.
- Dam materials used to create dams upstream and downstream of diversion should be erosion resistant; materials such as steel plate, sheet pile, sandbags, continuous berms, inflatable water bladders, etc., would be acceptable.

When constructing a diversion channel, begin excavation of the channel at the proposed downstream end, and work upstream. Once the watercourse to be diverted is reached and the excavated channel is stable, breach the upstream end and allow water to flow down the new channel. Once flow has been established in the diversion channel, install the diversion weir in the main channel; this will force all water to be diverted from the main channel.

Inspection and Maintenance

- Pumped diversions require 24-hour monitoring of pumps.
- Inspect embankments and diversion channels for damage to the linings, accumulating debris, sediment buildup, and adequacy of the slope protection. Remove debris and repair linings and slope protection as required. Remove holes, gaps, or scour.
- Upon completion of work, the diversion or isolation structure should be removed, and flow should be redirected through the new culvert or back into the original stream channel. Recycle or reuse if applicable.
- Revegetate areas disturbed by BMP removal if needed.

Costs

Costs of clear water diversion vary considerably and can be very high.

EXHIBIT "C" (Stormwater Pollution Prevention Plan)

Inspection and Maintenance

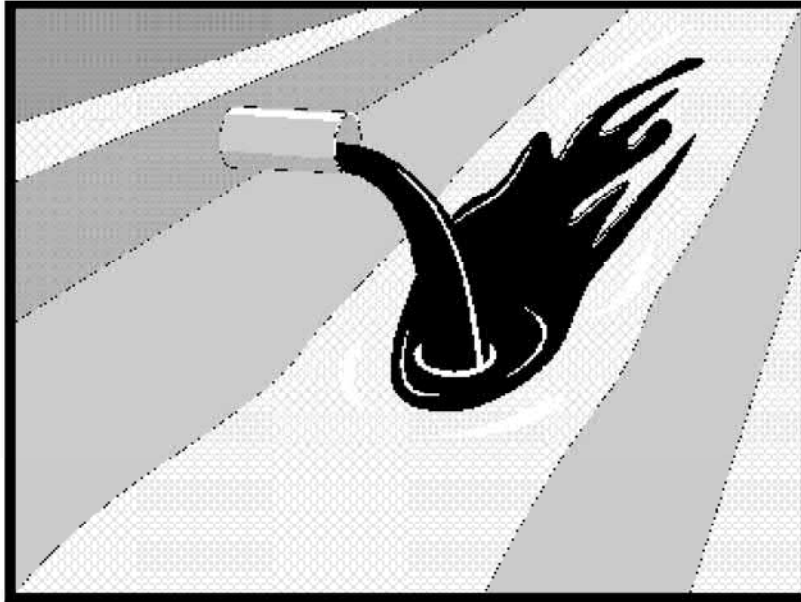
- Inspect and verify that activity-based BMPs are in place prior to the commencement of associated activities. While activities associated with the BMP are under way, inspect BMPs in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- Inspect BMPs subject to non-stormwater discharges daily while non-stormwater discharges occur.
- Refer to BMP-specific inspection and maintenance requirements.

References

California Bank and Shore Rock Slope Protection Design – Practitioners Guide and Field Evaluations of Riprap Methods, Caltrans Study No. F90TLO3, October 2000.

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.

EXHIBIT "C" (Stormwater Pollution Prevention Plan)



Categories

EC	Erosion Control	
SE	Sediment Control	
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	<input checked="" type="checkbox"/>
WM	Waste Management and Materials Pollution Control	

Legend:

- Primary Objective
- Secondary Objective

Targeted Constituents

Sediment	
Nutrients	<input checked="" type="checkbox"/>
Trash	<input checked="" type="checkbox"/>
Metals	<input checked="" type="checkbox"/>
Bacteria	<input checked="" type="checkbox"/>
Oil and Grease	<input checked="" type="checkbox"/>
Organics	<input checked="" type="checkbox"/>

Potential Alternatives

None

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Description and Purpose

Procedures and practices designed for construction contractors to recognize illicit connections or illegally dumped or discharged materials on a construction site and report incidents.

Suitable Applications

This best management practice (BMP) applies to all construction projects. Illicit connection/discharge and reporting is applicable anytime an illicit connection or discharge is discovered, or illegally dumped material is found on the construction site.

Limitations

Illicit connections and illegal discharges or dumping, for the purposes of this BMP, refer to discharges and dumping caused by parties other than the contractor. If pre-existing hazardous materials or wastes are known to exist onsite, they should be identified in the SWPPP and handled as set forth in the SWPPP.

Implementation

Planning

- Review the SWPPP. Pre-existing areas of contamination should be identified and documented in the SWPPP.
- Inspect site before beginning the job for evidence of illicit connections, illegal dumping or discharges. Document any pre-existing conditions and notify the owner.



- Inspect site regularly during project execution for evidence of illicit connections, illegal dumping or discharges.
- Observe site perimeter for evidence for potential of illicitly discharged or illegally dumped material, which may enter the job site.

Identification of Illicit Connections and Illegal Dumping or Discharges

- **General** – unlabeled and unidentifiable material should be treated as hazardous.
- **Solids** - Look for debris, or rubbish piles. Solid waste dumping often occurs on roadways with light traffic loads or in areas not easily visible from the traveled way.
- **Liquids** - signs of illegal liquid dumping or discharge can include:
 - Visible signs of staining or unusual colors to the pavement or surrounding adjacent soils
 - Pungent odors coming from the drainage systems
 - Discoloration or oily substances in the water or stains and residues detained within ditches, channels or drain boxes
 - Abnormal water flow during the dry weather season
- **Urban Areas** - Evidence of illicit connections or illegal discharges is typically detected at storm drain outfall locations or at manholes. Signs of an illicit connection or illegal discharge can include:
 - Abnormal water flow during the dry weather season
 - Unusual flows in sub drain systems used for dewatering
 - Pungent odors coming from the drainage systems
 - Discoloration or oily substances in the water or stains and residues detained within ditches, channels or drain boxes
 - Excessive sediment deposits, particularly adjacent to or near active offsite construction projects
- **Rural Areas** - Illicit connections or illegal discharges involving irrigation drainage ditches are detected by visual inspections. Signs of an illicit discharge can include:
 - Abnormal water flow during the non-irrigation season
 - Non-standard junction structures
 - Broken concrete or other disturbances at or near junction structures

Reporting

Notify the owner of any illicit connections and illegal dumping or discharge incidents at the time of discovery. For illicit connections or discharges to the storm drain system, notify the local stormwater management agency. For illegal dumping, notify the local law enforcement agency.

Cleanup and Removal

The responsibility for cleanup and removal of illicit or illegal dumping or discharges will vary by location. Contact the local stormwater management agency for further information.

Costs

Costs to look for and report illicit connections and illegal discharges and dumping are low. The best way to avoid costs associated with illicit connections and illegal discharges and dumping is to keep the project perimeters secure to prevent access to the site, to observe the site for vehicles that should not be there, and to document any waste or hazardous materials that exist onsite before taking possession of the site.

Inspection and Maintenance

- Inspect and verify that activity-based BMPs are in place prior to the commencement of associated activities. While activities associated with the BMP are under way, inspect BMPs in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- Inspect the site regularly to check for any illegal dumping or discharge.
- Prohibit employees and subcontractors from disposing of non-job-related debris or materials at the construction site.
- Notify the owner of any illicit connections and illegal dumping or discharge incidents at the time of discovery.

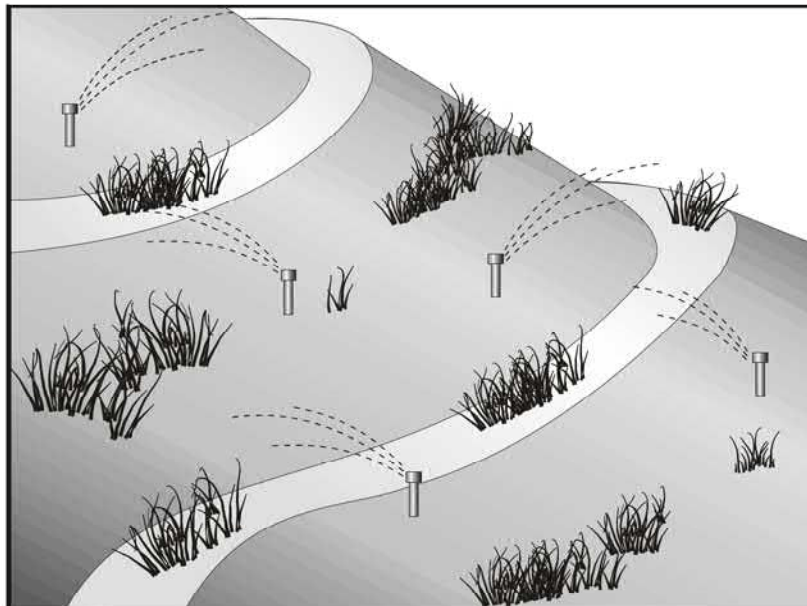
References

Blueprint for a Clean Bay: Best Management Practices to Prevent Stormwater Pollution from Construction Related Activities; Santa Clara Valley Nonpoint Source Pollution Control Program, 1995.

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Stormwater Management for Construction Activities, Developing Pollution Prevention Plans and Best Management Practices, EPA 832-R-92005; USEPA, April 1992.

EXHIBIT "C" (Stormwater Pollution Prevention Plan)



Description and Purpose

Potable Water/Irrigation consists of practices and procedures to manage the discharge of potential pollutants generated during discharges from irrigation water lines, landscape irrigation, lawn or garden watering, planned and unplanned discharges from potable water sources, water line flushing, and hydrant flushing.

Suitable Applications

Implement this BMP whenever potable water or irrigation water discharges occur at or enter a construction site.

Limitations

None identified.

Implementation

- Direct water from offsite sources around or through a construction site, where feasible, in a way that minimizes contact with the construction site.
- Discharges from water line flushing should be reused for landscaping purposes where feasible.
- Shut off the water source to broken lines, sprinklers, or valves as soon as possible to prevent excess water flow.
- Protect downstream stormwater drainage systems and watercourses from water pumped or bailed from trenches excavated to repair water lines.

Categories

EC	Erosion Control	
SE	Sediment Control	
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	<input checked="" type="checkbox"/>
WM	Waste Management and Materials Pollution Control	

Legend:

- Primary Objective
- Secondary Objective

Targeted Constituents

Sediment	<input checked="" type="checkbox"/>
Nutrients	<input checked="" type="checkbox"/>
Trash	
Metals	<input checked="" type="checkbox"/>
Bacteria	
Oil and Grease	
Organics	<input checked="" type="checkbox"/>

Potential Alternatives

None

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- Inspect irrigated areas within the construction limits for excess watering. Adjust watering times and schedules to ensure that the appropriate amount of water is being used and to minimize runoff. Consider factors such as soil structure, grade, time of year, and type of plant material in determining the proper amounts of water for a specific area.

Costs

Cost to manage potable water and irrigation are low and generally considered to be a normal part of related activities.

Inspection and Maintenance

- Inspect and verify that activity-based BMPs are in place prior to the commencement of associated activities. While activities associated with the BMP are under way, inspect BMPs in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- Inspect BMPs subject to non-stormwater discharges daily while non-stormwater discharges occur.
- Repair broken water lines as soon as possible.
- Inspect irrigated areas regularly for signs of erosion and/or discharge.

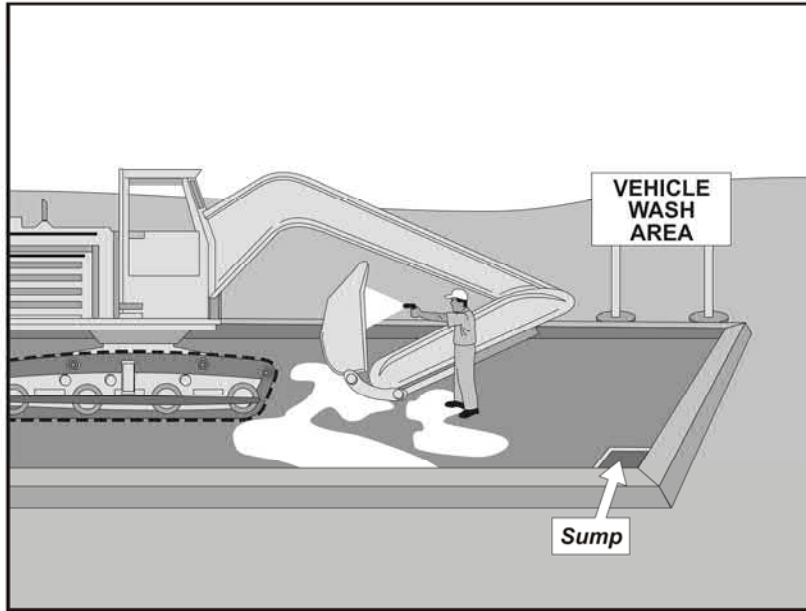
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Stormwater Management for Construction Activities, Developing Pollution Prevention Plans and Best Management Practices, EPA 832-R-92005; USEPA, April 1992.

EXHIBIT "C" (Stormwater Pollution Prevention Plan)



Description and Purpose

Vehicle and equipment cleaning procedures and practices eliminate or reduce the discharge of pollutants to stormwater from vehicle and equipment cleaning operations. Procedures and practices include but are not limited to: using offsite facilities; washing in designated, contained areas only; eliminating discharges to the storm drain by infiltrating the wash water; and training employees and subcontractors in proper cleaning procedures.

Suitable Applications

These procedures are suitable on all construction sites where vehicle and equipment cleaning is performed.

Limitations

Even phosphate-free, biodegradable soaps have been shown to be toxic to fish before the soap degrades. Sending vehicles/equipment offsite should be done in conjunction with TC-1, Stabilized Construction Entrance/Exit.

Implementation

Other options to washing equipment onsite include contracting with either an offsite or mobile commercial washing business. These businesses may be better equipped to handle and dispose of the wash waters properly. Performing this work offsite can also be economical by eliminating the need for a separate washing operation onsite.

If washing operations are to take place onsite, then:

Categories

EC	Erosion Control	
SE	Sediment Control	
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	<input checked="" type="checkbox"/>
WM	Waste Management and Materials Pollution Control	

Legend:

- Primary Objective
- Secondary Objective

Targeted Constituents

Sediment	<input checked="" type="checkbox"/>
Nutrients	<input checked="" type="checkbox"/>
Trash	
Metals	
Bacteria	
Oil and Grease	<input checked="" type="checkbox"/>
Organics	<input checked="" type="checkbox"/>

Potential Alternatives

None

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- Use phosphate-free, biodegradable soaps.
- Educate employees and subcontractors on pollution prevention measures.
- Do not permit steam cleaning onsite. Steam cleaning can generate significant pollutant concentrates.
- Cleaning of vehicles and equipment with soap, solvents or steam should not occur on the project site unless resulting wastes are fully contained and disposed of. Resulting wastes should not be discharged or buried and must be captured and recycled or disposed according to the requirements of WM-10, Liquid Waste Management or WM-6, Hazardous Waste Management, depending on the waste characteristics. Minimize use of solvents. Use of diesel for vehicle and equipment cleaning is prohibited.
- All vehicles and equipment that regularly enter and leave the construction site must be cleaned offsite.
- When vehicle and equipment washing and cleaning must occur onsite, and the operation cannot be located within a structure or building equipped with appropriate disposal facilities, the outside cleaning area should have the following characteristics:
 - Located away from storm drain inlets, drainage facilities, or watercourses
 - Paved with concrete or asphalt and bermed to contain wash waters and to prevent runoff and runoff
 - Configured with a sump to allow collection and disposal of wash water
 - No discharge of wash waters to storm drains or watercourses
 - Used only when necessary
- When cleaning vehicles and equipment with water:
 - Use as little water as possible. High-pressure sprayers may use less water than a hose and should be considered
 - Use positive shutoff valve to minimize water usage
 - Facility wash racks should discharge to a sanitary sewer, recycle system or other approved discharge system and must not discharge to the storm drainage system, watercourses, or to groundwater

Costs

Cleaning vehicles and equipment at an offsite facility may reduce overall costs for vehicle and equipment cleaning by eliminating the need to provide similar services onsite. When onsite cleaning is needed, the cost to establish appropriate facilities is relatively low on larger, long-duration projects, and moderate to high on small, short-duration projects.

EXHIBIT "C" (Stormwater Pollution Prevention Plan)

Inspection and Maintenance

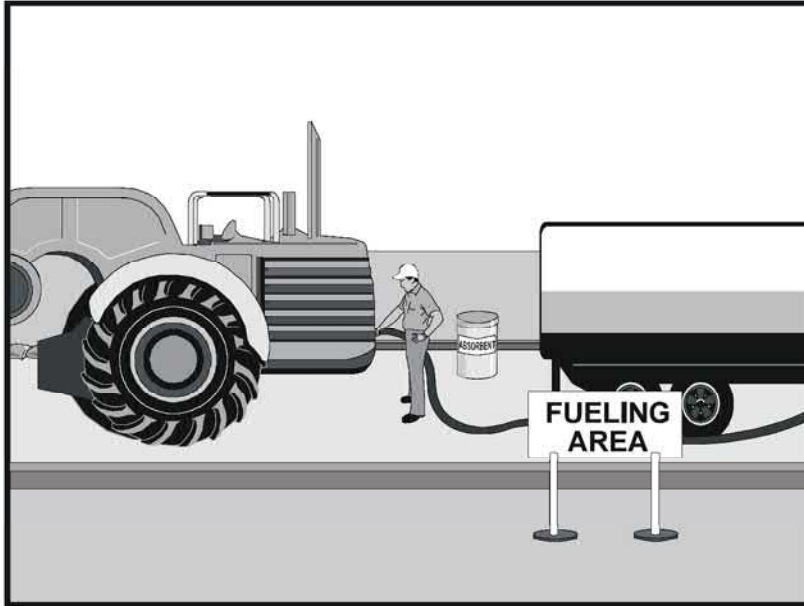
- Inspect and verify that activity-based BMPs are in place prior to the commencement of associated activities. While activities associated with the BMP are under way, inspect BMPs in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- Inspect BMPs subject to non-stormwater discharges daily while non-stormwater discharges occur.
- Inspection and maintenance is minimal, although some berm repair may be necessary.
- Monitor employees and subcontractors throughout the duration of the construction project to ensure appropriate practices are being implemented.
- Inspect sump regularly and remove liquids and sediment as needed.
- Prohibit employees and subcontractors from washing personal vehicles and equipment on the construction site.

References

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.

Swisher, R.D. Surfactant Biodegradation, Marcel Decker Corporation, 1987.

EXHIBIT "C" (Stormwater Pollution Prevention Plan)



Description and Purpose

Vehicle equipment fueling procedures and practices are designed to prevent fuel spills and leaks and reduce or eliminate contamination of stormwater. This can be accomplished by using offsite facilities, fueling in designated areas only, enclosing or covering stored fuel, implementing spill controls, and training employees and subcontractors in proper fueling procedures.

Suitable Applications

These procedures are suitable on all construction sites where vehicle and equipment fueling takes place.

Limitations

Onsite vehicle and equipment fueling should only be used where it is impractical to send vehicles and equipment offsite for fueling. Sending vehicles and equipment offsite should be done in conjunction with TC-1, Stabilized Construction Entrance/ Exit.

Implementation

- Use offsite fueling stations as much as possible. These businesses are better equipped to handle fuel and spills properly. Performing this work offsite can also be economical by eliminating the need for a separate fueling area at a site.
- Discourage “topping-off” of fuel tanks.

Categories

EC	Erosion Control	
SE	Sediment Control	
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	<input checked="" type="checkbox"/>
WM	Waste Management and Materials Pollution Control	

Legend:

- Primary Objective
- Secondary Objective

Targeted Constituents

Sediment	
Nutrients	
Trash	
Metals	
Bacteria	
Oil and Grease	<input checked="" type="checkbox"/>
Organics	

Potential Alternatives

None

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EXHIBIT "C" (Stormwater Pollution Prevention Plan)



- Absorbent spill cleanup materials and spill kits should be available in fueling areas and on fueling trucks and should be disposed of properly after use.
- Drip pans or absorbent pads should be used during vehicle and equipment fueling, unless the fueling is performed over an impermeable surface in a dedicated fueling area.
- Use absorbent materials on small spills. Do not hose down or bury the spill. Remove the adsorbent materials promptly and dispose of properly.
- Avoid mobile fueling of mobile construction equipment around the site; rather, transport the equipment to designated fueling areas. With the exception of tracked equipment such as bulldozers and large excavators, most vehicles should be able to travel to a designated area with little lost time.
- Train employees and subcontractors in proper fueling and cleanup procedures.
- When fueling must take place onsite, designate an area away from drainage courses to be used. Fueling areas should be identified in the SWPPP.
- Dedicated fueling areas should be protected from stormwater runoff and should be located at least 50 ft away from downstream drainage facilities and watercourses. Fueling must be performed on level-grade areas.
- Protect fueling areas with berms and dikes to prevent runoff, and to contain spills.
- Nozzles used in vehicle and equipment fueling should be equipped with an automatic shutoff to control drips. Fueling operations should not be left unattended.
- Use vapor recovery nozzles to help control drips as well as air pollution where required by Air Quality Management Districts (AQMD).
- Federal, state, and local requirements should be observed for any stationary above ground storage tanks.

Costs

- All of the above measures are low cost except for the capital costs of above ground tanks that meet all local environmental, zoning, and fire codes.

Inspection and Maintenance

- Inspect BMPs in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- Vehicles and equipment should be inspected each day of use for leaks. Leaks should be repaired immediately, or problem vehicles or equipment should be removed from the project site.
- Keep ample supplies of spill cleanup materials onsite.

EXHIBIT "C" (Stormwater Pollution Prevention Plan)

- Immediately clean up spills and properly dispose of contaminated soil and cleanup materials.

References

Blueprint for a Clean Bay: Best Management Practices to Prevent Stormwater Pollution from Construction Related Activities; Santa Clara Valley Nonpoint Source Pollution Control Program, 1995.

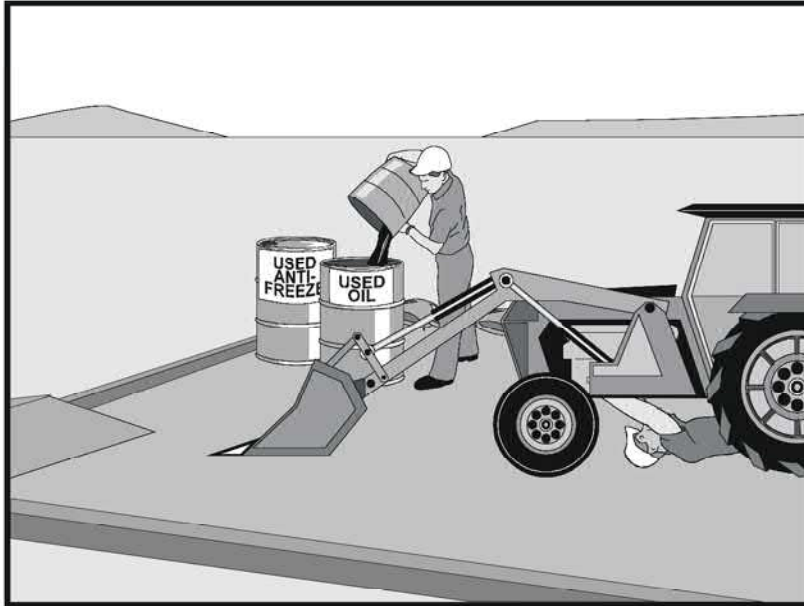
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EXHIBIT "C" (Stormwater Pollution Prevention Plan)

Vehicle & Equipment Maintenance NS-10



Description and Purpose

Prevent or reduce the contamination of stormwater resulting from vehicle and equipment maintenance by running a “dry and clean site”. The best option would be to perform maintenance activities at an offsite facility. If this option is not available then work should be performed in designated areas only, while providing cover for materials stored outside, checking for leaks and spills, and containing and cleaning up spills immediately. Employees and subcontractors must be trained in proper procedures.

Suitable Applications

These procedures are suitable on all construction projects where an onsite yard area is necessary for storage and maintenance of heavy equipment and vehicles.

Limitations

Onsite vehicle and equipment maintenance should only be used where it is impractical to send vehicles and equipment offsite for maintenance and repair. Sending vehicles/equipment offsite should be done in conjunction with TC-1, Stabilized Construction Entrance/Exit.

Outdoor vehicle or equipment maintenance is a potentially significant source of stormwater pollution. Activities that can contaminate stormwater include engine repair and service, changing or replacement of fluids, and outdoor equipment storage and parking (engine fluid leaks). For further information on vehicle or equipment servicing, see NS-8,

Categories

EC	Erosion Control	
SE	Sediment Control	
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	<input checked="" type="checkbox"/>
WM	Waste Management and Materials Pollution Control	

Legend:

- Primary Objective
- Secondary Objective

Targeted Constituents

Sediment	
Nutrients	<input checked="" type="checkbox"/>
Trash	<input checked="" type="checkbox"/>
Metals	
Bacteria	
Oil and Grease	<input checked="" type="checkbox"/>
Organics	<input checked="" type="checkbox"/>

Potential Alternatives

None

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EXHIBIT "C" (Stormwater Pollution Prevention Plan)



Vehicle & Equipment Maintenance NS-10

Vehicle and Equipment Cleaning, and NS-9, Vehicle and Equipment Fueling.

Implementation

- Use offsite repair shops as much as possible. These businesses are better equipped to handle vehicle fluids and spills properly. Performing this work offsite can also be economical by eliminating the need for a separate maintenance area.
- If maintenance must occur onsite, use designated areas, located away from drainage courses. Dedicated maintenance areas should be protected from stormwater runoff and should be located at least 50 ft from downstream drainage facilities and watercourses.
- Drip pans or absorbent pads should be used during vehicle and equipment maintenance work that involves fluids, unless the maintenance work is performed over an impermeable surface in a dedicated maintenance area.
- Place a stockpile of spill cleanup materials where it will be readily accessible.
- All fueling trucks and fueling areas are required to have spill kits and/or use other spill protection devices.
- Use adsorbent materials on small spills. Remove the absorbent materials promptly and dispose of properly.
- Inspect onsite vehicles and equipment daily at startup for leaks, and repair immediately.
- Keep vehicles and equipment clean; do not allow excessive build-up of oil and grease.
- Segregate and recycle wastes, such as greases, used oil or oil filters, antifreeze, cleaning solutions, automotive batteries, hydraulic and transmission fluids. Provide secondary containment and covers for these materials if stored onsite.
- Train employees and subcontractors in proper maintenance and spill cleanup procedures.
- Drip pans or plastic sheeting should be placed under all vehicles and equipment placed on docks, barges, or other structures over water bodies when the vehicle or equipment is planned to be idle for more than 1 hour.
- For long-term projects, consider using portable tents or covers over maintenance areas if maintenance cannot be performed offsite.
- Consider use of new, alternative greases and lubricants, such as adhesive greases, for chassis lubrication and fifth-wheel lubrication.
- Properly dispose of used oils, fluids, lubricants, and spill cleanup materials.
- Do not place used oil in a dumpster or pour into a storm drain or watercourse.
- Properly dispose of or recycle used batteries.
- Do not bury used tires.

EXHIBIT "C" (Stormwater Pollution Prevention Plan)

Vehicle & Equipment Maintenance NS-10

- Repair leaks of fluids and oil immediately.

Listed below is further information if you must perform vehicle or equipment maintenance onsite.

Safer Alternative Products

- Consider products that are less toxic or hazardous than regular products. These products are often sold under an “environmentally friendly” label.
- Consider use of grease substitutes for lubrication of truck fifth-wheels. Follow manufacturers label for details on specific uses.
- Consider use of plastic friction plates on truck fifth-wheels in lieu of grease. Follow manufacturers label for details on specific uses.

Waste Reduction

Parts are often cleaned using solvents such as trichloroethylene, trichloroethane, or methylene chloride. Many of these cleaners are listed in California Toxic Rule as priority pollutants. These materials are harmful and must not contaminate stormwater. They must be disposed of as a hazardous waste. Reducing the number of solvents makes recycling easier and reduces hazardous waste management costs. Often, one solvent can perform a job as well as two different solvents. Also, if possible, eliminate or reduce the amount of hazardous materials and waste by substituting non-hazardous or less hazardous materials. For example, replace chlorinated organic solvents with non-chlorinated solvents. Non-chlorinated solvents like kerosene or mineral spirits are less toxic and less expensive to dispose of properly. Check the list of active ingredients to see whether it contains chlorinated solvents. The “chlor” term indicates that the solvent is chlorinated. Also, try substituting a wire brush for solvents to clean parts.

Recycling and Disposal

Separating wastes allows for easier recycling and may reduce disposal costs. Keep hazardous wastes separate, do not mix used oil solvents, and keep chlorinated solvents (like, -trichloroethane) separate from non-chlorinated solvents (like kerosene and mineral spirits). Promptly transfer used fluids to the proper waste or recycling drums. Don't leave full drip pans or other open containers lying around. Provide cover and secondary containment until these materials can be removed from the site.

Oil filters can be recycled. Ask your oil supplier or recycler about recycling oil filters.

Do not dispose of extra paints and coatings by dumping liquid onto the ground or throwing it into dumpsters. Allow coatings to dry or harden before disposal into covered dumpsters.

Store cracked batteries in a non-leaking secondary container. Do this with all cracked batteries, even if you think all the acid has drained out. If you drop a battery, treat it as if it is cracked. Put it into the containment area until you are sure it is not leaking.

Costs

All of the above are low cost measures. Higher costs are incurred to setup and maintain onsite maintenance areas.

EXHIBIT "C" (Stormwater Pollution Prevention Plan)

Vehicle & Equipment Maintenance NS-10

Inspection and Maintenance

- Inspect and verify that activity-based BMPs are in place prior to the commencement of associated activities. While activities associated with the BMP are under way, inspect BMPs in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- Inspect BMPs subject to non-stormwater discharges daily while non-stormwater discharges occur.
- Keep ample supplies of spill cleanup materials onsite.
- Maintain waste fluid containers in leak proof condition.
- Vehicles and equipment should be inspected on each day of use. Leaks should be repaired immediately, or the problem vehicle(s) or equipment should be removed from the project site.
- Inspect equipment for damaged hoses and leaky gaskets routinely. Repair or replace as needed.

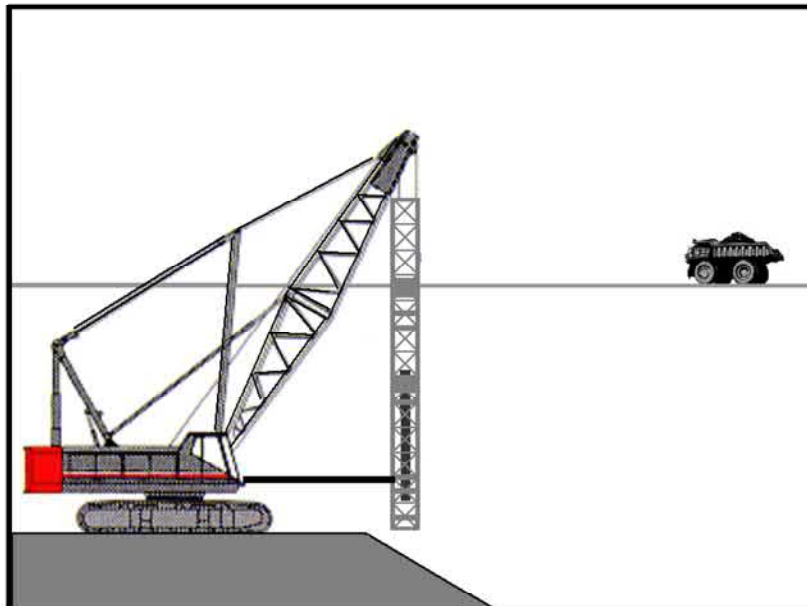
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Coastal Nonpoint Pollution Control Program; Program Development and Approval Guidance, Working Group, Working Paper; USEPA, April 1992.

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EXHIBIT "C" (Stormwater Pollution Prevention Plan)



Description and Purpose

The construction and retrofit of bridges and retaining walls often include driving piles for foundation support and shoring operations. Driven piles are typically constructed of precast concrete, steel, or timber. Driven sheet piles are also used for shoring and cofferdam construction. Proper control and use of equipment, materials, and waste products from pile driving operations will reduce or eliminate the discharge of potential pollutants to the storm drain system, watercourses, and waters of the United States.

Suitable Applications

These procedures apply to all construction sites near or adjacent to a watercourse or groundwater where permanent and temporary pile driving (impact and vibratory) takes place, including operations using pile shells as well as construction of cast-in-steel-shell and cast-in-drilled-hole piles.

Limitations

None identified.

Implementation

- Use drip pans or absorbent pads during vehicle and equipment operation, maintenance, cleaning, fueling, and storage. Refer to NS-8, Vehicle and Equipment Cleaning, NS-9, Vehicle and Equipment Fueling, and NS-10, Vehicle and Equipment Maintenance.

Categories

EC	Erosion Control	
SE	Sediment Control	
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	<input checked="" type="checkbox"/>
WM	Waste Management and Materials Pollution Control	

Legend:

- Primary Objective
- Secondary Objective

Targeted Constituents

Sediment	<input checked="" type="checkbox"/>
Nutrients	
Trash	
Metals	
Bacteria	
Oil and Grease	<input checked="" type="checkbox"/>
Organics	

Potential Alternatives

None

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- Have spill kits and cleanup materials available at all locations of pile driving. Refer to WM-4, Spill Prevention and Control.
- Equipment that is stored or in use in streambeds, or on docks, barges, or other structures over water bodies should be kept leak free.
- Park equipment over plastic sheeting or equivalent where possible. Plastic is not a substitute for drip pans or absorbent pads. The storage or use of equipment in streambeds or other bodies of water must comply with all applicable permits.
- Implement other BMPs as applicable, such as NS-2, Dewatering Operations, WM-5, Solid Waste Management, WM-6, Hazardous Waste Management, and WM-10, Liquid Waste Management.
- When not in use, store pile-driving equipment away from concentrated flows of stormwater, drainage courses, and inlets. Protect hammers and other hydraulic attachments from runoff and runoff by placing them on plywood and covering them with plastic or a comparable material prior to the onset of rain.
- Use less hazardous products, e.g., vegetable oil, when practicable.

Costs

All of the above measures can be low cost.

Inspection and Maintenance

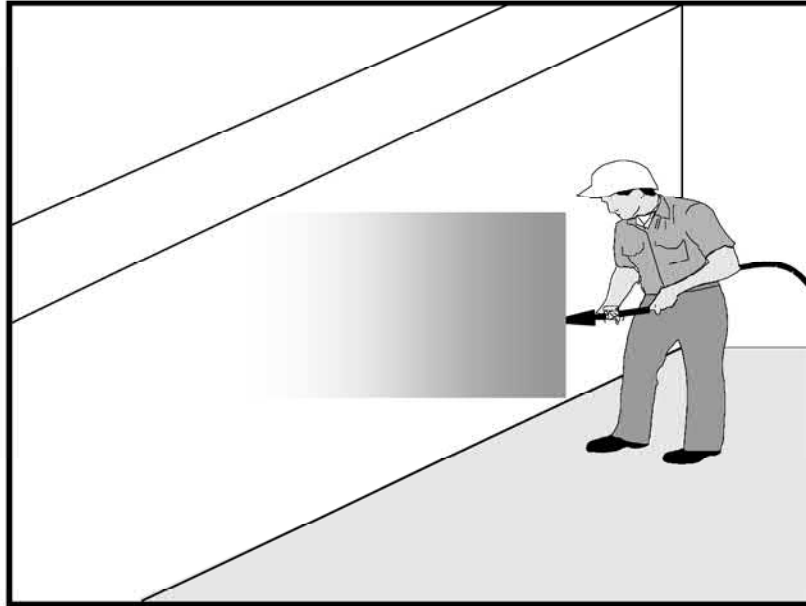
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- Inspect BMPs subject to non-stormwater discharges daily while non-stormwater discharges occur.
- Inspect equipment every day at startup and repair equipment as needed (i.e., worn or damaged hoses, fittings, and gaskets). Recheck equipment at shift changes or at the end of the day and scheduled repairs as needed.

References

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.

Stormwater Management for Construction Activities, Developing Pollution Prevention Plans and Best Management Practices, EPA 832-R-92005; USEPA, April 1992.

EXHIBIT "C" (Stormwater Pollution Prevention Plan)



Description and Purpose

Concrete curing is used in the construction of structures such as bridges, retaining walls, pump houses, large slabs, and structured foundations. Concrete curing includes the use of both chemical and water methods.

Concrete and its associated curing materials have basic chemical properties that can raise the pH of water to levels outside of the permitted range. Discharges of stormwater and non-stormwater exposed to concrete during curing may have a high pH and may contain chemicals, metals, and fines. The General Permit incorporates Numeric Action Levels (NAL) for pH (see Section 2 of this handbook to determine your project's risk level and if you are subject to these requirements).

Proper procedures and care should be taken when managing concrete curing materials to prevent them from coming into contact with stormwater flows, which could result in a high pH discharge.

Suitable Applications

Suitable applications include all projects where Portland Cement Concrete (PCC) and concrete curing chemicals are placed where they can be exposed to rainfall, runoff from other areas, or where runoff from the PCC will leave the site.

Limitations

- Runoff contact with concrete waste can raise pH levels in the water to environmentally harmful levels and trigger permit violations.

Categories

EC	Erosion Control	
SE	Sediment Control	
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	<input checked="" type="checkbox"/>
WM	Waste Management and Materials Pollution Control	<input checked="" type="checkbox"/>

Legend:

- Primary Category
- Secondary Category

Targeted Constituents

Sediment	<input checked="" type="checkbox"/>
Nutrients	
Trash	
Metals	<input checked="" type="checkbox"/>
Bacteria	
Oil and Grease	<input checked="" type="checkbox"/>
Organics	

Potential Alternatives

None

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Implementation

Chemical Curing

- Avoid over spray of curing compounds.
- Minimize the drift by applying the curing compound close to the concrete surface. Apply an amount of compound that covers the surface but does not allow any runoff of the compound.
- Use proper storage and handling techniques for concrete curing compounds. Refer to WM-1, Material Delivery and Storage.
- Protect drain inlets prior to the application of curing compounds.
- Refer to WM-4, Spill Prevention and Control.

Water Curing for Bridge Decks, Retaining Walls, and other Structures

- Direct cure water away from inlets and watercourses to collection areas for evaporation or other means of removal in accordance with all applicable permits. See WM-8 Concrete Waste Management.
- Collect cure water at the top of slopes and transport to a concrete waste management area in a non-erosive manner. See EC-9 Earth Dikes and Drainage Swales, EC-10, Velocity Dissipation Devices, and EC-11, Slope Drains.
- Utilize wet blankets or a similar method that maintains moisture while minimizing the use and possible discharge of water.

Education

- Educate employees, subcontractors, and suppliers on proper concrete curing techniques to prevent contact with discharge as described herein.
- Arrange for the QSP or the appropriately trained contractor's superintendent or representative to oversee and enforce concrete curing procedures.

Costs

All of the above measures are generally low cost.

Inspection and Maintenance

- Inspect and verify that activity-based BMPs are in place prior to the commencement of associated activities.
- BMPs must be inspected in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- Inspect BMPs subject to non-stormwater discharges daily while non-stormwater discharges occur.

- Sample non-stormwater discharges and stormwater runoff that contacts uncured and partially cured concrete as required by the General Permit.

EXHIBIT "C" (Stormwater Pollution Prevention Plan)

- Ensure that employees and subcontractors implement appropriate measures for storage, handling, and use of curing compounds.
- Inspect cure containers and spraying equipment for leaks.

References

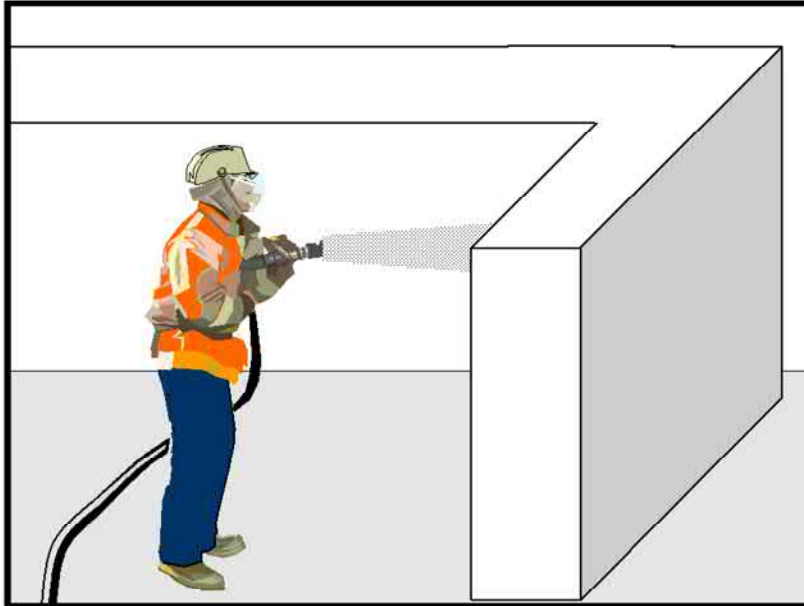
Blue Print for a Clean Bay-Construction-Related Industries: Best Management Practices for Stormwater Pollution Prevention; Santa Clara Valley Non-Point Source Pollution Control Program, 1992.

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), March 2003.

Stormwater Management for Construction Activities, Developing Pollution Prevention Plans and Best Management Practices, EPA 832-R-92005; USEPA, April 1992.

Erosion and Sediment Control Manual, Oregon Department of Environmental Quality, February 2005.

EXHIBIT "C" (Stormwater Pollution Prevention Plan)



Categories

EC	Erosion Control	
SE	Sediment Control	
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	<input checked="" type="checkbox"/>
WM	Waste Management and Materials Pollution Control	<input checked="" type="checkbox"/>

Legend:

- Primary Category
- Secondary Category

Targeted Constituents

Sediment	<input checked="" type="checkbox"/>
Nutrients	
Trash	
Metals	<input checked="" type="checkbox"/>
Bacteria	
Oil and Grease	
Organics	<input checked="" type="checkbox"/>

Potential Alternatives

None

Description and Purpose

Concrete finishing methods are used for bridge deck rehabilitation, paint removal, curing compound removal, and final surface finish appearances. Methods include sand blasting, shot blasting, grinding, or high-pressure water blasting. Stormwater and non-stormwater exposed to concrete finishing by-products may have a high pH and may contain chemicals, metals, and fines. Proper procedures and implementation of appropriate BMPs can minimize the impact that concrete-finishing methods may have on stormwater and non-stormwater discharges.

The General Permit incorporates Numeric Action Levels (NAL) for pH (see Section 2 of this handbook to determine your project's risk level and if you are subject to these requirements).

Concrete and its associated curing materials have basic chemical properties that can raise pH levels outside of the permitted range. Additional care should be taken when managing these materials to prevent them from coming into contact with stormwater flows, which could lead to exceedances of the General Permit requirements.

Suitable Applications

These procedures apply to all construction locations where concrete finishing operations are performed.

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Limitations

- Runoff contact with concrete waste can raise pH levels in the water to environmentally harmful levels and trigger permit violations.

Implementation

- Collect and properly dispose of water from high-pressure water blasting operations.
- Collect contaminated water from blasting operations at the top of slopes. Transport or dispose of contaminated water while using BMPs such as those for erosion control. Refer to EC-9, Earth Dikes and Drainage Swales, EC-10, Velocity Dissipation Devices, and EC-11, Slope Drains.
- Direct water from blasting operations away from inlets and watercourses to collection areas for infiltration or other means of removal (dewatering). Refer to NS-2 Dewatering Operations.
- Protect inlets during sandblasting operations. Refer to SE-10, Storm Drain Inlet Protection.
- Refer to WM-8, Concrete Waste Management for disposal of concrete debris.
- Minimize the drift of dust and blast material as much as possible by keeping the blasting nozzle close to the surface.
- When blast residue contains a potentially hazardous waste, refer to WM-6, Hazardous Waste Management.

Education

- Educate employees, subcontractors, and suppliers on proper concrete finishing techniques to prevent contact with discharge as described herein.
- Arrange for the QSP or the appropriately trained contractor's superintendent or representative to oversee and enforce concrete finishing procedures.

Costs

These measures are generally of low cost.

Inspection and Maintenance

- Inspect and verify that activity-based BMPs are in place prior to the commencement of associated activities.
- BMPs must be inspected in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- Inspect BMPs subject to non-stormwater discharges daily while non-stormwater discharges occur.
- Sample non-stormwater discharges and stormwater runoff that contacts concrete dust and debris as required by the General Permit.

EXHIBIT "C" (Stormwater Pollution Prevention Plan)

- Sweep or vacuum up debris from sandblasting at the end of each shift.
- At the end of each work shift, remove and contain liquid and solid waste from containment structures, if any, and from the general work area.
- Inspect containment structures for damage prior to use and prior to onset of forecasted rain.

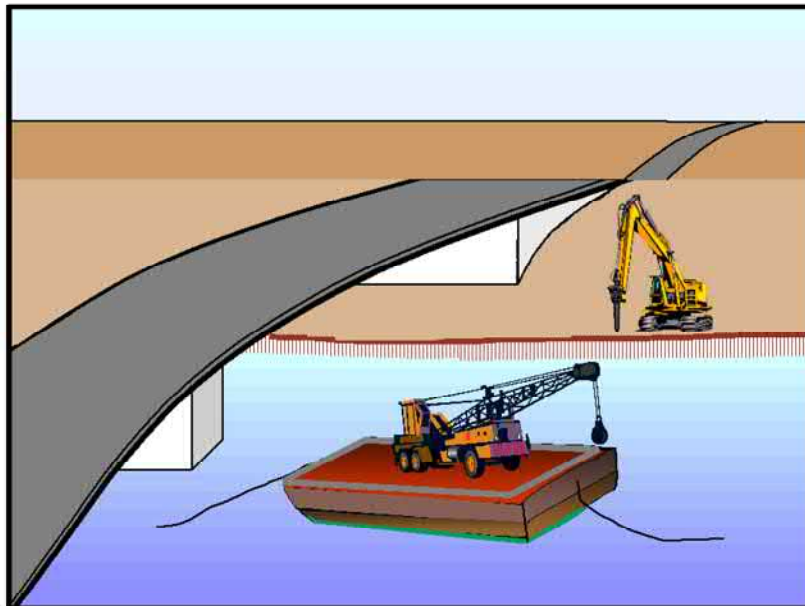
References

Blueprint for a Clean Bay: Best Management Practices to Prevent Stormwater Pollution from Construction Related Activities; Santa Clara Valley Nonpoint Source Pollution Control Program, 1995.

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), March 2003.

Stormwater Management for Construction Activities, Developing Pollution Prevention Plans and Best Management Practices, EPA 832-R-92005; USEPA, April 1992.

EXHIBIT "C" (Stormwater Pollution Prevention Plan)



Description and Purpose

Procedures for the proper use, storage, and disposal of materials and equipment on barges, boats, temporary construction pads, or similar locations that minimize or eliminate the discharge of potential pollutants to a watercourse.

Suitable Applications

Applies where materials and equipment are used on barges, boats, docks, and other platforms over or adjacent to a watercourse including waters of the United States. These procedures should be implemented for construction materials and wastes (solid and liquid), soil or dredging materials, or any other materials that may cause or contribute to exceedances of water quality standards.

Limitations

Dredge and fill activities are regulated by the US Army Corps of Engineers and Regional Boards under Section 404/401 of the Clean Water Act.

Implementation

- Refer to WM-1, Material Delivery and Storage and WM-4, Spill Prevention and Control.
- Use drip pans and absorbent materials for equipment and vehicles and ensure that an adequate supply of spill clean up materials is available.
- Drip pans should be placed under all vehicles and equipment placed on (docks, barges, or other structures over

Categories

EC	Erosion Control	
SE	Sediment Control	
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	<input checked="" type="checkbox"/>
WM	Waste Management and Materials Pollution Control	<input checked="" type="checkbox"/>

Legend:

- Primary Objective
- Secondary Objective

Targeted Constituents

Sediment	<input checked="" type="checkbox"/>
Nutrients	<input checked="" type="checkbox"/>
Trash	<input checked="" type="checkbox"/>
Metals	<input checked="" type="checkbox"/>
Bacteria	<input checked="" type="checkbox"/>
Oil and Grease	<input checked="" type="checkbox"/>
Organics	<input checked="" type="checkbox"/>

Potential Alternatives

None

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water bodies when the vehicle or equipment is expected to be idle for more than 1 hour.

- Maintain equipment in accordance with NS-10, Vehicle and Equipment Maintenance. If a leaking line cannot be repaired, remove equipment from over the water.
- Provide watertight curbs or toe boards to contain spills and prevent materials, tools, and debris from leaving the barge, platform, dock, etc.
- Secure all materials to prevent discharges to receiving waters via wind.
- Identify types of spill control measures to be employed, including the storage of such materials and equipment. Ensure that staff is trained regarding the use of the materials, deployment and access of control measures, and reporting measures.
- In case of spills, contact the local Regional Board as soon as possible but within 48 hours.
- Refer to WM-5, Solid Waste Management (non-hazardous) and WM-6, Hazardous Waste Management. Ensure the timely and proper removal of accumulated wastes
- Comply with all necessary permits required for construction within or near the watercourse, such as Regional Water Quality Control Board, U.S. Army Corps of Engineers, Department of Fish and Game or and other local permitting.
- Discharges to waterways should be reported to the Regional Water Quality Control Board immediately upon discovery. A written discharge notification must follow within 7 days. Follow the spill reporting procedures contained in SWPPP.

Costs

These measures are generally of low to moderate cost. Exceptions are areas for temporary storage of materials, engine fluids, or wastewater pump out.

Inspection and Maintenance

- Inspect and verify that activity-based BMPs are in place prior to the commencement of associated activities. While activities associated with the BMP are under way, inspect BMPs in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- Inspect BMPs subject to non-stormwater discharge daily while non-stormwater discharges occur.
- Ensure that employees and subcontractors implement the appropriate measures for storage and use of materials and equipment.
- Inspect and maintain all associated BMPs and perimeter controls to ensure continuous protection of the water courses, including waters of the United States.

References

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.

Stormwater Management for Construction Activities, Developing Pollution Prevention Plans and Best Management Practices, EPA 832-R-92005; USEPA, April 1992.

EXHIBIT "C" (Stormwater Pollution Prevention Plan)



Description and Purpose

Procedures to protect water bodies from debris and wastes associated with structure demolition or removal over or adjacent to watercourses.

Suitable Applications

Full bridge demolition and removal, partial bridge removal (barrier rail, edge of deck) associated with bridge widening projects, concrete channel removal, or any other structure removal that could potentially affect water quality.

Limitations

None identified.

Implementation

- Refer to NS-5, Clear Water Diversion, to direct water away from work areas.
- Use attachments on construction equipment such as backhoes to catch debris from small demolition operations.
- Use covers or platforms to collect debris.
- Platforms and covers are to be approved by the owner.
- Stockpile accumulated debris and waste generated during demolition away from watercourses and in accordance with WM-3, Stockpile Management.
- Ensure safe passage of wildlife, as necessary.

Categories

EC	Erosion Control	
SE	Sediment Control	
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	<input checked="" type="checkbox"/>
WM	Waste Management and Materials Pollution Control	

Legend:

- Primary Objective
- Secondary Objective

Targeted Constituents

Sediment	<input checked="" type="checkbox"/>
Nutrients	<input checked="" type="checkbox"/>
Trash	<input checked="" type="checkbox"/>
Metals	<input checked="" type="checkbox"/>
Bacteria	<input checked="" type="checkbox"/>
Oil and Grease	<input checked="" type="checkbox"/>
Organics	<input checked="" type="checkbox"/>

Potential Alternatives

None

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- Discharges to waterways shall be reported to the Regional Water Quality Control Board immediately upon discovery. A written discharge notification must follow within 7 days. Follow the spill reporting procedures in the SWPPP.
- For structures containing hazardous materials, i.e., lead paint or asbestos, refer to BMP WM-6, Hazardous Waste Management. For demolition work involving soil excavation around lead-painted structures, refer to WM-7, Contaminated Soil Management.

Costs

Cost may vary according to the combination of practices implemented.

Inspection and Maintenance

- Inspect and verify that activity-based BMPs are in place prior to the commencement of associated activities. While activities associated with the BMP are under way, inspect BMPs in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- Inspect BMPs subject to non-stormwater discharge daily while non-stormwater discharges occur.
- Any debris-catching devices shall be emptied regularly. Collected debris shall be removed and stored away from the watercourse and protected from runoff.

References

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.

Stormwater Management for Construction Activities, Developing Pollution Prevention Plans and Best Management Practices, EPA 832-R-92005; USEPA, April 1992.

EXHIBIT "C" (Stormwater Pollution Prevention Plan)



Description and Purpose

The construction of roads, bridges, retaining walls, and other large structures in remote areas, often requires temporary batch plant facilities to manufacture Portland Cement Concrete (PCC) or asphalt cement (AC). Temporary batch plant facilities typically consist of silos containing fly ash, lime, and cement; heated tanks of liquid asphalt; sand and gravel material storage areas; mixing equipment; above ground storage tanks containing concrete additives and water; and designated areas for sand and gravel truck unloading, concrete truck loading, and concrete truck washout. Proper control and use of equipment, materials, and waste products from temporary batch plant facilities will reduce the discharge of potential pollutants to the storm drain system or watercourses, reduce air emissions, and mitigate noise impacts.

The General Permit draft incorporates Numeric Action Levels (NAL) for pH (see Section 2 of this handbook to determine your project's risk level and if you are subject to these requirements). Many types of batch plant materials, including mortar, concrete, cement and block and their associated wastes have basic chemical properties that can raise pH levels outside of the permitted range. Additional care should be taken when managing these materials to prevent them from coming into contact with stormwater flows which may cause an exceedance of the General Permit requirements.

Suitable Applications

These procedures typically apply to construction sites where temporary batch plant facilities are used; however, some of the

Categories

EC	Erosion Control	
SE	Sediment Control	
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	<input checked="" type="checkbox"/>
WM	Waste Management and Materials Pollution Control	

Legend:

- Primary Category
- Secondary Category

Targeted Constituents

Sediment	<input checked="" type="checkbox"/>
Nutrients	
Trash	<input checked="" type="checkbox"/>
Metals	<input checked="" type="checkbox"/>
Bacteria	
Oil and Grease	
Organics	

Potential Alternatives

None

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practices described are applicable to construction sites with general concrete use.

Limitations

The General Permit for discharges of stormwater associated with industrial activities (General Industrial Permit) may be applicable to temporary batch plants.

Specific permit requirements or mitigation measures such as Air Resources Board (ARB), Air Quality Management District (AQMD), Air Pollution Control District (APCD, Regional Water Quality Control Board (RWQCB), county ordinances and city ordinances may require alternative mitigation measures for temporary batch plants. Contact the local regulatory agencies to determine if a permit is required.

Implementation

Planning

- Temporary batch plants may be subject to the General Industrial Permit. To obtain a copy of this permit and the application forms, visit <http://www.waterboards.ca.gov> or contact the State Water Resources Control Board.
- Proper planning, design, and construction of temporary batch plants should be implemented to minimize potential water quality, air pollution, and noise impacts associated with temporary batch plants.
- BMPs and a Construction Site Monitoring Plan (CSMP) should be included in the project Stormwater Pollution Prevention Plan (SWPPP). BMPs should be implemented, inspected, and maintained in accordance with these plans.
- Temporary batch plants should be managed to comply with AQMD Statewide Registration Program and/or local AQMD Portable Equipment Registration requirements.
- Construct temporary batch plants downwind of existing developments whenever possible.
- Placement of access roads should be planned to mitigate water and air quality impacts.

Layout and Design

- Temporary batch plants should be properly located and designed to mitigate water quality impacts to receiving water bodies. Batch plants should be located away from watercourses, drainage courses, and drain inlets. Batch plants should be located to minimize the potential for stormwater runoff onto the site.
- Temporary batch plant facilities (including associated stationary equipment and stockpiles) should be located at least 300 ft from any recreational area, school, residence, or other structure not associated with the construction project.
- Construct continuous interior AC or PCC berms around batch plant equipment (mixing equipment, silos, concrete drop points, conveyor belts, admixture tanks, etc.) to facilitate proper containment and cleanup of releases. Rollover or flip top curbs or dikes should be placed at ingress and egress points (SE-12, Temporary Silt Dike).
- Direct runoff from the paved or unpaved portion of the batch plant into a sump and pipe to a lined washout area or dewatering tank.

- Direct stormwater and non-stormwater runoff from unpaved portions of batch plant facility to catchment ponds or tanks.
- Construct and remove concrete washout facilities in accordance with WM-8, Concrete Waste Management.
- Layout of a typical batch plant and associated BMP is located at the end of this BMP fact sheet.

Operational Procedures

- Washout of concrete trucks should be conducted in a designated area in accordance with WM-8, Concrete Waste Management.
- Do not dispose of concrete into drain inlets, the stormwater drainage system, or watercourses.
- Washing of concrete mixing and transport equipment (including concrete truck washout) should occur in a designated area in accordance with WM-8, Concrete Waste Management.
- Washing equipment, tools, or vehicles to remove PCC should be conducted in accordance with NS-7, Potable Water/Irrigation, NS-8, Vehicle and Equipment Cleaning, and WM-8, Concrete Waste Management.
- All dry material transfer points should be ducted through a fabric or cartridge type filter unless there are no visible emissions from the transfer point.
- Equip all bulk storage silos, including auxiliary bulk storage trailers, with fabric or cartridge type filter(s).
- Maintain silo vent filters in proper operating condition.
- Equip silos and auxiliary bulk storage trailers with dust-tight service hatches.
- Fabric dust collection system should be capable of controlling particulate matter in accordance with the California Air Resources Control Board and local Air Pollution Control District Regulations.
- Fabric dust collectors (except for vent filters) should be equipped with an operational pressure differential gauge to measure the pressure drop across the filters.
- All transfer points should be equipped with a wet suppression system to control fugitive particulate emissions unless there are no visible emissions.
- All conveyors should be covered, unless the material being transferred results in no visible emissions.
- There should be no visible emissions beyond the property line, while the equipment is being operated.
- Collect dust emissions from the loading of open-bodied trucks, at the drip point of dry batch plants, or dust emissions from the drum feed for central mix plants.

- Equip silos and auxiliary bulk storage trailers with a visible and/or audible warning mechanism to warn operators that the silo or trailer is full.
- All open-bodied vehicles transporting material should be loaded with a final layer of wet sand and the truck should be covered with a tarp to reduce emissions.

Tracking Control

- Plant roads (batch truck and material delivery truck roads) and areas between stockpiles and conveyor hoppers should be stabilized (TC-2, Stabilized Construction Roadway), watered, treated with dust-suppressant chemicals (WE-1, Wind Erosion Control), or paved with a cohesive hard surface that can be repeatedly swept, maintained intact, and cleaned as necessary to control dust emissions.
- Trucks should not track PCC from plants onto public roads. Use appropriate practices from TC-1, Stabilized Construction Entrance/Exit, to prevent tracking.

Materials Storage

- WM-1, Material Delivery and Storage, should be implemented at all batch plants using concrete components or compounds. An effective strategy is to cover and contain materials.
- WM-2, Material Use should be conducted in a way to minimize or eliminate the discharge of materials to storm drain system or watercourse.
- Ensure that finer materials are not dispersed into the air during operations, such as unloading of cement delivery trucks.
- Stockpiles should be covered and enclosed with perimeter sediment barriers per WM-3, Stockpile Management. Uncovered stockpiles should be sprayed with water and/or dust-suppressant chemicals as necessary to control dust emissions, unless the stockpiled material results in no visible emissions. An operable stockpile watering system should be onsite at all times.
- Store bagged and boxed materials on pallets and cover or store in a completely enclosed storage area on non-working days and prior to rain.
- Minimize stockpiles of demolished PCC by recycling them in a timely manner.
- Provide secondary containment for liquid materials (WM-1, Material Delivery and Storage, WM-10, Liquid Waste Management). Containment should provide sufficient volume to contain precipitation from a 25-year storm plus 10% of the aggregate volume of all containers or plus 100% of the largest container, whichever is greater.
- Handle solid and liquid waste in accordance with WM-5, Solid Waste Management, WM-10, Liquid Waste Management, and WM-8, Concrete Waste Management.
- Maintain adequate supplies of spill cleanup materials and train staff to respond to spills per WM-4, Spill Prevention and Control.

- Immediately contain and clean up spilled cement and fly ash and contain.

EXHIBIT "C" (Stormwater Pollution Prevention Plan)

Equipment Maintenance

- Equipment should be maintained to prevent fluid leaks and spills per NS-9, Vehicle and Equipment Fueling, and NS-10, Vehicle and Equipment Maintenance.
- Maintain adequate supplies of spill cleanup materials and train staff to respond to spills per WM-4, Spill Prevention and Control.
- Incorporate other BMPs such as WM-5, Solid Waste Management, WM-6, Hazardous Waste Management, and WM-10, Liquid Waste Management.

Costs

Costs will vary depending on the size of the facility and combination of BMPs implemented.

Inspection and Maintenance

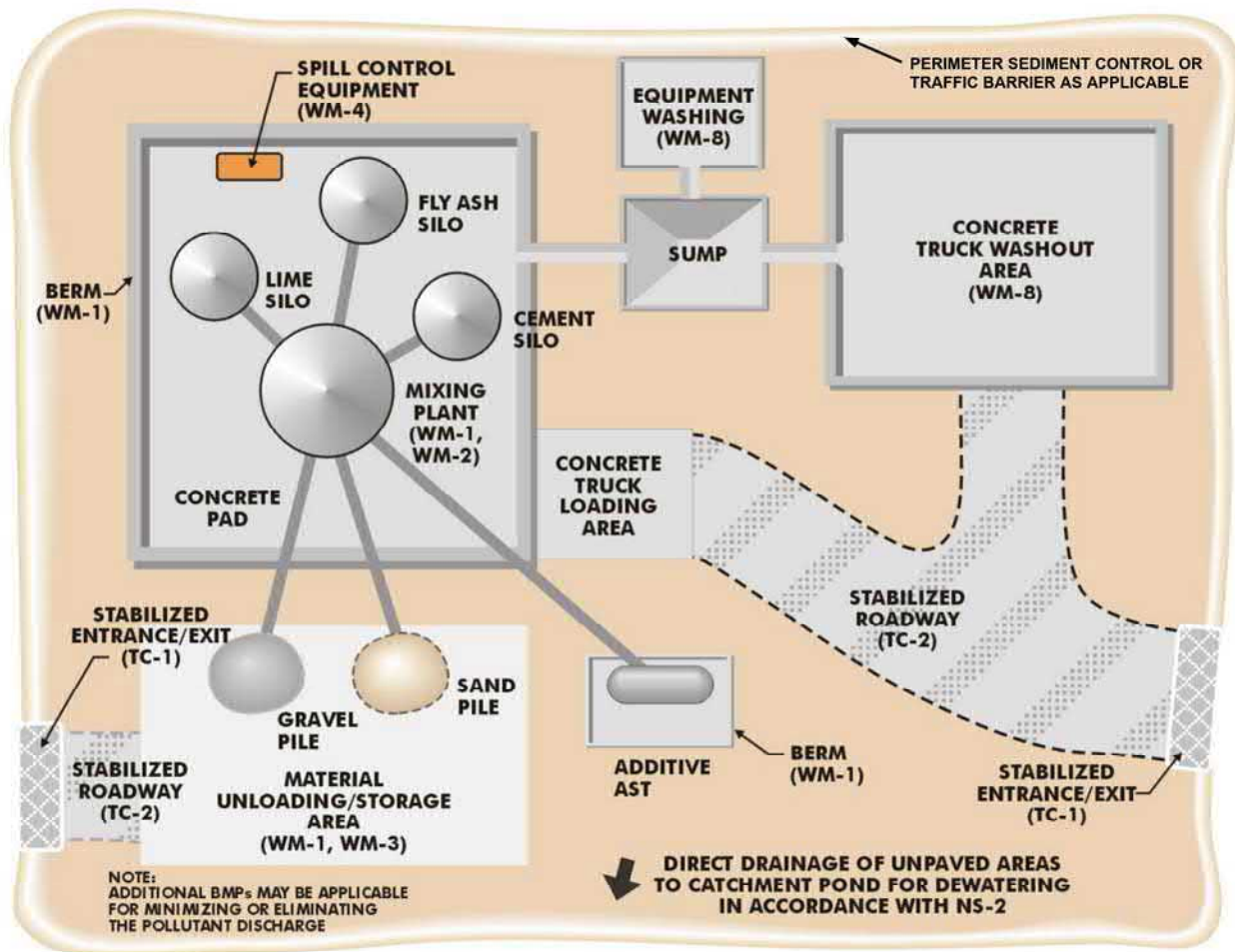
- Inspect and verify that activity-based BMPs are in place prior to the commencement of associated activities.
- BMPs must be inspected in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- Inspect BMPs subject to non-stormwater discharge daily while non-stormwater discharges occur.
- Sample non-stormwater discharges and stormwater runoff that contacts cementitious materials or fly ash as required by the General Permit.
- Inspect and repair equipment (for damaged hoses, fittings, and gaskets).
- Inspect and maintain a Stabilized Construction Entrance/Exit (TC-1) as needed.
- Inspect and maintain stabilized haul roads as needed (TC-2, Stabilized Construction Roadway).
- Inspect and maintain materials and waste storage areas as needed.

References

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), March 2003.

Stormwater Management for Construction Activities, Developing Pollution Prevention Plans and Best Management Practices, EPA 832-R-92005; USEPA, April 1992.

EXHIBIT "C" (Stormwater Pollution Prevention Plan)



Typical Temporary Batch

EXHIBIT "C" (Stormwater Pollution Prevention Plan)



Categories

EC	Erosion Control	
SE	Sediment Control	
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	<input checked="" type="checkbox"/>

Legend:

- Primary Category
- Secondary Category

Description and Purpose

Prevent, reduce, or eliminate the discharge of pollutants from material delivery and storage to the stormwater system or watercourses by minimizing the storage of hazardous materials onsite, storing materials in watertight containers and/or a completely enclosed designated area, installing secondary containment, conducting regular inspections, and training employees and subcontractors.

This best management practice covers only material delivery and storage. For other information on materials, see WM-2, Material Use, or WM-4, Spill Prevention and Control. For information on wastes, see the waste management BMPs in this section.

Suitable Applications

These procedures are suitable for use at all construction sites with delivery and storage of the following materials:

- Soil stabilizers and binders
- Pesticides and herbicides
- Fertilizers
- Detergents
- Plaster
- Petroleum products such as fuel, oil, and grease

Targeted Constituents

Sediment	<input checked="" type="checkbox"/>
Nutrients	<input checked="" type="checkbox"/>
Trash	<input checked="" type="checkbox"/>
Metals	<input checked="" type="checkbox"/>
Bacteria	
Oil and Grease	<input checked="" type="checkbox"/>
Organics	<input checked="" type="checkbox"/>

Potential Alternatives

None

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- Asphalt and concrete components
- Hazardous chemicals such as acids, lime, glues, adhesives, paints, solvents, and curing compounds
- Concrete compounds
- Other materials that may be detrimental if released to the environment

Limitations

- Space limitation may preclude indoor storage.
- Storage sheds often must meet building and fire code requirements.

Implementation

The following steps should be taken to minimize risk:

- Chemicals must be stored in water tight containers with appropriate secondary containment or in a storage shed.
- When a material storage area is located on bare soil, the area should be lined and bermed.
- Use containment pallets or other practical and available solutions, such as storing materials within newly constructed buildings or garages, to meet material storage requirements.
- Stack erodible landscape material on pallets and cover when not in use.
- Contain all fertilizers and other landscape materials when not in use.
- Temporary storage areas should be located away from vehicular traffic.
- Material Safety Data Sheets (MSDS) should be available on-site for all materials stored that have the potential to effect water quality.
- Construction site areas should be designated for material delivery and storage.
- Material delivery and storage areas should be located away from waterways, if possible.
 - Avoid transport near drainage paths or waterways.
 - Surround with earth berms or other appropriate containment BMP. See EC-9, Earth Dikes and Drainage Swales.
 - Place in an area that will be paved.
- Storage of reactive, ignitable, or flammable liquids must comply with the fire codes of your area. Contact the local Fire Marshal to review site materials, quantities, and proposed storage area to determine specific requirements. See the Flammable and Combustible Liquid Code, NFPA30.
- An up to date inventory of materials delivered and stored onsite should be kept.

EXHIBIT "C" (Stormwater Pollution Prevention Plan)

- Hazardous materials storage onsite should be minimized.
- Hazardous materials should be handled as infrequently as possible.
- Keep ample spill cleanup supplies appropriate for the materials being stored. Ensure that cleanup supplies are in a conspicuous, labeled area.
- Employees and subcontractors should be trained on the proper material delivery and storage practices.
- Employees trained in emergency spill cleanup procedures must be present when dangerous materials or liquid chemicals are unloaded.
- If significant residual materials remain on the ground after construction is complete, properly remove and dispose of materials and any contaminated soil. See WM-7, Contaminated Soil Management. If the area is to be paved, pave as soon as materials are removed to stabilize the soil.

Material Storage Areas and Practices

- Liquids, petroleum products, and substances listed in 40 CFR Parts 110, 117, or 302 should be stored in approved containers and drums and should not be overfilled. Containers and drums should be placed in temporary containment facilities for storage.
- A temporary containment facility should provide for a spill containment volume able to contain precipitation from a 25-year storm event, plus the greater of 10% of the aggregate volume of all containers or 100% of the capacity of the largest container within its boundary, whichever is greater.
- A temporary containment facility should be impervious to the materials stored therein for a minimum contact time of 72 hours.
- A temporary containment facility should be maintained free of accumulated rainwater and spills. In the event of spills or leaks, accumulated rainwater and spills should be collected and placed into drums. These liquids should be handled as a hazardous waste unless testing determines them to be non-hazardous. All collected liquids or non-hazardous liquids should be sent to an approved disposal site.
- Sufficient separation should be provided between stored containers to allow for spill cleanup and emergency response access.
- Incompatible materials, such as chlorine and ammonia, should not be stored in the same temporary containment facility.
- Materials should be covered prior to, and during rain events.
- Materials should be stored in their original containers and the original product labels should be maintained in place in a legible condition. Damaged or otherwise illegible labels should be replaced immediately.

EXHIBIT "C" (Stormwater Pollution Prevention Plan)

- Bagged and boxed materials should be stored on pallets and should not be allowed to accumulate on the ground. To provide protection from wind and rain throughout the rainy season, bagged and boxed materials should be covered during non-working days and prior to and during rain events.
- Stockpiles should be protected in accordance with WM-3, Stockpile Management.
- Materials should be stored indoors within existing structures or completely enclosed storage sheds when available.
- Proper storage instructions should be posted at all times in an open and conspicuous location.
- An ample supply of appropriate spill clean up material should be kept near storage areas.
- Also see WM-6, Hazardous Waste Management, for storing of hazardous wastes.

Material Delivery Practices

- Keep an accurate, up-to-date inventory of material delivered and stored onsite.
- Arrange for employees trained in emergency spill cleanup procedures to be present when dangerous materials or liquid chemicals are unloaded.

Spill Cleanup

- Contain and clean up any spill immediately.
- Properly remove and dispose of any hazardous materials or contaminated soil if significant residual materials remain on the ground after construction is complete. See WM-7, Contaminated Soil Management.
- See WM-4, Spill Prevention and Control, for spills of chemicals and/or hazardous materials.
- If spills or leaks of materials occur that are not contained and could discharge to surface waters, non-visible sampling of site discharge may be required. Refer to the General Permit or to your project specific Construction Site Monitoring Plan to determine if and where sampling is required.

Cost

- The largest cost of implementation may be in the construction of a materials storage area that is covered and provides secondary containment.

Inspection and Maintenance

- BMPs must be inspected in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- Keep storage areas clean and well organized, including a current list of all materials onsite.
- Inspect labels on containers for legibility and accuracy.

EXHIBIT "C" (Stormwater Pollution Prevention Plan)

- Repair or replace perimeter controls, containment structures, covers, and liners as needed to maintain proper function.

References

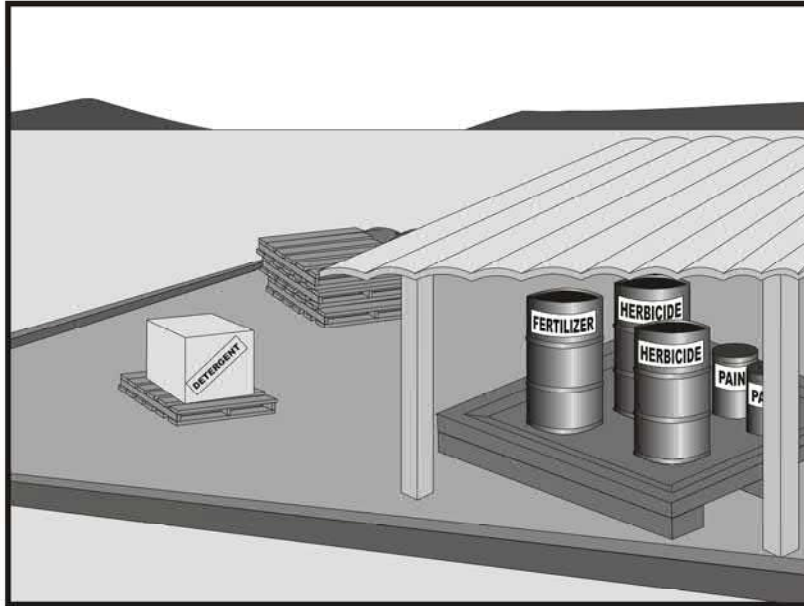
Blueprint for a Clean Bay: Best Management Practices to Prevent Stormwater Pollution from Construction Related Activities; Santa Clara Valley Nonpoint Source Pollution Control Program, 1995.

Coastal Nonpoint Pollution Control Program: Program Development and Approval Guidance, Working Group Working Paper; USEPA, April 1992.

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), March 2003.

Stormwater Management for Construction Activities; Developing Pollution Prevention Plans and Best Management Practice, EPA 832-R-92005; USEPA, April 1992.

EXHIBIT "C" (Stormwater Pollution Prevention Plan)



Description and Purpose

Prevent or reduce the discharge of pollutants to the storm drain system or watercourses from material use by using alternative products, minimizing hazardous material use onsite, and training employees and subcontractors.

Suitable Applications

This BMP is suitable for use at all construction projects. These procedures apply when the following materials are used or prepared onsite:

- Pesticides and herbicides
- Fertilizers
- Detergents
- Petroleum products such as fuel, oil, and grease
- Asphalt and other concrete components
- Other hazardous chemicals such as acids, lime, glues, adhesives, paints, solvents, and curing compounds
- Other materials that may be detrimental if released to the environment

Categories

EC	Erosion Control	
SE	Sediment Control	
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	<input checked="" type="checkbox"/>

Legend:

- Primary Category
- Secondary Category

Targeted Constituents

Sediment	<input checked="" type="checkbox"/>
Nutrients	<input checked="" type="checkbox"/>
Trash	<input checked="" type="checkbox"/>
Metals	<input checked="" type="checkbox"/>
Bacteria	
Oil and Grease	<input checked="" type="checkbox"/>
Organics	<input checked="" type="checkbox"/>

Potential Alternatives

None

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Limitations

Safer alternative building and construction products may not be available or suitable in every instance.

Implementation

The following steps should be taken to minimize risk:

- Minimize use of hazardous materials onsite.
- Follow manufacturer instructions regarding uses, protective equipment, ventilation, flammability, and mixing of chemicals.
- Train personnel who use pesticides. The California Department of Pesticide Regulation and county agricultural commissioners license pesticide dealers, certify pesticide applicators, and conduct onsite inspections.
- The preferred method of termiticide application is soil injection near the existing or proposed structure foundation/slab; however, if not feasible, soil drench application of termiticides should follow EPA label guidelines and the following recommendations (most of which are applicable to most pesticide applications):
 - Do not treat soil that is water-saturated or frozen.
 - Application shall not commence within 24-hours of a predicted precipitation event with a 40% or greater probability. Weather tracking must be performed on a daily basis prior to termiticide application and during the period of termiticide application.
 - Do not allow treatment chemicals to runoff from the target area. Apply proper quantity to prevent excess runoff. Provide containment for and divert stormwater from application areas using berms or diversion ditches during application.
 - Dry season: Do not apply within 10 feet of storm drains. Do not apply within 25 feet of aquatic habitats (such as, but not limited to, lakes; reservoirs; rivers; permanent streams; marshes or ponds; estuaries; and commercial fish farm ponds).
 - Wet season: Do not apply within 50 feet of storm drains or aquatic habitats (such as, but not limited to, lakes; reservoirs; rivers; permanent streams; marshes or ponds; estuaries; and commercial fish farm ponds) unless a vegetative buffer is present (if so, refer to dry season requirements).
 - Do not make on-grade applications when sustained wind speeds are above 10 mph (at application site) at nozzle end height.
 - Cover treatment site prior to a rain event in order to prevent run-off of the pesticide into non-target areas. The treated area should be limited to a size that can be backfilled and/or covered by the end of the work shift. Backfilling or covering of the treated area shall be done by the end of the same work shift in which the application is made.
- The applicator must either cover the soil him/herself or provide written notification of the above requirement to the contractor on site and to the person commissioning the

application (if different than the contractor). If notice is provided to the contractor or the person commissioning the application, then they are responsible under the Federal Insecticide Fungicide, and Rodenticide Act (FIFRA) to ensure that: 1) if the concrete slab cannot be poured over the treated soil within 24 hours of application, the treated soil is covered with a waterproof covering (such as polyethylene sheeting), and 2) the treated soil is covered if precipitation is predicted to occur before the concrete slab is scheduled to be poured.

- Do not over-apply fertilizers, herbicides, and pesticides. Prepare only the amount needed. Follow the recommended usage instructions. Over-application is expensive and environmentally harmful. Unless on steep slopes, till fertilizers into the soil rather than hydraulic application. Apply surface dressings in several smaller applications, as opposed to one large application, to allow time for infiltration and to avoid excess material being carried offsite by runoff. Do not apply these chemicals before predicted rainfall.
- Train employees and subcontractors in proper material use.
- Supply Material Safety Data Sheets (MSDS) for all materials.
- Dispose of latex paint and paint cans, used brushes, rags, absorbent materials, and drop cloths, when thoroughly dry and are no longer hazardous, with other construction debris.
- Do not remove the original product label; it contains important safety and disposal information. Use the entire product before disposing of the container.
- Mix paint indoors or in a containment area. Never clean paintbrushes or rinse paint containers into a street, gutter, storm drain, or watercourse. Dispose of any paint thinners, residue, and sludge(s) that cannot be recycled, as hazardous waste.
- For water-based paint, clean brushes to the extent practicable, and rinse to a drain leading to a sanitary sewer where permitted or contain for proper disposal off site. For oil-based paints, clean brushes to the extent practicable, and filter and reuse thinners and solvents.
- Use recycled and less hazardous products when practical. Recycle residual paints, solvents, non-treated lumber, and other materials.
- Use materials only where and when needed to complete the construction activity. Use safer alternative materials as much as possible. Reduce or eliminate use of hazardous materials onsite when practical.
- Document the location, time, chemicals applied, and applicator's name and qualifications.
- Keep an ample supply of spill clean up material near use areas. Train employees in spill clean up procedures.
- Avoid exposing applied materials to rainfall and runoff unless sufficient time has been allowed for them to dry.
- Discontinue use of erodible landscape material within 2 days prior to a forecasted rain event and materials should be covered and/or bermed.

EXHIBIT "C" (Stormwater Pollution Prevention Plan)

- Provide containment for material use areas such as masons' areas or paint mixing/preparation areas to prevent materials/pollutants from entering stormwater.

Costs

All of the above are low cost measures.

Inspection and Maintenance

- Inspect and verify that activity-based BMPs are in place prior to the commencement of associated activities.
- BMPs must be inspected in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- Ensure employees and subcontractors throughout the job are using appropriate practices.

References

Blueprint for a Clean Bay: Best Management Practices to Prevent Stormwater Pollution from Construction Related Activities; Santa Clara Valley Nonpoint Source Pollution Control Program, 1995.

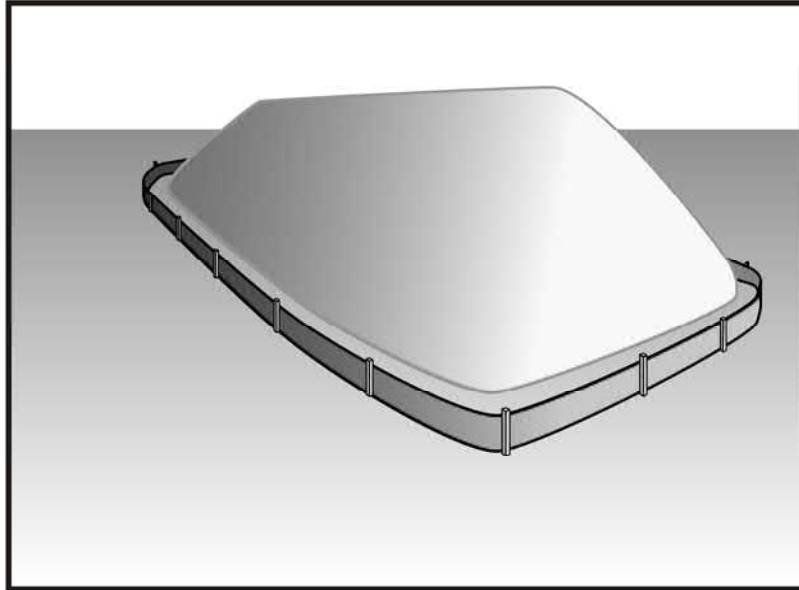
Coastal Nonpoint Pollution Control Program: Program Development and Approval Guidance, Working Group Working Paper; USEPA, April 1992.

Comments on Risk Assessments Risk Reduction Options for Cypermethrin: Docket No. OPP-2005-0293; California Stormwater Quality Association (CASQA) letter to USEPA, 2006. Environmental Hazard and General Labeling for Pyrethroid Non-Agricultural Outdoor Products, EPA-HQ-OPP-2008-0331-0021; USEPA, 2008.

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), March 2003.

Stormwater Management for Construction Activities; Developing Pollution Prevention Plans and Best Management Practice, EPA 832-R-92005; USEPA, April 1992.

EXHIBIT "C" (Stormwater Pollution Prevention Plan)



Description and Purpose

Stockpile management procedures and practices are designed to reduce or eliminate air and stormwater pollution from stockpiles of soil, soil amendments, sand, paving materials such as Portland cement concrete (PCC) rubble, asphalt concrete (AC), asphalt concrete rubble, aggregate base, aggregate sub base or pre-mixed aggregate, asphalt minder (so called “cold mix” asphalt), and pressure treated wood.

Suitable Applications

Implement in all projects that stockpile soil and other loose materials.

Limitations

- Plastic sheeting as a stockpile protection is temporary and hard to manage in windy conditions. Where plastic is used, consider use of plastic tarps with nylon reinforcement which may be more durable than standard sheeting.
- Plastic sheeting can increase runoff volume due to lack of infiltration and potentially cause perimeter control failure.
- Plastic sheeting breaks down faster in sunlight.
- The use of Plastic materials and photodegradable plastics should be avoided.

Implementation

Protection of stockpiles is a year-round requirement. To properly manage stockpiles:

Treat Categories

EC	Erosion Control	
SE	Sediment Control	<input checked="" type="checkbox"/>
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	<input checked="" type="checkbox"/>
WM	Waste Management and Materials Pollution Control	<input checked="" type="checkbox"/>

Legend:

- Primary Category
- Secondary Category

Targeted Constituents

Sediment	<input checked="" type="checkbox"/>
Nutrients	<input checked="" type="checkbox"/>
Trash	<input checked="" type="checkbox"/>
Metals	<input checked="" type="checkbox"/>
Bacteria	
Oil and Grease	<input checked="" type="checkbox"/>
Organics	<input checked="" type="checkbox"/>

Potential Alternatives

None

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- On larger sites, a minimum of 50 ft separation from concentrated flows of stormwater, drainage courses, and inlets is recommended.
- After 14 days of inactivity, a stockpile is non-active and requires further protection described below. All stockpiles are required to be protected as non-active stockpiles immediately if they are not scheduled to be used within 14 days.
- Protect all stockpiles from stormwater run-on using temporary perimeter sediment barriers such as compost berms (SE-13), temporary silt dikes (SE-12), fiber rolls (SE-5), silt fences (SE-1), sandbags (SE-8), gravel bags (SE-6), or biofilter bags (SE-14). Refer to the individual fact sheet for each of these controls for installation information.
- Implement wind erosion control practices as appropriate on all stockpiled material. For specific information, see WE-1, Wind Erosion Control.
- Manage stockpiles of contaminated soil in accordance with WM-7, Contaminated Soil Management.
- Place bagged materials on pallets and under cover.
- Ensure that stockpile coverings are installed securely to protect from wind and rain.
- Some plastic covers withstand weather and sunlight better than others. Select cover materials or methods based on anticipated duration of use.

Protection of Non-Active Stockpiles

A stockpile is considered non-active if it either is not used for 14 days or if it is scheduled not to be used for 14 days or more. Stockpiles need to be protected immediately if they are not scheduled to be used within 14 days. Non-active stockpiles of the identified materials should be protected as follows:

Soil stockpiles

- Soil stockpiles should be covered or protected with soil stabilization measures and a temporary perimeter sediment barrier at all times.
- Temporary vegetation should be considered for topsoil piles that will be stockpiled for extended periods.

Stockpiles of Portland cement concrete rubble, asphalt concrete, asphalt concrete rubble, aggregate base, or aggregate sub base

- Stockpiles should be covered and protected with a temporary perimeter sediment barrier at all times.

Stockpiles of “cold mix”

- Cold mix stockpiles should be placed on and covered with plastic sheeting or comparable material at all times and surrounded by a berm.

Stockpiles of fly ash, stucco, hydrated lime

EXHIBIT "C" (Stormwater Pollution Prevention Plan)

- Stockpiles of materials that may raise the pH of runoff (i.e., basic materials) should be covered with plastic and surrounded by a berm.

Stockpiles/Storage of treated wood

- Treated wood should be covered with plastic sheeting or comparable material at all times and surrounded by a berm.

Protection of Active Stockpiles

A stockpile is active when it is being used or is scheduled to be used within 14 days of the previous use. Active stockpiles of the identified materials should be protected as follows:

- All stockpiles should be covered and protected with a temporary linear sediment barrier prior to the onset of precipitation.
- Stockpiles of “cold mix” and treated wood, and basic materials should be placed on and covered with plastic sheeting or comparable material and surrounded by a berm prior to the onset of precipitation.
- The downstream perimeter of an active stockpile should be protected with a linear sediment barrier or berm and runoff should be diverted around or away from the stockpile on the upstream perimeter.

Costs

For cost information associated with stockpile protection refer to the individual erosion or sediment control BMP fact sheet considered for implementation (For example, refer to SE-1 Silt Fence for installation of silt fence around the perimeter of a stockpile.)

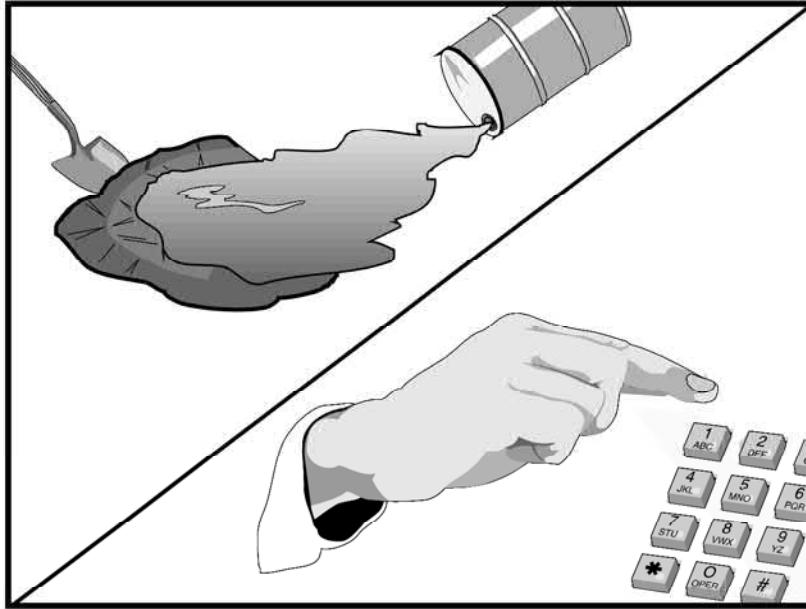
Inspection and Maintenance

- Stockpiles must be inspected in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- It may be necessary to inspect stockpiles covered with plastic sheeting more frequently during certain conditions (for example, high winds or extreme heat).
- Repair and/or replace perimeter controls and covers as needed to keep them functioning properly.
- Sediment shall be removed when it reaches one-third of the barrier height.

References

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), March 2003.

EXHIBIT "C" (Stormwater Pollution Prevention Plan)



Description and Purpose

Prevent or reduce the discharge of pollutants to drainage systems or watercourses from leaks and spills by reducing the chance for spills, stopping the source of spills, containing and cleaning up spills, properly disposing of spill materials, and training employees.

This best management practice covers only spill prevention and control. However, WM-1, Materials Delivery and Storage, and WM-2, Material Use, also contain useful information, particularly on spill prevention. For information on wastes, see the waste management BMPs in this section.

Suitable Applications

This BMP is suitable for all construction projects. Spill control procedures are implemented anytime chemicals or hazardous substances are stored on the construction site, including the following materials:

- Soil stabilizers/binders
- Dust palliatives
- Herbicides
- Growth inhibitors
- Fertilizers
- Deicing/anti-icing chemicals

Categories

EC	Erosion Control	
SE	Sediment Control	
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	<input checked="" type="checkbox"/>

Legend:

- Primary Objective
- Secondary Objective

Targeted Constituents

Sediment	<input checked="" type="checkbox"/>
Nutrients	<input checked="" type="checkbox"/>
Trash	<input checked="" type="checkbox"/>
Metals	<input checked="" type="checkbox"/>
Bacteria	
Oil and Grease	<input checked="" type="checkbox"/>
Organics	<input checked="" type="checkbox"/>

Potential Alternatives

None

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- Fuels
- Lubricants
- Other petroleum distillates

Limitations

- In some cases, it may be necessary to use a private spill cleanup company.
- This BMP applies to spills caused by the contractor and subcontractors.
- Procedures and practices presented in this BMP are general. Contractor should identify appropriate practices for the specific materials used or stored onsite

Implementation

The following steps will help reduce the stormwater impacts of leaks and spills:

Education

- Be aware that different materials pollute in different amounts. Make sure that each employee knows what a “significant spill” is for each material they use, and what is the appropriate response for “significant” and “insignificant” spills.
- Educate employees and subcontractors on potential dangers to humans and the environment from spills and leaks.
- Hold regular meetings to discuss and reinforce appropriate disposal procedures (incorporate into regular safety meetings).
- Establish a continuing education program to indoctrinate new employees.
- Have contractor’s superintendent or representative oversee and enforce proper spill prevention and control measures.

General Measures

- To the extent that the work can be accomplished safely, spills of oil, petroleum products, substances listed under 40 CFR parts 110,117, and 302, and sanitary and septic wastes should be contained and cleaned up immediately.
- Store hazardous materials and wastes in covered containers and protect from vandalism.
- Place a stockpile of spill cleanup materials where it will be readily accessible.
- Train employees in spill prevention and cleanup.
- Designate responsible individuals to oversee and enforce control measures.
- Spills should be covered and protected from stormwater runoff during rainfall to the extent that it doesn’t compromise clean up activities.

- Do not bury or wash spills with water.

EXHIBIT "C" (Stormwater Pollution Prevention Plan)

- Store and dispose of used clean up materials, contaminated materials, and recovered spill material that is no longer suitable for the intended purpose in conformance with the provisions in applicable BMPs.
- Do not allow water used for cleaning and decontamination to enter storm drains or watercourses. Collect and dispose of contaminated water in accordance with WM-10, Liquid Waste Management.
- Contain water overflow or minor water spillage and do not allow it to discharge into drainage facilities or watercourses.
- Place proper storage, cleanup, and spill reporting instructions for hazardous materials stored or used on the project site in an open, conspicuous, and accessible location.
- Keep waste storage areas clean, well organized, and equipped with ample cleanup supplies as appropriate for the materials being stored. Perimeter controls, containment structures, covers, and liners should be repaired or replaced as needed to maintain proper function.

Cleanup

- Clean up leaks and spills immediately.
- Use a rag for small spills on paved surfaces, a damp mop for general cleanup, and absorbent material for larger spills. If the spilled material is hazardous, then the used cleanup materials are also hazardous and must be sent to either a certified laundry (rags) or disposed of as hazardous waste.
- Never hose down or bury dry material spills. Clean up as much of the material as possible and dispose of properly. See the waste management BMPs in this section for specific information.

Minor Spills

- Minor spills typically involve small quantities of oil, gasoline, paint, etc. which can be controlled by the first responder at the discovery of the spill.
- Use absorbent materials on small spills rather than hosing down or burying the spill.
- Absorbent materials should be promptly removed and disposed of properly.
- Follow the practice below for a minor spill:
 - Contain the spread of the spill.
 - Recover spilled materials.
 - Clean the contaminated area and properly dispose of contaminated materials.

Semi-Significant Spills

- Semi-significant spills still can be controlled by the first responder along with the aid of other personnel such as laborers and the foreman, etc. This response may require the cessation of all other activities.

- Spills should be cleaned up immediately:
 - Contain spread of the spill.
 - Notify the project foreman immediately.
 - If the spill occurs on paved or impermeable surfaces, clean up using "dry" methods (absorbent materials, cat litter and/or rags). Contain the spill by encircling with absorbent materials and do not let the spill spread widely.
 - If the spill occurs in dirt areas, immediately contain the spill by constructing an earthen dike. Dig up and properly dispose of contaminated soil.
 - If the spill occurs during rain, cover spill with tarps or other material to prevent contaminating runoff.

Significant/Hazardous Spills

- For significant or hazardous spills that cannot be controlled by personnel in the immediate vicinity, the following steps should be taken:
 - Notify the local emergency response by dialing 911. In addition to 911, the contractor will notify the proper county officials. It is the contractor's responsibility to have all emergency phone numbers at the construction site.
 - Notify the Governor's Office of Emergency Services Warning Center, (916) 845-8911.
 - For spills of federal reportable quantities, in conformance with the requirements in 40 CFR parts 110,119, and 302, the contractor should notify the National Response Center at (800) 424-8802.
 - Notification should first be made by telephone and followed up with a written report.
 - The services of a spill's contractor or a Haz-Mat team should be obtained immediately. Construction personnel should not attempt to clean up until the appropriate and qualified staffs have arrived at the job site.
 - Other agencies which may need to be consulted include, but are not limited to, the Fire Department, the Public Works Department, the Coast Guard, the Highway Patrol, the City/County Police Department, Department of Toxic Substances, California Division of Oil and Gas, Cal/OSHA, etc.

Reporting

- Report significant spills to local agencies, such as the Fire Department; they can assist in cleanup.
- Federal regulations require that any significant oil spill into a water body or onto an adjoining shoreline be reported to the National Response Center (NRC) at 800-424-8802 (24 hours).

Use the following measures related to specific activities:

EXHIBIT "C" (Stormwater Pollution Prevention Plan)

Vehicle and Equipment Maintenance

- If maintenance must occur onsite, use a designated area and a secondary containment, located away from drainage courses, to prevent the runoff of stormwater and the runoff of spills.
- Regularly inspect onsite vehicles and equipment for leaks and repair immediately
- Check incoming vehicles and equipment (including delivery trucks, and employee and subcontractor vehicles) for leaking oil and fluids. Do not allow leaking vehicles or equipment onsite.
- Always use secondary containment, such as a drain pan or drop cloth, to catch spills or leaks when removing or changing fluids.
- Place drip pans or absorbent materials under paving equipment when not in use.
- Use absorbent materials on small spills rather than hosing down or burying the spill. Remove the absorbent materials promptly and dispose of properly.
- Promptly transfer used fluids to the proper waste or recycling drums. Don't leave full drip pans or other open containers lying around
- Oil filters disposed of in trashcans or dumpsters can leak oil and pollute stormwater. Place the oil filter in a funnel over a waste oil-recycling drum to drain excess oil before disposal. Oil filters can also be recycled. Ask the oil supplier or recycler about recycling oil filters.
- Store cracked batteries in a non-leaking secondary container. Do this with all cracked batteries even if you think all the acid has drained out. If you drop a battery, treat it as if it is cracked. Put it into the containment area until you are sure it is not leaking.

Vehicle and Equipment Fueling

- If fueling must occur onsite, use designate areas, located away from drainage courses, to prevent the runoff of stormwater and the runoff of spills.
- Discourage "topping off" of fuel tanks.
- Always use secondary containment, such as a drain pan, when fueling to catch spills/ leaks.

Costs

Prevention of leaks and spills is inexpensive. Treatment and/ or disposal of contaminated soil or water can be quite expensive.

Inspection and Maintenance

- Inspect and verify that activity-based BMPs are in place prior to the commencement of associated activities. While activities associated with the BMP are under way, inspect BMPs in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.

EXHIBIT "C" (Stormwater Pollution Prevention Plan)

- Inspect BMPs subject to non-stormwater discharge daily while non-stormwater discharges occur.
- Keep ample supplies of spill control and cleanup materials onsite, near storage, unloading, and maintenance areas.
- Update your spill prevention and control plan and stock cleanup materials as changes occur in the types of chemicals onsite.

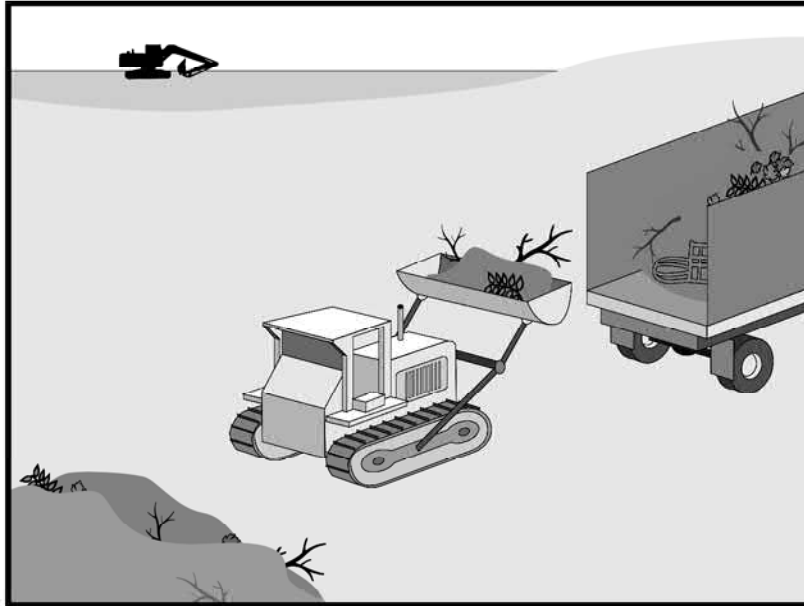
References

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Stormwater Management for Construction Activities; Developing Pollution Prevention Plans and Best Management Practice, EPA 832-R-92005; USEPA, April 1992.

EXHIBIT "C" (Stormwater Pollution Prevention Plan)



Description and Purpose

Solid waste management procedures and practices are designed to prevent or reduce the discharge of pollutants to stormwater from solid or construction waste by providing designated waste collection areas and containers, arranging for regular disposal, and training employees and subcontractors.

Suitable Applications

This BMP is suitable for construction sites where the following wastes are generated or stored:

- Solid waste generated from trees and shrubs removed during land clearing, demolition of existing structures (rubble), and building construction
- Packaging materials including wood, paper, and plastic
- Scrap or surplus building materials including scrap metals, rubber, plastic, glass pieces, and masonry products
- Domestic wastes including food containers such as beverage cans, coffee cups, paper bags, plastic wrappers, and cigarettes
- Construction wastes including brick, mortar, timber, steel and metal scraps, pipe and electrical cuttings, non-hazardous equipment parts, styrofoam and other materials used to transport and package construction materials

Categories

EC	Erosion Control	
SE	Sediment Control	
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	<input checked="" type="checkbox"/>

Legend:

- Primary Objective
- Secondary Objective

Targeted Constituents

Sediment	<input checked="" type="checkbox"/>
Nutrients	<input checked="" type="checkbox"/>
Trash	<input checked="" type="checkbox"/>
Metals	<input checked="" type="checkbox"/>
Bacteria	
Oil and Grease	<input checked="" type="checkbox"/>
Organics	<input checked="" type="checkbox"/>

Potential Alternatives

None

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- Highway planting wastes, including vegetative material, plant containers, and packaging materials

Limitations

Temporary stockpiling of certain construction wastes may not necessitate stringent drainage related controls during the non-rainy season or in desert areas with low rainfall.

Implementation

The following steps will help keep a clean site and reduce stormwater pollution:

- Select designated waste collection areas onsite.
- Inform trash-hauling contractors that you will accept only watertight dumpsters for onsite use. Inspect dumpsters for leaks and repair any dumpster that is not watertight.
- Locate containers in a covered area or in a secondary containment.
- Provide an adequate number of containers with lids or covers that can be placed over the container to keep rain out or to prevent loss of wastes when it is windy.
- Cover waste containers at the end of each work day and when it is raining.
- Plan for additional containers and more frequent pickup during the demolition phase of construction.
- Collect site trash daily, especially during rainy and windy conditions.
- Remove this solid waste promptly since erosion and sediment control devices tend to collect litter.
- Make sure that toxic liquid wastes (used oils, solvents, and paints) and chemicals (acids, pesticides, additives, curing compounds) are not disposed of in dumpsters designated for construction debris.
- Do not hose out dumpsters on the construction site. Leave dumpster cleaning to the trash hauling contractor.
- Arrange for regular waste collection before containers overflow.
- Clean up immediately if a container does spill.
- Make sure that construction waste is collected, removed, and disposed of only at authorized disposal areas.

Education

- Have the contractor's superintendent or representative oversee and enforce proper solid waste management procedures and practices.
- Instruct employees and subcontractors on identification of solid waste and hazardous waste.
- Educate employees and subcontractors on solid waste storage and disposal procedures.

EXHIBIT "C" (Stormwater Pollution Prevention Plan)

- Hold regular meetings to discuss and reinforce disposal procedures (incorporate into regular safety meetings).
- Require that employees and subcontractors follow solid waste handling and storage procedures.
- Prohibit littering by employees, subcontractors, and visitors.
- Minimize production of solid waste materials wherever possible.

Collection, Storage, and Disposal

- Littering on the project site should be prohibited.
- To prevent clogging of the storm drainage system, litter and debris removal from drainage grates, trash racks, and ditch lines should be a priority.
- Trash receptacles should be provided in the contractor's yard, field trailer areas, and at locations where workers congregate for lunch and break periods.
- Litter from work areas within the construction limits of the project site should be collected and placed in watertight dumpsters at least weekly, regardless of whether the litter was generated by the contractor, the public, or others. Collected litter and debris should not be placed in or next to drain inlets, stormwater drainage systems, or watercourses.
- Dumpsters of sufficient size and number should be provided to contain the solid waste generated by the project.
- Full dumpsters should be removed from the project site and the contents should be disposed of by the trash hauling contractor.
- Construction debris and waste should be removed from the site biweekly or more frequently as needed.
- Construction material visible to the public should be stored or stacked in an orderly manner.
- Stormwater runoff should be prevented from contacting stored solid waste through the use of berms, dikes, or other temporary diversion structures or through the use of measures to elevate waste from site surfaces.
- Solid waste storage areas should be located at least 50 ft from drainage facilities and watercourses and should not be located in areas prone to flooding or ponding.
- Except during fair weather, construction and highway planting waste not stored in watertight dumpsters should be securely covered from wind and rain by covering the waste with tarps or plastic.
- Segregate potentially hazardous waste from non-hazardous construction site waste.
- Make sure that toxic liquid wastes (used oils, solvents, and paints) and chemicals (acids, pesticides, additives, curing compounds) are not disposed of in dumpsters designated for construction debris.

- For disposal of hazardous waste, see WM-6, Hazardous Waste Management. Have hazardous waste hauled to an appropriate disposal and/or recycling facility.
- Salvage or recycle useful vegetation debris, packaging and surplus building materials when practical. For example, trees and shrubs from land clearing can be used as a brush barrier, or converted into wood chips, then used as mulch on graded areas. Wood pallets, cardboard boxes, and construction scraps can also be recycled.

Costs

All of the above are low cost measures.

Inspection and Maintenance

- Inspect and verify that activity-based BMPs are in place prior to the commencement of associated activities. While activities associated with the BMP are under way, inspect BMPs in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- Inspect BMPs subject to non-stormwater discharge daily while non-stormwater discharges occur
- Inspect construction waste area regularly.
- Arrange for regular waste collection.

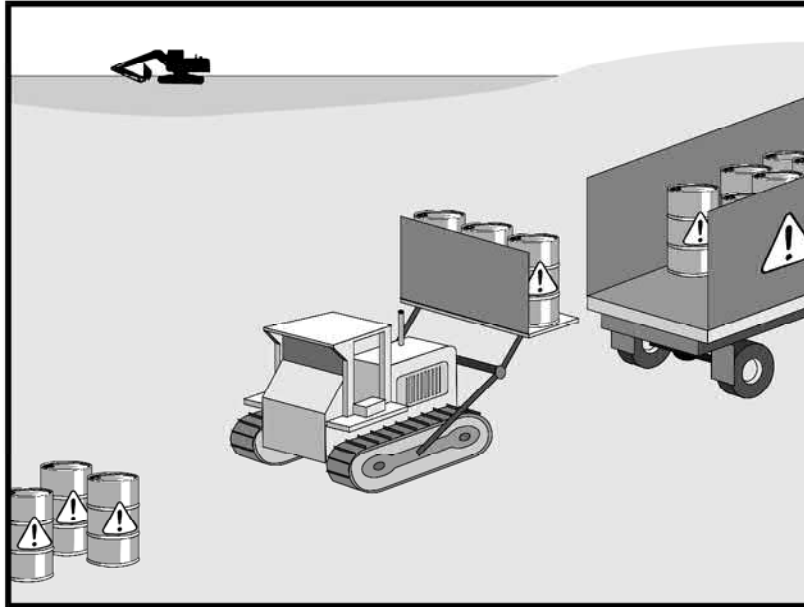
References

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Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.

Stormwater Management for Construction Activities; Developing Pollution Prevention Plans and Best Management Practice, EPA 832-R-92005; USEPA, April 1992.

EXHIBIT "C" (Stormwater Pollution Prevention Plan)



Categories

EC	Erosion Control	
SE	Sediment Control	
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	<input checked="" type="checkbox"/>

Legend:

- Primary Objective**
- Secondary Objective**

Targeted Constituents

Sediment	
Nutrients	<input checked="" type="checkbox"/>
Trash	<input checked="" type="checkbox"/>
Metals	<input checked="" type="checkbox"/>
Bacteria	<input checked="" type="checkbox"/>
Oil and Grease	<input checked="" type="checkbox"/>
Organics	<input checked="" type="checkbox"/>

Potential Alternatives

None

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Description and Purpose

Prevent or reduce the discharge of pollutants to stormwater from hazardous waste through proper material use, waste disposal, and training of employees and subcontractors.

Suitable Applications

This best management practice (BMP) applies to all construction projects. Hazardous waste management practices are implemented on construction projects that generate waste from the use of:

- Petroleum Products
- Concrete Curing Compounds
- Palliatives
- Septic Wastes
- Stains
- Wood Preservatives
- Any materials deemed a hazardous waste in California, Title 22 Division 4.5, or listed in 40 CFR Parts 110, 117, 261, or 302
- Asphalt Products
- Pesticides
- Acids
- Paints
- Solvents
- Roofing Tar

In addition, sites with existing structures may contain wastes, which must be disposed of in accordance with federal, state, and local regulations. These wastes include:

- Sandblasting grit mixed with lead-, cadmium-, or chromium-based paints
- Asbestos
- PCBs (particularly in older transformers)

Limitations

- Hazardous waste that cannot be reused or recycled must be disposed of by a licensed hazardous waste hauler.
- Nothing in this BMP relieves the contractor from responsibility for compliance with federal, state, and local laws regarding storage, handling, transportation, and disposal of hazardous wastes.
- This BMP does not cover aerially deposited lead (ADL) soils. For ADL soils refer to WM-7, Contaminated Soil Management.

Implementation

The following steps will help reduce stormwater pollution from hazardous wastes:

Material Use

- Wastes should be stored in sealed containers constructed of a suitable material and should be labeled as required by Title 22 CCR, Division 4.5 and 49 CFR Parts 172, 173, 178, and 179.
- All hazardous waste should be stored, transported, and disposed as required in Title 22 CCR, Division 4.5 and 49 CFR 261-263.
- Waste containers should be stored in temporary containment facilities that should comply with the following requirements:
 - Temporary containment facility should provide for a spill containment volume equal to 1.5 times the volume of all containers able to contain precipitation from a 25-year storm event, plus the greater of 10% of the aggregate volume of all containers or 100% of the capacity of the largest tank within its boundary, whichever is greater.
 - Temporary containment facility should be impervious to the materials stored there for a minimum contact time of 72 hours.
 - Temporary containment facilities should be maintained free of accumulated rainwater and spills. In the event of spills or leaks, accumulated rainwater and spills should be placed into drums after each rainfall. These liquids should be handled as a hazardous waste unless testing determines them to be non-hazardous. Non-hazardous liquids should be sent to an approved disposal site.
 - Sufficient separation should be provided between stored containers to allow for spill cleanup and emergency response access.

- Incompatible materials, such as chlorine and ammonia, should not be stored in the same temporary containment facility.
- Throughout the rainy season, temporary containment facilities should be covered during non-working days, and prior to rain events. Covered facilities may include use of plastic tarps for small facilities or constructed roofs with overhangs.
- Drums should not be overfilled, and wastes should not be mixed.
- Unless watertight, containers of dry waste should be stored on pallets.
- Do not over-apply herbicides and pesticides. Prepare only the amount needed. Follow the recommended usage instructions. Over application is expensive and environmentally harmful. Apply surface dressings in several smaller applications, as opposed to one large application. Allow time for infiltration and avoid excess material being carried offsite by runoff. Do not apply these chemicals just before it rains. People applying pesticides must be certified in accordance with federal and state regulations.
- Paint brushes and equipment for water and oil-based paints should be cleaned within a contained area and should not be allowed to contaminate site soils, watercourses, or drainage systems. Waste paints, thinners, solvents, residues, and sludges that cannot be recycled or reused should be disposed of as hazardous waste. When thoroughly dry, latex paint and paint cans, used brushes, rags, absorbent materials, and drop cloths should be disposed of as solid waste.
- Do not clean out brushes or rinse paint containers into the dirt, street, gutter, storm drain, or stream. "Paint out" brushes as much as possible. Rinse water-based paints to the sanitary sewer. Filter and reuse thinners and solvents. Dispose of excess oil-based paints and sludge as hazardous waste.
- The following actions should be taken with respect to temporary contaminant:
 - Ensure that adequate hazardous waste storage volume is available.
 - Ensure that hazardous waste collection containers are conveniently located.
 - Designate hazardous waste storage areas onsite away from storm drains or watercourses and away from moving vehicles and equipment to prevent accidental spills.
 - Minimize production or generation of hazardous materials and hazardous waste on the job site.
 - Use containment berms in fueling and maintenance areas and where the potential for spills is high.
 - Segregate potentially hazardous waste from non-hazardous construction site debris.
 - Keep liquid or semi-liquid hazardous waste in appropriate containers (closed drums or similar) and under cover.

EXHIBIT "C" (Stormwater Pollution Prevention Plan)

- Clearly label all hazardous waste containers with the waste being stored and the date of accumulation.
- Place hazardous waste containers in secondary containment.
- Do not allow potentially hazardous waste materials to accumulate on the ground.
- Do not mix wastes.
- Use all of the product before disposing of the container.
- Do not remove the original product label; it contains important safety and disposal information.

Waste Recycling Disposal

- Select designated hazardous waste collection areas onsite.
- Hazardous materials and wastes should be stored in covered containers and protected from vandalism.
- Place hazardous waste containers in secondary containment.
- Do not mix wastes, this can cause chemical reactions, making recycling impossible and complicating disposal.
- Recycle any useful materials such as used oil or water-based paint.
- Make sure that toxic liquid wastes (used oils, solvents, and paints) and chemicals (acids, pesticides, additives, curing compounds) are not disposed of in dumpsters designated for construction debris.
- Arrange for regular waste collection before containers overflow.
- Make sure that hazardous waste (e.g., excess oil-based paint and sludge) is collected, removed, and disposed of only at authorized disposal areas.

Disposal Procedures

- Waste should be disposed of by a licensed hazardous waste transporter at an authorized and licensed disposal facility or recycling facility utilizing properly completed Uniform Hazardous Waste Manifest forms.
- A Department of Health Services certified laboratory should sample waste to determine the appropriate disposal facility.
- Properly dispose of rainwater in secondary containment that may have mixed with hazardous waste.
- Attention is directed to "Hazardous Material", "Contaminated Material", and "Aerially Deposited Lead" of the contract documents regarding the handling and disposal of hazardous materials.

EXHIBIT "C" (Stormwater Pollution Prevention Plan)

Education

- Educate employees and subcontractors on hazardous waste storage and disposal procedures.
- Educate employees and subcontractors on potential dangers to humans and the environment from hazardous wastes.
- Instruct employees and subcontractors on safety procedures for common construction site hazardous wastes.
- Instruct employees and subcontractors in identification of hazardous and solid waste.
- Hold regular meetings to discuss and reinforce hazardous waste management procedures (incorporate into regular safety meetings).
- The contractor's superintendent or representative should oversee and enforce proper hazardous waste management procedures and practices.
- Make sure that hazardous waste is collected, removed, and disposed of only at authorized disposal areas.
- Warning signs should be placed in areas recently treated with chemicals.
- Place a stockpile of spill cleanup materials where it will be readily accessible.
- If a container does spill, clean up immediately.

Costs

All of the above are low cost measures.

Inspection and Maintenance

- Inspect and verify that activity-based BMPs are in place prior to the commencement of associated activities. While activities associated with the BMP are under way, inspect BMPs in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- Inspect BMPs subject to non-stormwater discharge daily while non-stormwater discharges occur
- Hazardous waste should be regularly collected.
- A foreman or construction supervisor should monitor onsite hazardous waste storage and disposal procedures.
- Waste storage areas should be kept clean, well organized, and equipped with ample cleanup supplies as appropriate for the materials being stored.
- Perimeter controls, containment structures, covers, and liners should be repaired or replaced as needed to maintain proper function.

EXHIBIT "C" (Stormwater Pollution Prevention Plan)

- Hazardous spills should be cleaned up and reported in conformance with the applicable Material Safety Data Sheet (MSDS) and the instructions posted at the project site.
- The National Response Center, at (800) 424-8802, should be notified of spills of federal reportable quantities in conformance with the requirements in 40 CFR parts 110, 117, and 302. Also notify the Governors Office of Emergency Services Warning Center at (916) 845-8911.
- A copy of the hazardous waste manifests should be provided.

References

Blueprint for a Clean Bay: Best Management Practices to Prevent Stormwater Pollution from Construction Related Activities; Santa Clara Valley Nonpoint Source Pollution Control Program, 1995.

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EXHIBIT "C" (Stormwater Pollution Prevention Plan)



Categories

EC	Erosion Control	
SE	Sediment Control	
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	<input checked="" type="checkbox"/>

Legend:

- Primary Objective
- Secondary Objective

Description and Purpose

Prevent or reduce the discharge of pollutants to stormwater from contaminated soil and highly acidic or alkaline soils by conducting pre-construction surveys, inspecting excavations regularly, and remediating contaminated soil promptly.

Suitable Applications

Contaminated soil management is implemented on construction projects in highly urbanized or industrial areas where soil contamination may have occurred due to spills, illicit discharges, aerial deposition, past use and leaks from underground storage tanks.

Limitations

Contaminated soils that cannot be treated onsite must be disposed of offsite by a licensed hazardous waste hauler. The presence of contaminated soil may indicate contaminated water as well. See NS-2, Dewatering Operations, for more information.

The procedures and practices presented in this BMP are general. The contractor should identify appropriate practices and procedures for the specific contaminants known to exist or discovered onsite.

Implementation

Most owners and developers conduct pre-construction environmental assessments as a matter of routine. Contaminated soils are often identified during project planning and development with known locations identified in the plans, specifications and in the SWPPP. The contractor should review applicable reports and investigate appropriate call-outs in the

Targeted Constituents

Sediment	
Nutrients	<input checked="" type="checkbox"/>
Trash	<input checked="" type="checkbox"/>
Metals	<input checked="" type="checkbox"/>
Bacteria	<input checked="" type="checkbox"/>
Oil and Grease	<input checked="" type="checkbox"/>
Organics	<input checked="" type="checkbox"/>

Potential Alternatives

None

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plans, specifications, and SWPPP. Recent court rulings holding contractors liable for cleanup costs when they unknowingly move contaminated soil highlight the need for contractors to confirm a site assessment is completed before earth moving begins.

The following steps will help reduce stormwater pollution from contaminated soil:

- Conduct thorough, pre-construction inspections of the site and review documents related to the site. If inspection or reviews indicated presence of contaminated soils, develop a plan before starting work.
- Look for contaminated soil as evidenced by discoloration, odors, differences in soil properties, abandoned underground tanks or pipes, or buried debris.
- Prevent leaks and spills. Contaminated soil can be expensive to treat and dispose of properly. However, addressing the problem before construction is much less expensive than after the structures are in place.
- The contractor may further identify contaminated soils by investigating:
 - Past site uses and activities
 - Detected or undetected spills and leaks
 - Acid or alkaline solutions from exposed soil or rock formations high in acid or alkaline forming elements
 - Contaminated soil as evidenced by discoloration, odors, differences in soil properties, abandoned underground tanks or pipes, or buried debris.
 - Suspected soils should be tested at a certified laboratory.

Education

- Have employees and subcontractors complete a safety training program which meets 29 CFR 1910.120 and 8 CCR 5192 covering the potential hazards as identified, prior to performing any excavation work at the locations containing material classified as hazardous.
- Educate employees and subcontractors in identification of contaminated soil and on contaminated soil handling and disposal procedures.
- Hold regular meetings to discuss and reinforce disposal procedures (incorporate into regular safety meetings).

Handling Procedures for Material with Aerially Deposited Lead (ADL)

- Materials from areas designated as containing (ADL) may, if allowed by the contract special provisions, be excavated, transported, and used in the construction of embankments and/or backfill.
- Excavation, transportation, and placement operations should result in no visible dust.
- Caution should be exercised to prevent spillage of lead containing material during transport.

EXHIBIT "C" (Stormwater Pollution Prevention Plan)

- Quality should be monitored during excavation of soils contaminated with lead.

Handling Procedures for Contaminated Soils

- Minimize onsite storage. Contaminated soil should be disposed of properly in accordance with all applicable regulations. All hazardous waste storage will comply with the requirements in Title 22, CCR, Sections 66265.250 to 66265.260.
- Test suspected soils at an approved certified laboratory.
- Work with the local regulatory agencies to develop options for treatment or disposal if the soil is contaminated.
- Avoid temporary stockpiling of contaminated soils or hazardous material.
- Take the following precautions if temporary stockpiling is necessary:
 - Cover the stockpile with plastic sheeting or tarps.
 - Install a berm around the stockpile to prevent runoff from leaving the area.
 - Do not stockpile in or near storm drains or watercourses.
- Remove contaminated material and hazardous material on exteriors of transport vehicles and place either into the current transport vehicle or into the excavation prior to the vehicle leaving the exclusion zone.
- Monitor the air quality continuously during excavation operations at all locations containing hazardous material.
- Procure all permits and licenses, pay all charges and fees, and give all notices necessary and incident to the due and lawful prosecution of the work, including registration for transporting vehicles carrying the contaminated material and the hazardous material.
- Collect water from decontamination procedures and treat or dispose of it at an appropriate disposal site.
- Collect non-reusable protective equipment, once used by any personnel, and dispose of at an appropriate disposal site.
- Install temporary security fence to surround and secure the exclusion zone. Remove fencing when no longer needed.
- Excavate, transport, and dispose of contaminated material and hazardous material in accordance with the rules and regulations of the following agencies (the specifications of these agencies supersede the procedures outlined in this BMP):
 - United States Department of Transportation (USDOT)
 - United States Environmental Protection Agency (USEPA)
 - California Environmental Protection Agency (CAL-EPA)

EXHIBIT "C" (Stormwater Pollution Prevention Plan)

- California Division of Occupation Safety and Health Administration (CAL-OSHA)
- Local regulatory agencies

Procedures for Underground Storage Tank Removals

- Prior to commencing tank removal operations, obtain the required underground storage tank removal permits and approval from the federal, state, and local agencies that have jurisdiction over such work.
- To determine if it contains hazardous substances, arrange to have tested, any liquid or sludge found in the underground tank prior to its removal.
- Following the tank removal, take soil samples beneath the excavated tank and perform analysis as required by the local agency representative(s).
- The underground storage tank, any liquid or sludge found within the tank, and all contaminated substances and hazardous substances removed during the tank removal and transported to disposal facilities permitted to accept such waste.

Water Control

- All necessary precautions and preventive measures should be taken to prevent the flow of water, including ground water, from mixing with hazardous substances or underground storage tank excavations. Such preventative measures may consist of, but are not limited to, berms, cofferdams, grout curtains, freeze walls, and seal course concrete or any combination thereof.
- If water does enter an excavation and becomes contaminated, such water, when necessary to proceed with the work, should be discharged to clean, closed top, watertight transportable holding tanks, treated, and disposed of in accordance with federal, state, and local laws.

Costs

Prevention of leaks and spills is inexpensive. Treatment or disposal of contaminated soil can be quite expensive.

Inspection and Maintenance

- Inspect and verify that activity-based BMPs are in place prior to the commencement of associated activities. While activities associated with the BMP are under way, inspect BMPs in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- Arrange for contractor's Water Pollution Control Manager, foreman, and/or construction supervisor to monitor onsite contaminated soil storage and disposal procedures.
- Monitor air quality continuously during excavation operations at all locations containing hazardous material.
- Coordinate contaminated soils and hazardous substances/waste management with the appropriate federal, state, and local agencies.

EXHIBIT "C" (Stormwater Pollution Prevention Plan)

- Implement WM-4, Spill Prevention and Control, to prevent leaks and spills as much as possible.

References

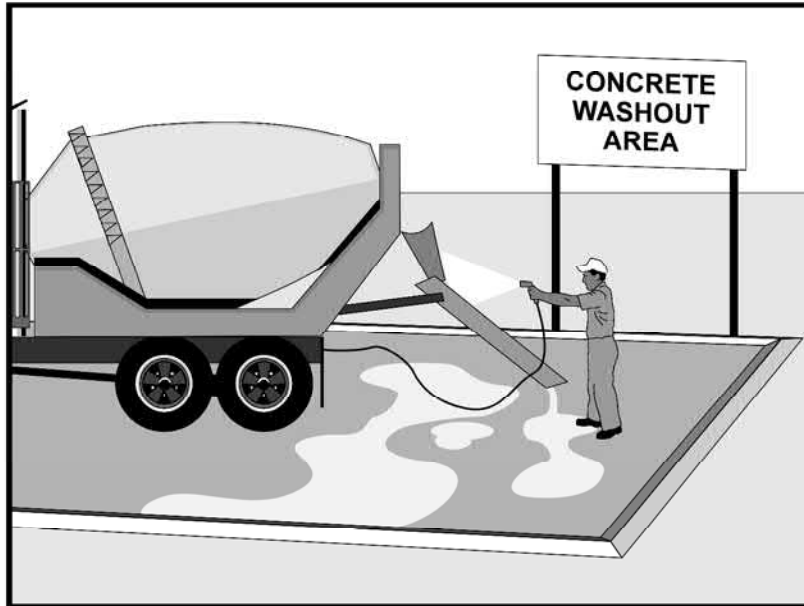
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EXHIBIT "C" (Stormwater Pollution Prevention Plan)



Description and Purpose

Prevent the discharge of pollutants to stormwater from concrete waste by conducting washout onsite or offsite in a designated area, and by employee and subcontractor training.

The General Permit incorporates Numeric Action Levels (NAL) for pH (see Section 2 of this handbook to determine your project's risk level and if you are subject to these requirements).

Many types of construction materials, including mortar, concrete, stucco, cement and block and their associated wastes have basic chemical properties that can raise pH levels outside of the permitted range. Additional care should be taken when managing these materials to prevent them from coming into contact with stormwater flows and raising pH to levels outside the accepted range.

Suitable Applications

Concrete waste management procedures and practices are implemented on construction projects where:

- Concrete is used as a construction material or where concrete dust and debris result from demolition activities.
- Slurries containing Portland cement concrete (PCC) are generated, such as from saw cutting, coring, grinding, grooving, and hydro-concrete demolition.
- Concrete trucks and other concrete-coated equipment are washed onsite.

Categories

EC	Erosion Control	
SE	Sediment Control	
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	<input checked="" type="checkbox"/>
WM	Waste Management and Materials Pollution Control	<input checked="" type="checkbox"/>

Legend:

- Primary Category
- Secondary Category

Targeted Constituents

Sediment	<input checked="" type="checkbox"/>
Nutrients	
Trash	
Metals	<input checked="" type="checkbox"/>
Bacteria	
Oil and Grease	
Organics	

Potential Alternatives

None

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- Mortar-mixing stations exist.
- Stucco mixing and spraying.
- See also NS-8, Vehicle and Equipment Cleaning.

Limitations

- Offsite washout of concrete wastes may not always be possible.
- Multiple washouts may be needed to assure adequate capacity and to allow for evaporation.

Implementation

The following steps will help reduce stormwater pollution from concrete wastes:

- Incorporate requirements for concrete waste management into material supplier and subcontractor agreements.
- Store dry and wet materials under cover, away from drainage areas. Refer to WM-1, Material Delivery and Storage for more information.
- Avoid mixing excess amounts of concrete.
- Perform washout of concrete trucks in designated areas only, where washout will not reach stormwater.
- Do not wash out concrete trucks into storm drains, open ditches, streets, streams or onto the ground. Trucks should always be washed out into designated facilities.
- Do not allow excess concrete to be dumped onsite, except in designated areas.
- For onsite washout:
 - On larger sites, it is recommended to locate washout areas at least 50 feet from storm drains, open ditches, or water bodies. Do not allow runoff from this area by constructing a temporary pit or bermed area large enough for liquid and solid waste.
 - Washout wastes into the temporary washout where the concrete can set, be broken up, and then disposed properly.
 - Washouts shall be implemented in a manner that prevents leaching to underlying soils. Washout containers must be water tight and washouts on or in the ground must be lined with a suitable impervious liner, typically a plastic type material.
- Do not wash sweepings from exposed aggregate concrete into the street or storm drain. Collect and return sweepings to aggregate base stockpile or dispose in the trash.
- See typical concrete washout installation details at the end of this fact sheet.

Education

- Educate employees, subcontractors, and suppliers on the concrete waste management techniques described herein.

- Arrange for contractor's superintendent or representative to oversee and enforce concrete waste management procedures.
- Discuss the concrete management techniques described in this BMP (such as handling of concrete waste and washout) with the ready-mix concrete supplier before any deliveries are made.

Concrete Demolition Wastes

- Stockpile concrete demolition waste in accordance with BMP WM-3, Stockpile Management.
- Dispose of or recycle hardened concrete waste in accordance with applicable federal, state or local regulations.

Concrete Slurry Wastes

- PCC and AC waste should not be allowed to enter storm drains or watercourses.
- PCC and AC waste should be collected and disposed of or placed in a temporary concrete washout facility (as described in Onsite Temporary Concrete Washout Facility, Concrete Transit Truck Washout Procedures, below).
- A foreman or construction supervisor should monitor onsite concrete working tasks, such as saw cutting, coring, grinding and grooving to ensure proper methods are implemented.
- Saw-cut concrete slurry should not be allowed to enter storm drains or watercourses. Residue from grinding operations should be picked up by means of a vacuum attachment to the grinding machine or by sweeping. Saw cutting residue should not be allowed to flow across the pavement and should not be left on the surface of the pavement. See also NS-3, Paving and Grinding Operations; and WM-10, Liquid Waste Management.
- Concrete slurry residue should be disposed in a temporary washout facility (as described in Onsite Temporary Concrete Washout Facility, Concrete Transit Truck Washout Procedures, below) and allowed to dry. Dispose of dry slurry residue in accordance with WM-5, Solid Waste Management.

Onsite Temporary Concrete Washout Facility, Transit Truck Washout Procedures

- Temporary concrete washout facilities should be located a minimum of 50 ft from storm drain inlets, open drainage facilities, and watercourses. Each facility should be located away from construction traffic or access areas to prevent disturbance or tracking.
- A sign should be installed adjacent to each washout facility to inform concrete equipment operators to utilize the proper facilities.
- Temporary concrete washout facilities should be constructed above grade or below grade at the option of the contractor. Temporary concrete washout facilities should be constructed and maintained in sufficient quantity and size to contain all liquid and concrete waste generated by washout operations.

EXHIBIT "C" (Stormwater Pollution Prevention Plan)

- Temporary washout facilities should have a temporary pit or bermed areas of sufficient volume to completely contain all liquid and waste concrete materials generated during washout procedures.
- Temporary washout facilities should be lined to prevent discharge to the underlying ground or surrounding area.
- Washout of concrete trucks should be performed in designated areas only.
- Only concrete from mixer truck chutes should be washed into concrete wash out.
- Concrete washout from concrete pumper bins can be washed into concrete pumper trucks and discharged into designated washout area or properly disposed of or recycled offsite.
- Once concrete wastes are washed into the designated area and allowed to harden, the concrete should be broken up, removed, and disposed of per WM-5, Solid Waste Management. Dispose of or recycle hardened concrete on a regular basis.
- Temporary Concrete Washout Facility (Type Above Grade)
 - Temporary concrete washout facility (type above grade) should be constructed as shown on the details at the end of this BMP, with a recommended minimum length and minimum width of 10 ft; however, smaller sites or jobs may only need a smaller washout facility. With any washout, always maintain a sufficient quantity and volume to contain all liquid and concrete waste generated by washout operations.
 - Materials used to construct the washout area should conform to the provisions detailed in their respective BMPs (e.g., SE-8 Sandbag Barrier).
 - Plastic lining material should be a minimum of 10 mil in polyethylene sheeting and should be free of holes, tears, or other defects that compromise the impermeability of the material.
 - Alternatively, portable removable containers can be used as above grade concrete washouts. Also called a “roll-off”; this concrete washout facility should be properly sealed to prevent leakage and should be removed from the site and replaced when the container reaches 75% capacity.
- Temporary Concrete Washout Facility (Type Below Grade)
 - Temporary concrete washout facilities (type below grade) should be constructed as shown on the details at the end of this BMP, with a recommended minimum length and minimum width of 10 ft. The quantity and volume should be sufficient to contain all liquid and concrete waste generated by washout operations.
 - Lath and flagging should be commercial type.
 - Plastic lining material should be a minimum of 10 mil polyethylene sheeting and should be free of holes, tears, or other defects that compromise the impermeability of the material.

- The base of a washout facility should be free of rock or debris that may damage a plastic liner.

Removal of Temporary Concrete Washout Facilities

- When temporary concrete washout facilities are no longer required for the work, the hardened concrete should be removed and properly disposed or recycled in accordance with federal, state or local regulations. Materials used to construct temporary concrete washout facilities should be removed from the site of the work and properly disposed or recycled in accordance with federal, state or local regulations.
- Holes, depressions or other ground disturbance caused by the removal of the temporary concrete washout facilities should be backfilled and repaired.

Costs

All of the above are low cost measures. Roll-off concrete washout facilities can be more costly than other measures due to removal and replacement; however, provide a cleaner alternative to traditional washouts. The type of washout facility, size, and availability of materials will determine the cost of the washout.

Inspection and Maintenance

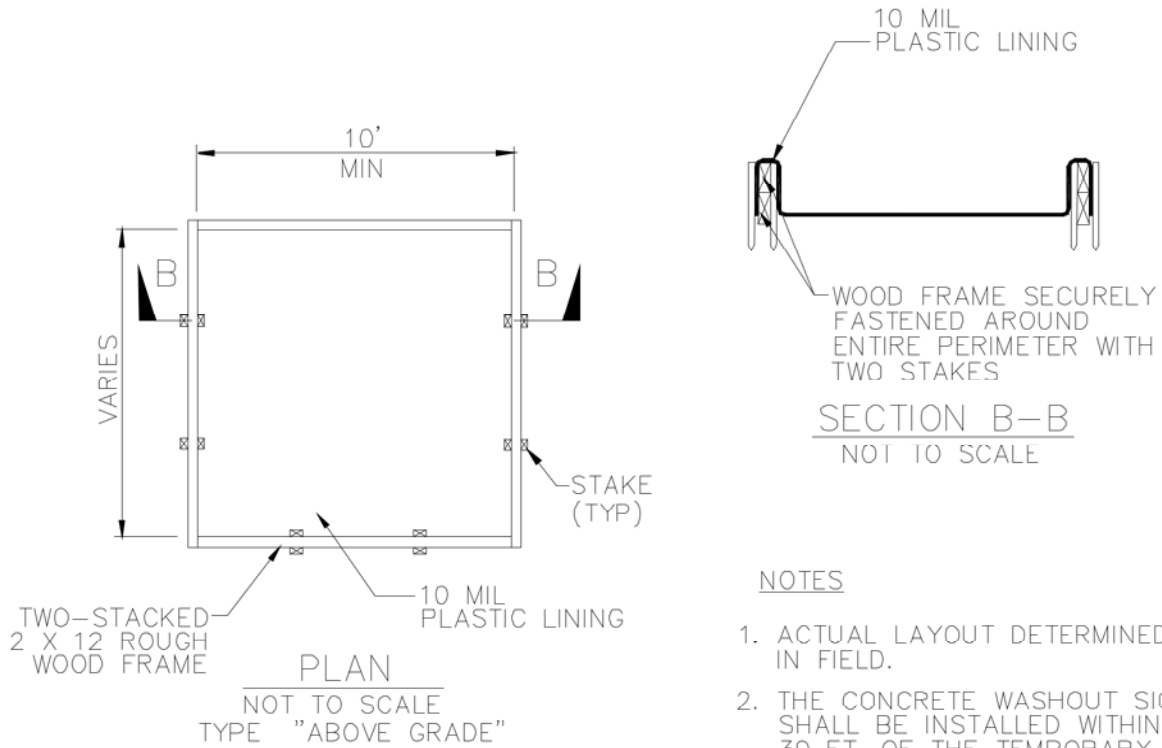
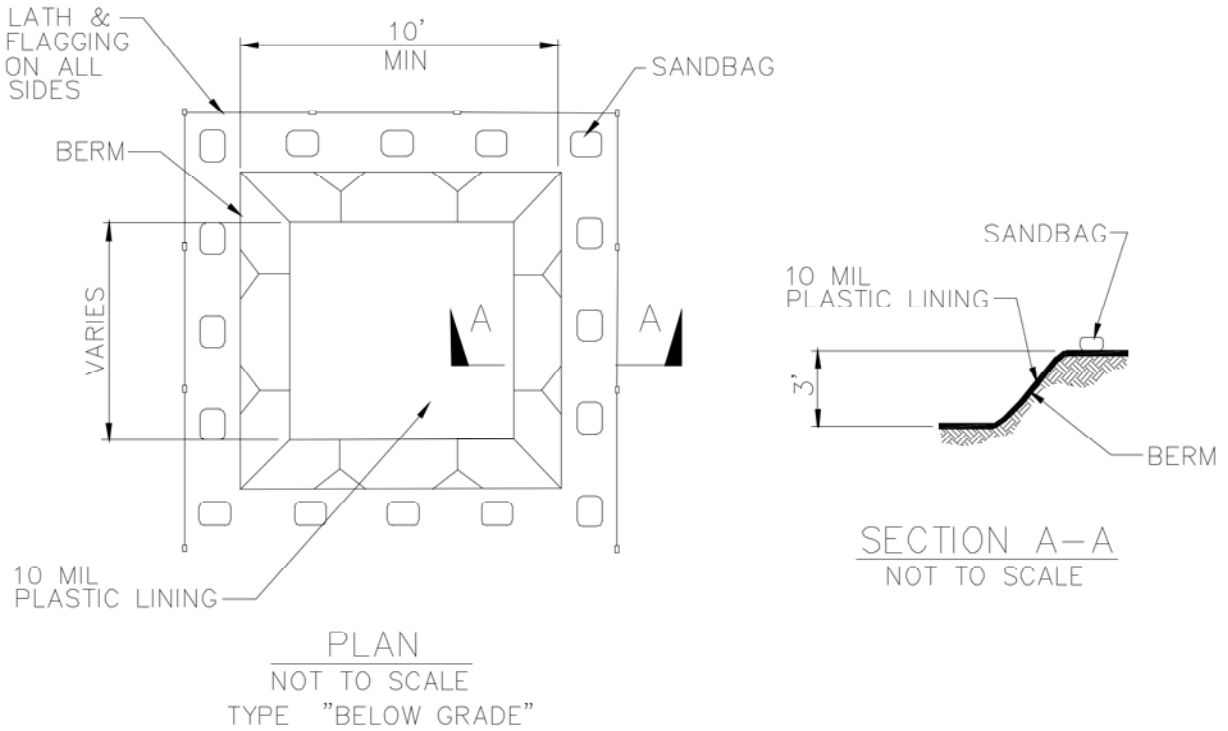
- BMPs must be inspected in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- Temporary concrete washout facilities should be maintained to provide adequate holding capacity with a minimum freeboard of 4 in. for above grade facilities and 12 in. for below grade facilities. Maintaining temporary concrete washout facilities should include removing and disposing of hardened concrete and returning the facilities to a functional condition. Hardened concrete materials should be removed and properly disposed or recycled in accordance with federal, state or local regulations.
- Washout facilities must be cleaned, or new facilities must be constructed and ready for use once the washout is 75% full.
- Inspect washout facilities for damage (e.g. torn liner, evidence of leaks, signage, etc.). Repair all identified damage.

References

Blueprint for a Clean Bay: Best Management Practices to Prevent Stormwater Pollution from Construction Related Activities; Santa Clara Valley Nonpoint Source Pollution Control Program, 1995.

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000, Updated March 2003.

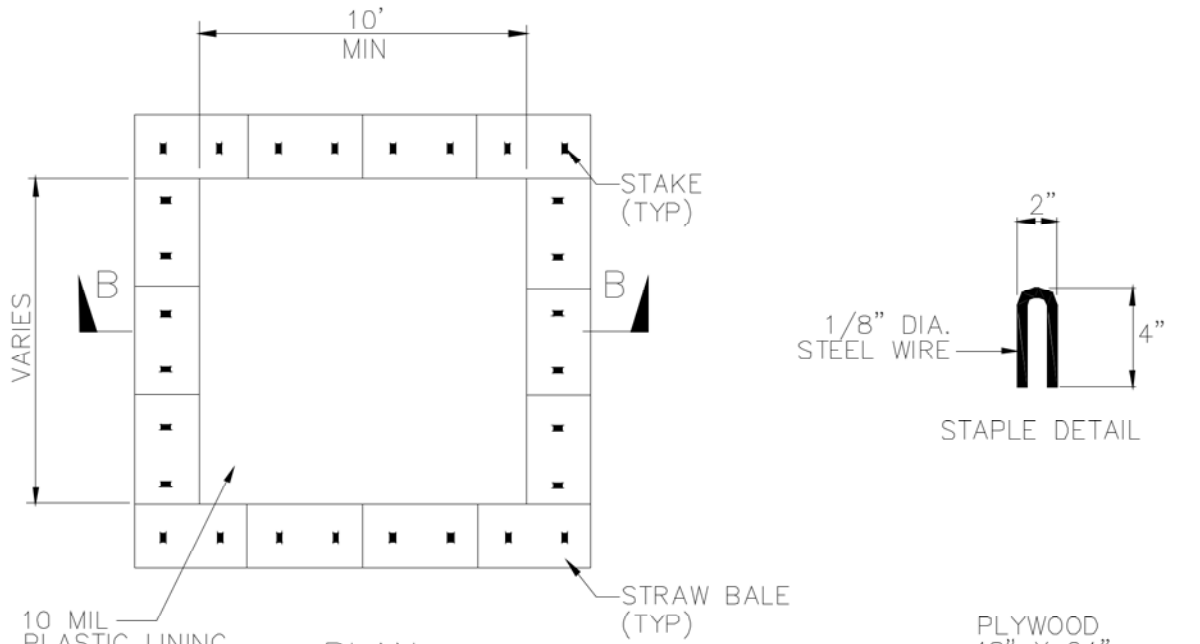
Stormwater Management for Construction Activities; Developing Pollution Prevention Plans and Best Management Practice, EPA 832-R-92005; USEPA, April 1992.



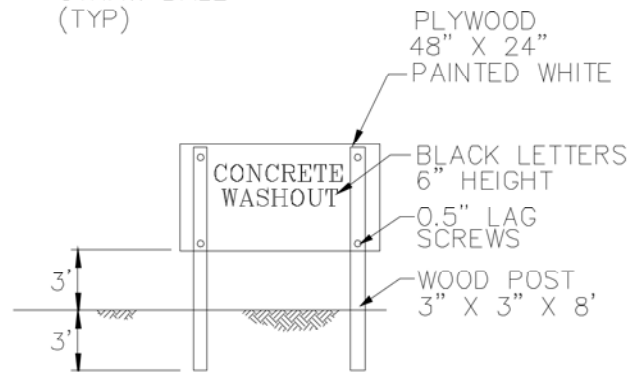
NOTES

1. ACTUAL LAYOUT DETERMINED IN FIELD.
2. THE CONCRETE WASHOUT SIGN SHALL BE INSTALLED WITHIN 30 FT. OF THE TEMPORARY CONCRETE WASHOUT FACILITY.

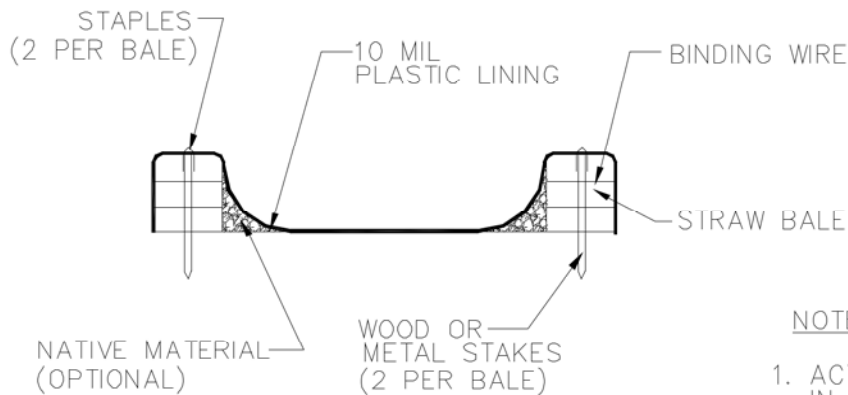
EXHIBIT "C" (Stormwater Pollution Prevention Plan)



PLAN
NOT TO SCALE
TYPE "ABOVE GRADE"
WITH STRAW BALES



**CONCRETE WASHOUT
SIGN DETAIL
(OR EQUIVALENT)**



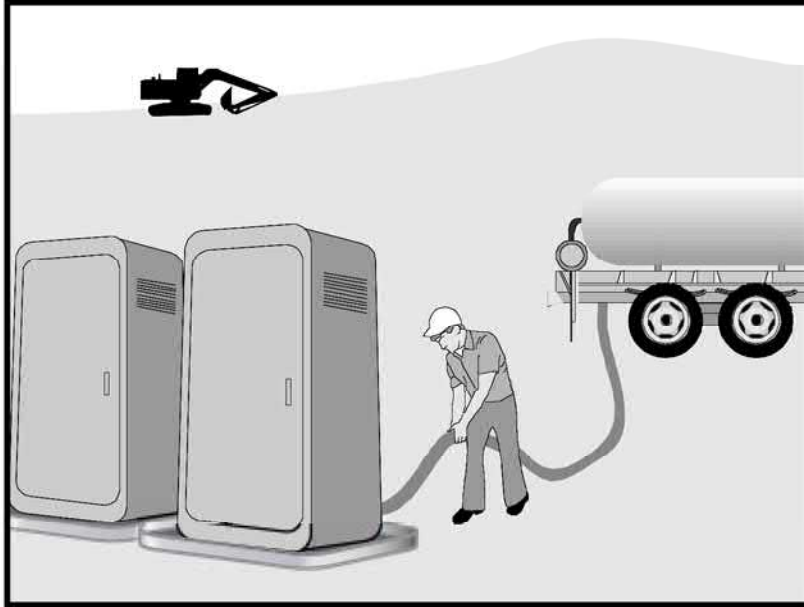
SECTION B-B
NOT TO SCALE

NOTES

1. ACTUAL LAYOUT DETERMINED IN FIELD.
2. THE CONCRETE WASHOUT SIGN SHALL BE INSTALLED WITHIN 30 FT. OF THE TEMPORARY CONCRETE WASHOUT FACILITY.

EXHIBIT "C" (Stormwater Pollution Prevention Plan)

Sanitary/Septic Waste Management WM-9



Description and Purpose

Proper sanitary and septic waste management prevent the discharge of pollutants to stormwater from sanitary and septic waste by providing convenient, well-maintained facilities, and arranging for regular service and disposal.

Suitable Applications

Sanitary septic waste management practices are suitable for use at all construction sites that use temporary or portable sanitary and septic waste systems.

Limitations

None identified.

Implementation

Sanitary or septic wastes should be treated or disposed of in accordance with state and local requirements. In many cases, one contract with a local facility supplier will be all that it takes to make sure sanitary wastes are properly disposed.

Storage and Disposal Procedures

- Temporary sanitary facilities should be located away from drainage facilities, watercourses, and from traffic circulation. If site conditions allow, place portable facilities a minimum of 50 feet from drainage conveyances and traffic areas. When subjected to high winds or risk of high winds, temporary sanitary facilities should be secured to prevent overturning.

Categories

EC	Erosion Control	
SE	Sediment Control	
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	<input checked="" type="checkbox"/>

Legend:

- Primary Category
- Secondary Category

Targeted Constituents

Sediment	
Nutrients	<input checked="" type="checkbox"/>
Trash	<input checked="" type="checkbox"/>
Metals	
Bacteria	<input checked="" type="checkbox"/>
Oil and Grease	
Organics	<input checked="" type="checkbox"/>

Potential Alternatives

None

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Sanitary/Septic Waste Management WM-9

- Temporary sanitary facilities must be equipped with containment to prevent discharge of pollutants to the stormwater drainage system of the receiving water.
- Consider safety as well as environmental implications before placing temporary sanitary facilities.
- Wastewater should not be discharged or buried within the project site.
- Sanitary and septic systems that discharge directly into sanitary sewer systems, where permissible, should comply with the local health agency, city, county, and sewer district requirements.
- Only reputable, licensed sanitary and septic waste haulers should be used.
- Sanitary facilities should be located in a convenient location.
- Temporary septic systems should treat wastes to appropriate levels before discharging.
- If using an onsite disposal system (OSDS), such as a septic system, local health agency requirements must be followed.
- Temporary sanitary facilities that discharge to the sanitary sewer system should be properly connected to avoid illicit discharges.
- Sanitary and septic facilities should be maintained in good working order by a licensed service.
- Regular waste collection by a licensed hauler should be arranged before facilities overflow.
- If a spill does occur from a temporary sanitary facility, follow federal, state and local regulations for containment and clean-up.

Education

- Educate employees, subcontractors, and suppliers on sanitary and septic waste storage and disposal procedures.
- Educate employees, subcontractors, and suppliers of potential dangers to humans and the environment from sanitary and septic wastes.
- Instruct employees, subcontractors, and suppliers in identification of sanitary and septic waste.
- Hold regular meetings to discuss and reinforce the use of sanitary facilities (incorporate into regular safety meetings).
- Establish a continuing education program to indoctrinate new employees.

Costs

All of the above are low cost measures.

EXHIBIT "C" (Stormwater Pollution Prevention Plan)

Sanitary/Septic Waste Management WM-9

Inspection and Maintenance

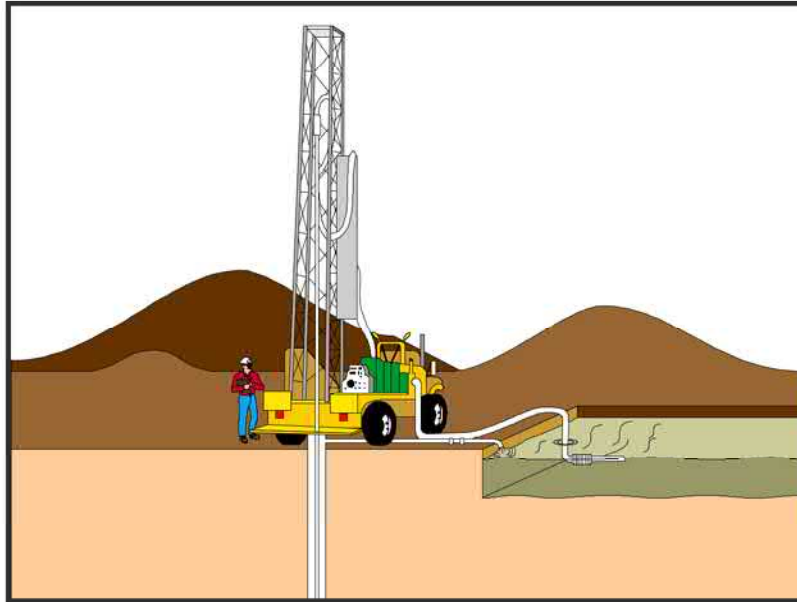
- BMPs must be inspected in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- Arrange for regular waste collection.
- If high winds are expected, portable sanitary facilities must be secured with spikes or weighed down to prevent over turning.
- If spills or leaks from sanitary or septic facilities occur that are not contained and discharge from the site, non-visible sampling of site discharge may be required. Refer to the General Permit or to your project specific Construction Site Monitoring Plan to determine if and where sampling is required.

References

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), March 2003.

Stormwater Management for Construction Activities; Developing Pollution Prevention Plans and Best Management Practice, EPA 832-R-92005; USEPA, April 1992.

EXHIBIT "C" (Stormwater Pollution Prevention Plan)



Description and Purpose

Liquid waste management includes procedures and practices to prevent discharge of pollutants to the storm drain system or to watercourses as a result of the creation, collection, and disposal of non-hazardous liquid wastes.

Suitable Applications

Liquid waste management is applicable to construction projects that generate any of the following non-hazardous by-products, residuals, or wastes:

- Drilling slurries and drilling fluids
- Grease-free and oil-free wastewater and rinse water
- Dredgings
- Other non-stormwater liquid discharges not permitted by separate permits

Limitations

- Disposal of some liquid wastes may be subject to specific laws and regulations or to requirements of other permits secured for the construction project (e.g., NPDES permits, Army Corps permits, Coastal Commission permits, etc.).
- Liquid waste management does not apply to dewatering operations (NS-2 Dewatering Operations), solid waste management (WM-5, Solid Waste Management), hazardous wastes (WM-6, Hazardous Waste Management), or

Categories

EC	Erosion Control	
SE	Sediment Control	
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	<input checked="" type="checkbox"/>

Legend:

- Primary Objective
- Secondary Objective

Targeted Constituents

Sediment	<input checked="" type="checkbox"/>
Nutrients	<input checked="" type="checkbox"/>
Trash	<input checked="" type="checkbox"/>
Metals	<input checked="" type="checkbox"/>
Bacteria	
Oil and Grease	<input checked="" type="checkbox"/>
Organics	

Potential Alternatives

None

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concrete slurry residue (WM-8, Concrete Waste Management).

- Typical permitted non-stormwater discharges can include: water line flushing; landscape irrigation; diverted stream flows; rising ground waters; uncontaminated pumped ground water; discharges from potable water sources; foundation drains; irrigation water; springs; water from crawl space pumps; footing drains; lawn watering; flows from riparian habitats and wetlands; and discharges or flows from emergency fire fighting activities.

Implementation

General Practices

- Instruct employees and subcontractors how to safely differentiate between non-hazardous liquid waste and potential or known hazardous liquid waste.
- Instruct employees, subcontractors, and suppliers that it is unacceptable for any liquid waste to enter any storm drainage device, waterway, or receiving water.
- Educate employees and subcontractors on liquid waste generating activities and liquid waste storage and disposal procedures.
- Hold regular meetings to discuss and reinforce disposal procedures (incorporate into regular safety meetings).
- Verify which non-stormwater discharges are permitted by the statewide NPDES permit; different regions might have different requirements not outlined in this permit.
- Apply NS-8, Vehicle and Equipment Cleaning for managing wash water and rinse water from vehicle and equipment cleaning operations.

Containing Liquid Wastes

- Drilling residue and drilling fluids should not be allowed to enter storm drains and watercourses and should be disposed of.
- If an appropriate location is available, drilling residue and drilling fluids that are exempt under Title 23, CCR § 2511(g) may be dried by infiltration and evaporation in a containment facility constructed in conformance with the provisions concerning the Temporary Concrete Washout Facilities detailed in WM-8, Concrete Waste Management.
- Liquid wastes generated as part of an operational procedure, such as water-laden dredged material and drilling mud, should be contained and not allowed to flow into drainage channels or receiving waters prior to treatment.
- Liquid wastes should be contained in a controlled area such as a holding pit, sediment basin, roll-off bin, or portable tank.
- Containment devices must be structurally sound and leak free.
- Containment devices must be of sufficient quantity or volume to completely contain the liquid wastes generated.

EXHIBIT "C" (Stormwater Pollution Prevention Plan)

- Precautions should be taken to avoid spills or accidental releases of contained liquid wastes. Apply the education measures and spill response procedures outlined in WM-4, Spill Prevention and Control.
- Containment areas or devices should not be located where accidental release of the contained liquid can threaten health or safety or discharge to water bodies, channels, or storm drains.

Capturing Liquid Wastes

- Capture all liquid wastes that have the potential to affect the storm drainage system (such as wash water and rinse water from cleaning walls or pavement), before they run off a surface.
- Do not allow liquid wastes to flow or discharge uncontrolled. Use temporary dikes or berms to intercept flows and direct them to a containment area or device for capture.
- Use a sediment trap (SE-3, Sediment Trap) for capturing and treating sediment laden liquid waste or capture in a containment device and allow sediment to settle.

Disposing of Liquid Wastes

- A typical method to handle liquid waste is to dewater the contained liquid waste, using procedures such as described in NS-2, Dewatering Operations, and SE-2, Sediment Basin, and dispose of resulting solids per WM-5, Solid Waste Management.
- Methods of disposal for some liquid wastes may be prescribed in Water Quality Reports, NPDES permits, Environmental Impact Reports, 401 or 404 permits, and local agency discharge permits, etc. Review the SWPPP to see if disposal methods are identified.
- Liquid wastes, such as from dredged material, may require testing and certification whether it is hazardous or not before a disposal method can be determined.
- For disposal of hazardous waste, see WM-6, Hazardous Waste Management.
- If necessary, further treat liquid wastes prior to disposal. Treatment may include, though is not limited to, sedimentation, filtration, and chemical neutralization.

Costs

Prevention costs for liquid waste management are minimal. Costs increase if cleanup or fines are involved.

Inspection and Maintenance

- Inspect and verify that activity-based BMPs are in place prior to the commencement of associated activities. While activities associated with the BMP are under way, inspect weekly during the rainy season and of two-week intervals in the non-rainy season to verify continued BMP implementation.
- Inspect BMPs subject to non-stormwater discharge daily while non-stormwater discharges occur.

EXHIBIT "C" (Stormwater Pollution Prevention Plan)

- Remove deposited solids in containment areas and capturing devices as needed and at the completion of the task. Dispose of any solids as described in WM-5, Solid Waste Management.
- Inspect containment areas and capturing devices and repair as needed.

References

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.

EXHIBIT "C" (Stormwater Pollution Prevention Plan)

APPENDIX H

Monitoring and Maintenance Report Form(s)

EXHIBIT "C" (Stormwater Pollution Prevention Plan)

Current Storm Information:

Start Date/Time current storm _____
 Stop Date/Time current storm _____
 Approximate rainfall amount (inches): _____
 Duration of storm (days or hrs to date) _____

Last Storm Information:

Start Date of last storm: _____
 Stop Date of last storm: _____
 Approximate rainfall amount (inches): _____
 Duration of last storm (hrs) _____

Weather: Clear Cloudy Mist Rain Sleet Fog Snowing Windy

Development: _____

Time _____ Date: _____

I. Type of Visit: Weekly Pre-Storm Event Post Storm Event During Storm Quarterly Non-Stormwater Other:

II. Current Construction Phase(s) (check all that apply):

Pre-Construction Grading and Land Development Utilities and Streets Landscaping
 Vertical Construction Site Stabilized Inactive Construction

III. Phases Completed (Check all that apply):

Pre-Construction Grading and Land Development Utilities and Streets Landscaping
 Vertical Construction Site Stabilized

IV. Check the response for each of the questions below:

Item#	Questions	YES	NO	N/A
1	Is the monitoring representative qualified to perform the inspection or supervised by a QSP/D?	<input type="checkbox"/>	<input type="checkbox"/>	--
2	Are their qualifications documented in this SWPPP?	<input type="checkbox"/>	<input type="checkbox"/>	--
3	Were floating materials, sheen, discoloration, turbidity or odor observed? If yes, what did you observe? _____ If yes, were the materials discharged off site? If yes, where were the discharge locations _____	<input type="checkbox"/>	<input type="checkbox"/>	--
4	Approximate Area of the Site Currently Unstabilized (disturbed): 0 acres			

V. Check the observed status of all items. Provide "Action Required" details and dates completed in Section VIII.

Item #	Inspection Items	Not Applicable	Acceptable	Action Required
5	Project perimeter controls	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6	Outfalls/Discharge points/Outlet protection and Downstream of outfall locations	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7	Stabilized exits maintained/functional	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8	Track out in public streets	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9	Disturbed Soil Areas (DSA)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10	BMPs at streams, rivers, lakes, ponds, 303(d) waters, wetlands, & protected areas	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
11	Slope stabilization: (Erosion control blankets, mulch, vegetation, soil binders etc.)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
12	Temporary erosion controls: (EC blankets, vegetation, soil binders, mulch, etc.)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
13	Slope drainage structures (engineered structures, ditches, drains, etc.)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
14	Temporary sediment basins/traps	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
15	Detention/Retention basins	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
16	Drainage swales & channels	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
17	Buffer Strips	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
18	Berms and dikes	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
19	Check dams	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
20	Silt fences	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
21	Sand/gravel bags	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
22	Straw wattles/Fiber rolls	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
23	Cutback curbs	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
24	Catch basins/ Inlet protection	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
25	Onsite streets & gutters free of sediment, silt, mud, & debris	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
26	Construction materials properly stored & protected	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
27	Trash/Debris bins used & regularly collected	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
28	Proper disposal of litter, construction debris & liquid waste	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
29	Concrete and Paint Wash outs	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
30	Inactive Stockpile Protection (Bermed and Covered)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
31	Secondary containment used for portable gas/diesel powered items	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
32	Secondary containment used for bulk storage of oils, chemicals, fuels & liquid waste	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
33	Material & Equipment storage yards clean & maintained	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
34	Drip barriers for equipment stored, parked, & under repair	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
35	Soil & paving free of stains from leaks from vehicles, power tools and/or equipment	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
36	Wind Erosion Controls-dust control, wind fence, water, palliatives, soil binders, etc.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
37	Sanitary waste facilities properly located and maintained	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
38	Stockpile protection (covered and bermed)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
39	Is site SWPPP binder current with prior monitoring and sampling checklists	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

EXHIBIT "C" (Stormwater Pollution Prevention Plan)

VI. The following items were monitored:

"In place" BMPs	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Material storage areas	Yes <input type="checkbox"/>	No <input type="checkbox"/>	N/A <input type="checkbox"/>
Construction entrances and exits	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Disturbed soils	Yes <input type="checkbox"/>	No <input type="checkbox"/>	N/A <input type="checkbox"/>
Equipment storage areas	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Runon/Runoff Locations	Yes <input type="checkbox"/>	No <input type="checkbox"/>	N/A <input type="checkbox"/>

VII. Changes observed since last inspection:

- a. A change in plans, construction, operation or maintenance that may affect discharges of pollutants from our site? Yes No
- b. A regulatory agency inspection that caused changes to the SWPPP or additional BMPs added to the community. Yes No
- c. Additional or modified BMPs used or needed that are not included in current list of BMPs in the SWPPP. Yes No
- d. Incidents of non-compliance with the requirements of the Permit. Yes No

If answering "yes" to any of the questions above, describe the event; date, time, cause, and what action was/will be taken (Be specific)

If answering "YES" to any of the questions in Section VII, the SWPPP needs to be amended. Contact the DEM or REM for assistance

General Comments:

VIII. Describe "Action Required" items in Section V and corrective action needed. Be specific on location of the work needed.

All actions needed must begin within 72 hours of the inspection. Document, initial and date items corrected.

Item #	Observed Item to be Corrected	Action Needed	Date Action Started	Date Action Completed	Initials

"This document and all attachments were prepared in general accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. To the best of my knowledge and belief, the information submitted is, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

Inspected By (Print Name)/Company: _____ Title: _____

Signature: _____ Date Signed: _____

Project QSP (Print Name)/Company: _____ Title: _____

Signature: _____ Date Signed: _____

EXHIBIT "C" (Stormwater Pollution Prevention Plan)

APPENDIX I

Training Documentation

EXHIBIT "C" (Stormwater Pollution Prevention Plan)

Storm Water Management Training Log

Project Name: _____

Project Location: _____

Storm Water Management Topic: (check as appropriate)

- Erosion Control
- Sediment Control
- Wind Erosion Control
- Tracking Control
- Non-storm water management
- Waste Management and Materials Pollution Control
- Storm Water Sampling

Specific Training Objective: Storm Water Management/Erosion Control for Construction

Location: _____ Date: _____

Instructor: _____ Telephone: _____

Course Length (hours): _____

Attendee Roster (attach additional forms if necessary)

Name	Company	Phone

APPENDIX J

Responsible Parties

EXHIBIT "C" (Stormwater Pollution Prevention Plan)

RESPONSIBLE PARTIES

Certifications of the authorized representatives for this SWPPP are provided in Section 0 and below. A list of authorized representatives is also provided in Appendix J.

The Legally Responsible Person (LRP) for this project is:

City of Goleta
Department of Neighborhood Services and Public Safety
Jaime Valdez
130 Cremona Drive, Suite
Goleta, CA 93117

The Site Stormwater Manager (SSWM) for this project is:

The Qualified SWPPP Developer (QSD) during SWPPP/ESCP Preparation for this project is:

Jonathan Buck
ENGEIO Incorporated
925-866-9000

The Qualified SWPPP Developer (QSD) during Implementation for this project is:

The Qualified SWPPP Practitioner (QSP) during Implementation for this project is:

The SWPPP Delegate representative, supervised and trained by the QSP, for this project is:

Date: _____

California Regional Water Quality Control Board

Re: Delegating an "Authorized Representative" for Project Name
WDID # _____

To Whom It May Concern:

This letter serves to designate the specifically described individual or position as an authorized person for signing reports and performing certain activities requested by the LRP or required by the NPDES Construction General Permit until further notice is provided in writing. This authorization cannot be used for signing ORDER NO. 2022-0057-DWQ Permit Registration Documents (e.g., Notice of Intent (NOI), Notice of Termination (NOT) and Annuals Reports). The following position is hereby authorized to perform storm water site inspections and to prepare, sign, and certify storm water inspection reports:

By signing this authorization, I confirm that I meet the requirements to make such a designation as set forth in the California General Permit for stormwater discharges associated with construction and land disturbance activities ORDER NO. 2022-0057-DWQ.

Sincerely,

EXHIBIT "C" (Stormwater Pollution Prevention Plan)

APPENDIX K

Subcontractor Notification Letter and Notification Log

EXHIBIT "C" (Stormwater Pollution Prevention Plan)

SWPPP Notification Sample

Company
Address
City, State, ZIP

Dear Sir/Madam,

Please be advised that the California State Water Resources Control Board has adopted the General Permit (General Permit) for Storm Water Discharges Associated with Construction Activity (CAS000002). The goal of these permits is prevent the discharge of pollutants associated with construction activity from entering the storm drain system, ground and surface waters.

ENGEO has developed a Storm Water Pollution Prevention Plan (SWPPP) in order to implement the requirements of the Permits.

As a subcontractor, you are required to comply with the SWPPP and the Permits for any work that you perform on site. Any person or group who violates any condition of the Permits may be subject to substantial penalties in accordance with state and federal law. You are encouraged to advise each of your employees working on this project of the requirements of the SWPPP and the Permits. A copy of the Permits and the SWPPP are available for your review at the construction office. Please contact me if you have further questions.

Sincerely,

Name
Title

EXHIBIT "C" (Stormwater Pollution Prevention Plan)

SUBCONTRACTOR NOTIFICATION LOG

Project Name: _____

Project Location: _____

SUBCONTRACTOR COMPANY NAME	CONTACT NAME	ADDRESS	PHONE NUMBER	PAGER/ FIELD PHONE	DATE NOTIFICATION LETTER SENT	TYPE OF WORK

USE ADDITIONAL PAGES AS NECESSARY

APPENDIX L

Construction Site Monitoring Program
(Excerpted SWPPP Section 6.0)

EXHIBIT "C" (Stormwater Pollution Prevention Plan)

6.0 CONSTRUCTION SITE MONITORING PROGRAM

The General Permit requires that a written site-specific Construction Site Monitoring Program (CSMP) be developed prior to the commencement of construction activities and be revised as necessary to reflect project revisions and that the CSMP be included with the SWPPP. The purpose of the CSMP is to describe specific requirements and objectives of the General Permit for the project's Risk Level. The project CSMP is described in the following sections with relevant monitoring, sampling, and activity forms located in Appendices H, M, and N. Submitted forms are to be inserted in Appendixes O, P, Q, and R.

This CSMP has been developed by the QSD and is a guide for the QSP and/or qualified individual(s) supervised by the QSP for monitoring and sampling procedures and instructions. The QSP, in coordination with the QSD, is to determine whether BMPs included in the SWPPP are effective, if immediate actions are needed and/or SWPPP revisions are necessary to reduce pollutants in stormwater and authorized non-stormwater discharges.

6.1 EFFLUENT STANDARDS AND DISCHARGE PROHIBITIONS

6.1.1 Narrative Effluent Standards

This Risk Level 2 site is subject to narrative effluent standards as follows.

1. Stormwater discharges and authorized non-stormwater discharges regulated by the General Permit shall not contain a hazardous substance equal to or in excess of reportable quantities established in 40 C.F.R. §§117.3 and 302.4, unless a separate NPDES Permit has been issued to regulate those discharges.
2. Dischargers shall minimize or prevent pollutants in stormwater discharges and authorized non-stormwater discharges through the use of controls, structures, and management practices that achieve BAT for toxic and non-conventional pollutants and BCT for conventional pollutants.

6.1.2 Numeric Action Level (NAL)

Risk Level 2 dischargers are subject to the following numeric action levels (NALs):

- Storm event daily average pH below 6.5 or above 8.5.
- Storm event daily average turbidity greater than 250 NTU.

6.1.3 TMDL Requirement Standards

This Risk Level 2 site does not discharge to any waterbody or watershed listed for Region 3 in Table H-2 of the 2022 CGP. No TMDL NAL or Numeric Effluent Limit (NEL) is applicable for this site.

6.1.4 Discharge Prohibitions

1. Unless granted an exception by the State Water Board, discharges from this site shall not violate any prohibitions contained in the applicable Basin Plan or statewide water control

EXHIBIT "C" (Stormwater Pollution Prevention Plan)

plans. Waste discharges to Areas of Special Biological Significance (ASBS) are prohibited by the California Ocean Plan.

2. The General Permit prohibits the discharge of pollutants other than stormwater and non-stormwater discharges authorized by this General Permit or another NPDES permit (see authorized non-stormwater discharges and conditions for discharges in Section 5). The Regional Board will be notified if the QSP or site management directed by the QSP anticipates any non-stormwater discharges not already authorized by this General Permit or another NPDES Permit. The Regional Board will determine if a separate NPDES permit will be necessary.
3. Debris¹ resulting from construction activities is prohibited from being discharged from construction sites.

6.2 MONITORING LOCATIONS

Sampling locations are based on proximity to planned stormwater run-on and runoff (discharge) locations, non-visible pollutant storage, occurrence or use; accessibility for sampling, personnel safety; and other factors in accordance with the applicable requirements in the General Permit.

Sampling locations are to be determined by the QSP or QSD based on site progress during construction and run-off patterns until final grades are established. Proposed sampling locations are shown on the Erosion and Sediment Control Plan in Appendix B.

If an operational activity or stormwater monitoring event conducted 48 hours prior to or during a rain event identifies (1) the presence of a material storage, waste storage, or operations area with spills; or (2) the potential for the discharge of non-visible pollutants to surface waters or a storm drain system that was an unplanned location, non-sediment sampling locations will be selected using the same rationale as that used to identify sediment sampling locations.

6.3 SAFETY

Site monitoring and sampling should be performed by the QSP, and/or a person trained in proper SWPPP management and water quality sampling protocol under the direction of the QSP. Anticipated site hazards during monitoring and sampling activities include the following.

- Traffic and noise
- Construction equipment
- Excavations and trenches
- Miscellaneous slip, trip and fall hazards
- Various chemical hazards

Accordingly, personal protective equipment for monitoring and sampling personnel should include the following, as applicable.

- Hard hat
- Safety boots
- Safety vest
- Hearing protection

¹ Litter, rubble, discarded refuse, and remains of destroyed inorganic anthropogenic (derived from human activities) waste.

- Safety glasses
- Nitrile gloves

6.4 INSPECTIONS

6.4.1 Frequency and Procedures

QSD, QSP(s), and QSP Delegates are identified for the project are identified in Appendix J.

The **QSD** will have primary responsibility for assessing how construction activities will affect sediment transport, erosion, and other discharges of pollutants in stormwater runoff throughout the project. The QSD is required to revise the SWPPP to address potential problems identified by visual inspections, sampling data, comments from a QSP, or their own site observations. The QSD is required to perform the following on-site visual inspections:

- Within 30 days of construction activities commencing on site;
- Within 30 days when a new QSD is assigned to the project;
- Twice annually, once August through October and once January through March;
- Within 14 calendar days after a numeric action level exceedance; and
- Within the time period requested in writing from Regional Water Board staff.

The **QSP** will have primary responsibility and significant authority for the implementation, maintenance, and inspection/monitoring of SWPPP requirements. The QSP will be available at all times throughout the duration of the project. The QSP duties include but are not limited to:

- Implementing all elements of the 2022 CGP and SWPPP, including, but not limited to:
 - Performing the following on-site visual inspections:
 - One inspection per calendar month; other weekly inspections in the month can be delegated to a trained QSP Delegate under the specific direction of the QSP.
 - Within 72 hours prior to a forecasted Qualifying Precipitation Event² (QPE) from the National Oceanic and Atmospheric Administration (NOAA) National Weather Service, to inspect any areas of concern and to verify the status of any deficient BMPs, or other identified issues at the site. If extended forecast precipitation data (greater than 72 hours) is available from the *National Weather Service*, then the Pre-Precipitation Event inspection may be done up to 120 hours in advance.
 - Within 14 days after a NAL exceedance, the QSP shall visually inspect the drainage area for exceedance and document any areas of concern.
 - Prior to the submittal for the NOT or COI (for acreage changes) for all or part of the site.
 - Ensuring that all BMPs are implemented, inspected, and properly maintained;

² Qualifying Precipitation Event (QPE): Any weather pattern that is forecast to have a greater than or equal to 50% probability of precipitation (POP) and greater than or equal to ½ inches of Quantitative Precipitation Forecast (QPF) within a 24-hour period. POP is the likelihood of a measurable amount (greater than or equal to 0.01 inches) of precipitation. QPF is a spatial and temporal precipitation forecast that will predict the potential amount of future precipitation for a specified area.

- Ensure that the SMARTS generated WDID Number Notification form is posted on-site, in a location viewable by the public or readily available upon request, and the dates are correct and match the dates listed in SMARTS.
- Implementing non-stormwater management, and materials and waste management activities such as: monitoring discharges; general Site clean-up; vehicle and equipment cleaning, fueling and maintenance; spill control; ensuring that no materials other than stormwater are discharged in quantities which will have an adverse effect on receiving waters or storm drain systems, etc.
- Ensuring elimination of unauthorized discharges.
- Authorized by the LRP to mobilize crews in order to make immediate repairs to the control measures.
- Coordinating with the Contractor(s) to assure the necessary corrections/repairs are made immediately and that the project complies with the SWPPP, the 2022 CGP, and approved plans at all times.
- Notifying the LRP or Duly Authorized Representative immediately of off-site discharges or other non-compliance events.
- Providing foundation and site-specific training to QSP Delegates and overseeing QSP Delegate work. Tasks that may be delegated to appropriately trained QSP-delegates include:
 - Performing non-stormwater and stormwater visual observations and inspections;
 - Performing stormwater sampling and analysis, as required; and
 - Performing routine inspections and observations.

TABLE 6.4.1: QSP and QSP Delegate Authorized Inspections

	WEEKLY BMP AND NSW	PRE-QPE	DAILY-QPE VISUAL INSPECTIONS	POST-QPE VISUAL INSPECTIONS	POST NAL EXCEEDANCES	MONTHLY BMP AND NSW	NOT
QSP*	X	X	X	X	X	X	X
QSP Delegate	X		X	X			

* or QSD

Recordkeeping:

For weekly, pre-storm event, extended storm event, post storm event, and quarterly non-stormwater inspections:

- Completely fill out and sign the inspection report to document the conditions found during the inspection.
- Describe any actions needed and the location of the action in the corrective action log and include a description of any additional BMPs that need to be installed.
- Review previous inspection reports that may have open corrective action items to confirm they have been completed.

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- Upon completion of a repair or maintenance items, the inspector will initial and date when corrective actions began and when they were completed on the corrective action log of the inspection form(s). All actions needed must begin within 72 hours of identification and be completed as soon as possible.

Update the Site Map:

Document and update the site map as site conditions or locations change during construction including:

- Current and up-to-date boundaries of operational control
- Drainage areas
- Discharge locations
- Areas of soil disturbance (cut or fill)
- Locations of sensitive habitats, watercourses, or other features which are not to be disturbed
- Run-on and run-off BMPs
- Sediment and erosion controls
- Temporary and permanent stabilization
- Waste disposal areas including dumpsters and portable toilets
- Material storage
- Vehicle/equipment storage areas
- Fueling and water storage, water transfer for dust control and compaction
- Stockpiles and protection
- Active and inactive inlets and protection
- Stabilized entrances or exits
- Sampling locations
- Construction trailers

Track Dates of:

- Start of major grading activity
- Completion of major grading activity
- Temporary and final stabilization
- Addition or reduction in acreage
- Change in ownership
- Date and initial all changes, additions, and or deletions to the site map

The site map will be kept as a permanent record. If a site map becomes too cluttered with documentation, a new site map will be developed and updated and the old site map will be kept as a permanent record in the SWPPP. The old site map is not to be discarded under any circumstances.

Annual Reporting:

By September 1 each year the WDID is active, an Annual Compliance Report will be electronically submitted to the State Water Resources Control Board via the SMARTS website. A copy of the annual report is to be kept in Appendix S of the SWPPP. The Annual Compliance Report will include:

- A summary and evaluation of sampling and analysis results, including laboratory reports.

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- The analytical method(s), method reporting unit(s), and method detection limit(s) of each analytical parameter (analytical results that are less than the method detection limit shall be reported as "less than the method detection limit").
- A summary of all corrective actions taken during the compliance year.
- Identification of any compliance activities or corrective actions that were not implemented.
- A summary of all violations of the General Permit.
- The names of individual(s) who performed the facility inspections, sampling, visual observation (inspections), and/or measurements.
- The date, place, time of facility inspections, sampling, visual observation (inspections), and/or measurements, including precipitation (rain gauge).
- The visual observation and sample collection exception records and reports.
- Documentation of all training for individuals responsible for all activities associated with compliance with this General Permit.
- Documentation of all training for individuals responsible for BMP installation, inspection, maintenance, and repair.
- Documentation of all training for individuals responsible for overseeing, revising, and amending the SWPPP.

6.5 QUALIFYING PRECIPITATION EVENT TRIGGERED OBSERVATIONS AND INSPECTIONS

Visual observations of the site and inspections of BMPs are required prior to a qualifying precipitation event; following a qualifying precipitation event, and every 24-hour period during a qualifying precipitation event. Pre-Qualifying Precipitation Event inspections will be conducted after reviewing NOAA (National Weather Service) and determining that a precipitation event with a 50 percent or greater Probability of Precipitation (PoP) and a Qualifying Precipitation Forecast (QPF) of 0.5 inch or more precipitation within a 24-hour period has been predicted by the National Weather Service Forecast Office.

6.5.1 Visual Observations Prior to a Forecasted Qualifying Precipitation Event

Within 72 hours prior to a qualifying precipitation event or up to 120 hours prior, if extended forecast precipitation data is available, a stormwater visual monitoring site inspection will include observations of the following locations:

- All stormwater drainage areas to identify leaks, spills, or uncontrolled pollutant sources and when necessary, implement appropriate corrective actions.
- All BMPs to identify whether they have been properly implemented per the SWPPP and implement appropriate corrective actions, as necessary.
- All stormwater storage and containment areas to detect leaks and check for available capacity to prevent overflow.

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The QSP must conduct the inspection prior to the qualifying precipitation event. Consistent with the requirements for a qualifying precipitation event, pre-rain BMP inspections and visual monitoring will be triggered by a NOAA forecast that indicates a 50 percent or greater probability of 0.5 inch of precipitation or more in a 24-hour period in the project area.

6.5.2 BMP Inspections During a Qualifying Precipitation Event

During an extended qualifying precipitation event, BMP inspections will be conducted at least once every 24 hours. Qualifying precipitation events are extended for each subsequent 24-hour period forecast to have at least 0.25 inch of precipitation. The BMP inspections are to identify and record:

- If BMPs were adequately designed, implemented and effective.
- BMPs that require repair or replacement due to damage.
- Additional BMPs that need to be implemented and revise the SWPPP accordingly.

If the construction site is not accessible during the rain event, the visual inspections shall be performed at all relevant outfalls, discharge points, downstream locations. The inspections should record any projected maintenance activities.

6.5.3 Visual Observations Following a Qualifying Precipitation Event

Within 96 hours following the end of a qualifying precipitation event a stormwater visual monitoring site inspection is required to observe:

- If BMPs were adequately designed, implemented and effective.
- BMPs that require repair or replacement due to damage.
- Additional BMPs that need to be implemented and revise the SWPPP accordingly.

6.6 STORMWATER DISCHARGE WATER QUALITY SAMPLING

For this Risk Level 2 project, the General Permit requires effluent monitoring subject to NALs for stormwater discharges. The monitoring is triggered for Qualifying Precipitation Events, defined in Section 6.4 and 6.5. During rain events producing run-off, the QSP or their designated personnel will collect stormwater grab samples from designated sampling locations.

Periodically, it will be necessary to re-evaluate sample locations as site conditions change. The sample location(s) must be representative of current site conditions with respect to disturbed areas and construction phase(s).

Risk Level 2 dischargers shall electronically submit daily average storm event sampling results to the SWRCB SMARTS site during the reporting year. This documentation is required as part of the Annual Report.

6.6.1 Stormwater Analytical Methods

The following analytical methods will be implemented at the site.

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- pH: perform pH analysis on site with a field pH meter.
- Turbidity: perform turbidity analysis with a field turbidity meter or by collecting a sample and delivering to an accredited laboratory for turbidity testing.

An example of the pH and turbidity sampling form is located in Appendix H. Once the form is completed, retain these records in the SWPPP in Appendix Q.

6.6.2 Stormwater Sampling Protocol

- Collect one sample per day of discharge from each discharge location during the qualifying event.
- Analyze effluent samples for pH and turbidity.
- Ensure samples are representative of effluent for entire disturbed area.
- Monitor, sample, and report site run-on from surrounding areas if there is reason to believe through visual observation that run-on may contribute to an exceedance of NALs.
 - Document findings on the sample log and inspection report.
- Physical sampling is not required if:
 - There are dangerous weather conditions such as flooding and electrical storms.
 - Rain event duration is outside of scheduled business hours.
- If no required visual observation (inspection) or sampling are collected, include an explanation in the SWPPP and in the Annual Report documenting why the sampling or inspections were not conducted.

6.6.3 Stormwater Sampling Locations

- Collect effluent samples at all discharge points where stormwater is discharged offsite from disturbed areas. Consult the site map for locations.
- Collect samples of stored or contained stormwater during a qualifying rain event. Consult the site map for location(s).
- Collect samples within designated drainage areas on the site map that are representative of current or recent construction activities that were exposed to stormwater prior to reaching the discharge location³.
 - Locations will be determined based on current construction activities
- If non-visible or visible non-stormwater pollutants other than pH or sediment or the potential of these pollutants are observed due to material or waste exposure to stormwater, follow non-visible and/or non-stormwater sampling protocol in Sections 6.7 or 6.8 (as necessary).

³ For example if there is recent concrete work exposed to stormwater, a pH sample shall be taken of drainage from this area.

6.6.4 Stormwater Sample Collection, Handling, and Testing Instructions

6.6.4.1 Stormwater Sample Collection

- Label the collection bottle with the site number, date, and time.
- Remove the cap from the bottle just before sampling. Avoid touching the inside of the bottle or the cap. If you accidentally touch the inside of the bottle, use another one.
- Work from downstream to upstream locations to avoid contamination of downstream samples.
- Try to disturb as little bottom sediment as possible. In any case, be careful not to collect water that has sediment from bottom disturbance. Stand facing upstream. Collect the water sample on your upstream side, in front of you. You may also tape your bottle to an extension pole to sample from deeper water.
- Hold the bottle near its base and plunge it (opening downward) below the water surface. If you are using an extension pole, remove the cap, turn the bottle upside down, and plunge it into the water, facing upstream. Collect a water sample mid-way between the surface and the bottom. If necessary, clean gravel bags can be used to pond water for collection in low flow. Carefully place the bags in a semi-circle taking care to not stir up sediment.
- Turn the bottle underwater into the current and away from you. In slow-moving stream reaches, push the bottle underneath the surface and away from you in an upstream direction.
- Leave a 1-inch air space. Do not fill the bottle completely (so that the sample can be shaken just before analysis). Recap the bottle carefully, remembering not to touch the inside.
- Fill in the bottle number and/or site number on the appropriate field data sheet.

6.6.4.2 Stormwater Sample Handling/Testing

Turbidity Determination (Laboratory)

If a California-accredited Laboratory will perform the analysis, test methods must be either Standard method 2130 or USEPA method 180.1.

- Using containers provided by the laboratory to collect samples, sample bottles will be capped and labeled, then placed in a cooler with ice to maintain 4°C for transport to the lab.
- Chain of Custody form will be completed.
- Within 24 hours of sampling (unless otherwise required by the laboratory), samples will be delivered to an accredited lab such as:

Laboratory Name: CAPCO Analytical Services, Inc.
Address: 2978 Seaborg Avenue, Suite 4
Ventura, CA 93003
Telephone Number: 805-644-1095
Email Address: rhernandez@capcoenv.com

Turbidity Determination (Field Meter)

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Use the following steps to determine the turbidity of your sample:

- Prepare the turbidity meter for use according to the manufacturer's directions.
- Calibrate the meter using the turbidity standards provided with the meter. Make sure it is reading accurately in the range in which you will be working.
- Shake the sample vigorously and wait until the bubbles have disappeared. You might want to tap the sides of the bottle gently to accelerate the process.
- Use a lint-free cloth to wipe the outside of the sampling cell (cell) into which the grab sample will be poured. Be sure not to handle the cell below the line where the light will pass when the cell is placed in the meter.
- Pour the sample water into the cell. Wipe off any drops on the outside of the cell.
- Set the meter for the appropriate turbidity range. Place the cell in the meter and read the turbidity measurement directly from the meter display.
- Record the result on sampling activity log sheet.
- Repeat Steps 3-7 for each sample.

pH Determination (Field Meter)

Since samples for pH must be analyzed onsite within 2 hours of sample collection, we anticipate a calibrated portable field meter will be utilized in lieu of an accredited laboratory. Use the following steps to determine the pH of your sample:

- Prepare the pH meter for use according to the manufacturer's directions.
- Calibrate the meter using the standards provided with the meter. Make sure it is reading accurately in the range in which you will be working.
- Rinse the electrode well with deionized water.
- Place the pH meter or electrode into the sample.
- Depress the dispenser button once to dispense electrolyte.
- Read and record the temperature and pH in the appropriate column on the data sheet.
- Rinse the electrode well with deionized water.
- Measure the pH of the 4.0 and 7.0 buffers periodically to ensure that the meter is not drifting off calibration. If it has drifted, recalibrate it.

The pH meter should be calibrated prior to sample analysis and according to the instructions that come with them. If you are using a laboratory grade meter, use at least two pH standard buffer solutions: 4.0 and 7.0 (Buffers can be purchased from test kit supply companies, such as Oakton, Hach, or LaMotte). Following are notes regarding buffers.

- The buffer solutions should be at room temperature when you calibrate the meter.
- Do not use a buffer after its expiration date.
- Always cap the buffers during storage to prevent contamination.

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- Because buffer pH values change with temperature, the meter must have a built-in temperature sensor that automatically standardizes the pH when the meter is calibrated.
- Do not reuse buffer solutions.

The following field instruments will be used to analyze the following constituents:

TABLE 6.6.4.2-1: Field Instruments

FIELD INSTRUMENT	CONSTITUENT
Oakton ECOTestr pH2+, or equivalent	pH
LaMotte 2020we Turbidimeter, or equivalent	Turbidity

For samples collected for field analysis, collection, analysis and equipment calibration will be in accordance with field instrument manufacturer's specifications.

- The instruments will be maintained in accordance with manufacturer's instructions.
- The instrument(s) will be calibrated per manufacturer's guidelines prior to sampling.
- Maintenance and calibration records will be maintained with the SWPPP.

6.6.5 NAL Exceedance

If an individual sample of pH measured in the field are less than 6.5 or greater than 8.5, or if an individual sample of turbidity measured is in excess of 250 NTUs, the permitted NAL has been exceeded. In this event, the QSP should perform the following:

- Conduct inspection for run-on source(s) or onsite construction activities such as but not limited to erosion, rilling, uncovered stockpiles, concrete, lime, mortar or masonry activities that may have contributed to the exceedance.
- Fill out the sampling activity log and document:
 - The sources of the pollutants suspected to be causing the exceedance of the NAL
 - Whether additional BMPs are required to:
 - Meet BAT/BCT requirements
 - Reduce or prevent pollutants in stormwater discharges from causing exceedance of receiving water objectives and determine what corrective action(s) were taken or will be taken with a description of the schedule for completion.
 - If applicable, report and document if the sources of pollutants were related to run-on associated with the construction site and whether additional BMPs are required to:
 - Meet BAT/BCT requirements
 - Reduce or prevent pollutants in stormwater discharges from causing exceedance of receiving water objectives and
 - Determine what corrective action(s) were taken or will be taken with a description of the schedule for completion
- Implement appropriate BMPs as needed according to the schedule described in the exceedance report.

EXHIBIT "C" (Stormwater Pollution Prevention Plan)

6.6.6 NAL Exceedance Reporting

In the event of an NAL exceedance, the QSD shall prepare an NAL exceedance report that is submitted to the LRP and filed into Appendix R.

Either the QSD or LRP/AS will also electronically report all qualifying storm event sampling results to the State Water Board through the SMARTS system within 10 days after the conclusion of the storm event. If the Regional Board notifies the LRP that an NAL Exceedance Report is required, authorized personnel will submit the already prepared report into the SMARTS system.

6.7 NON-STORMWATER DISCHARGE WATER QUALITY SAMPLING

If at any time during BMP inspections non-stormwater discharge(s) are observed going offsite through inlets or at outfall locations, sample the discharge at all points where it leaves the site. See the pollutant lists in Appendix N for potential pollutants and follow sampling and handling protocols in Section 6.6.4. Send all samples to the certified lab identified in Section 6.6.4.2 and document sampling results in Appendix M.

Indicate on the inspection report if run-on from surrounding areas is contributing to non-stormwater discharges that may cause or contribute to an exceedance of receiving water standards, or may exceed NALs. If NAL exceedance is measured for pH or Turbidity from run-on, document and report per Section 6.6.6.

6.8 NON-VISIBLE POLLUTANT SAMPLING

6.8.1 Non-Visible Sampling Schedule

If applicable, during the first 2 hours of rain events, samples for non-visible pollutant(s) and a sufficiently large uncontaminated background sample shall be collected during business hours and rain events that generate run-off. Samples shall be collected regardless of the time of year or status of the construction site. In conformance with the SWRCB definition, a minimum of 48 hours of dry weather will be used to distinguish between separate rain events.

Collection of discharge samples for non-visible pollutant monitoring will be triggered when any of the following conditions are observed during the required inspections conducted before or during rain events:

- Materials or wastes containing potential non-visible pollutants are not stored under watertight conditions. Watertight condition is defined as:
 - storage in a watertight container,
 - storage under a watertight roof or within a building, or
 - protected by temporary cover and containment that prevents stormwater contact and run-off from the storage area.
- Materials or wastes containing potential non-visible pollutants are stored under watertight conditions, but
 - a breach, leakage, malfunction, or spill is observed,
 - the leak or spill is not cleaned up prior to the rain event, and
 - there is the potential for discharge of non-visible pollutants to surface waters or a storm sewer system.

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- An operational activity with the potential to contribute non-visible pollutants:
 - was occurring just prior to the rain event,
 - applicable BMPs were observed to be breached, malfunctioning, or improperly implemented, and
 - there is the potential for discharge of non-visible pollutants to surface waters or a storm sewer system.
- Soil amendments/stabilizers that have the potential to alter pH levels or have unacceptable concentrations of non-visible pollutants have been applied, and there is the potential for discharge of non-visible pollutants to surface waters or a storm sewer system.
- Stormwater run-off from an area contaminated by historical usage of the site has been observed to combine with stormwater run-off, and there is the potential for discharge of non-visible pollutants to surface waters or a storm sewer system.

6.8.2 Non-Visible Sample Locations

If a visual inspection identifies any breach, malfunction, leakage or spill which could result in the discharge of non-visible pollutants to surface waters or a storm sewer system, the location(s) will be identified on the Site Map by the QSP or a qualified individual supervised by the QSP.

Sample locations shall include, at a minimum, the following areas and will be documented on the site map.

- All discharge location(s) downstream of the non-visible pollutant discharge that is safely accessible.
- A location upstream of the non-visible pollutant discharge where stormwater has not come into contact with the disturbed soils or material stored or used on site.

6.8.3 Non-Visible Sampling Preparation

In preparation of non-visible sampling, activities will include:

- Review hazardous materials inventory.
- Store sampling bottles, transport vessel, latex gloves and field equipment.
- Pre-print Chain of Custody, with date and time to be completed after sampling.
- Inspect hazardous materials storage areas for exposed, unsealed or damaged containers or spills.
- Identify run-off/discharge locations down grade of any breach, malfunction, leakage or spill observed which can result in the discharge of pollutants and sample the flow line.
- Identify run-off/discharge locations to take a representative background sample of flows known to be free of site materials with a potential to pollute.

6.8.4 Non-Visible Analytical Constituents

The following table lists the specific sources of and types of potential non-visible pollutants that may be found on the project and the applicable water quality indicator constituent(s) for that pollutant. Additional pollutants can be reviewed in Appendix N.

TABLE 6.8.4-1: Potential Non-Visible Pollutants and Water Quality Constituent

POLLUTANT SOURCE	POLLUTANT	WATER QUALITY INDICATOR CONSTITUENT
Batteries - Staging, streets, and material storage areas	Sulfuric acid, Lead, pH	pH, Lead
Portland Concrete Cement, Stucco, Chemical Stabilization	pH	pH
Landscaping	TDS	TDS
Pulverized Asphalt Concrete, Equipment Fluids	PAH, TPH, Oil	PAH, TPH, Oil

For correct sample management and analysis, the following will be observed:

TABLE 6.8.4-2: Analytical Constituents

ANALYTE/CONSTITUENT*	CONTAINER	VOLUME	PRESERVATIVE	HOLD TIME
Total Dissolved Solids (TDS)	Plastic	500 ml	Cool 4°C	7 days
pH	Plastic	500 ml	Cool 4°C	Immediately
Salinity	Plastic	500 ml	Cool 4°C	28 days
Conductivity	Plastic	500 ml	Cool 4°C	48 hrs
Biological Oxygen Demand (BOD)	Plastic	500 ml	Cool 4°C	48 hrs
Oil & Grease	Glass	500 ml	HCl	28 days
Total Petroleum Hydrocarbons as Gasoline/BTEX (TPHg)	VOA	3-40 ml	HCl	14 days
Total Petroleum Hydrocarbons as Diesel (TPHd)	Glass	2-1 L	Cool 4°C	14 days
Polynuclear Aromatic Hydrocarbons (PAH)	Plastic	500 ml	Cool 4°C	48 hrs
Chlorinated Volatile Organic Compounds (CVOC)	VOA	3-40 ml	HCl	14 days
Polychlorinated Biphenyls (PCB)	Glass	2-1 L	Cool 4°C	7 days
Metals (Lead)	Plastic	500 ml	HNO ₃	6 mos
Dissolved Oxygen	VOA	2-50 ml	H ₂ SO ₄	8 hrs

* For additional constituents and details see Appendices M and N

6.8.5 Non-Visible Sample Collection and Handling

6.8.5.1 Non-Visible Sample Collection

Samples of non-visible discharge(s) and an uncontaminated sample will be collected at the locations determined during visual inspections. Grab samples will be collected and preserved in accordance with the methods identified in the "Sample Collection, Preservation and Analysis for Monitoring Non-Visible Pollutants" table provided above and in Appendix M. Only personnel trained in proper water quality sampling will collect samples. Samples will be collected by placing a separate lab-provided sample container directly into a stream of water downgradient and within close proximity to the potential non-visible pollutant discharge location. This separate lab-provided sample container will be used to collect water, which will be transferred to sample bottles for laboratory analysis. The upgradient and uncontaminated background samples shall be collected after collecting the downgradient contaminated sample to minimize cross-contamination. The sampling personnel will collect the water upgradient of where they are standing.

Once the separate lab-provided sample container is filled, the water sample will be poured directly into sample bottles provided by the laboratory for the analyte(s) being monitored. Sample bottles will be filled completely. To maintain sample integrity and prevent cross-contamination, sampling collection personnel will:

- Wear a clean pair of surgical gloves prior to the collection and handling of each sample at each location.
- Not contaminate the inside of the sample bottle by allowing it to come into contact with any material other than the water sample.
- Discard sample bottles or sample lids that have been dropped onto the ground prior to sample collection.
- Not leave the cooler lid open for an extended period of time once samples are placed inside.
- Not sample near a running vehicle where exhaust fumes may impact the sample.
- Not touch the exposed end of a sampling tube, if applicable.
- Avoid allowing rain water to drip from rain gear or other surfaces into sample bottles.
- Not eat, smoke, or drink during sample collection.
- Not sneeze or cough in the direction of an open sample bottle.
- Minimize the exposure of the samples to direct sunlight, as sunlight may cause biochemical transformation of the sample.
- Decontaminate sampling equipment prior to sample collection using a TSP-soapy water wash, distilled water rinse, and final rinse with distilled water.

6.8.5.2 [Non-Visible Sample Handling Procedures](#)

Immediately following collection, sample bottles for laboratory analytical testing will be capped, labeled, documented on a Chain-of-Custody form provided by the analytical laboratory, sealed in a re-sealable storage bag, placed in an ice-chilled cooler, at as near to 4 degrees Celsius as practicable, and either retrieved by or delivered within 24 hours to the following California state-certified laboratory:

Laboratory Name: CAPCO Analytical Services, Inc.
Address: 2978 Seaborg Avenue, Suite 4
Ventura, CA 93003
Telephone Number: 805-644-1095
Email Address: rhernandez@capcoenv.com

Immediately following collection, samples for field analysis will be tested in accordance with field instrument manufacturer's instructions and results recorded on the Sampling Activity Log (Appendix M).

6.8.5.3 [Sample Documentation Procedures](#)

All original data documented on sample bottle identification labels, Chain-of-Custody forms, Sampling Activity Logs, and Inspection Checklists will be recorded using ink. These will be considered accountable documents. If an error is made on an accountable document, the individual will make corrections by lining through the error and entering the correct information.

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The erroneous information will not be obliterated. All corrections will be initialed and dated. Copies of the Chain-of-Custody form and Sampling Activity Log are provided in Attachment M.

6.8.5.4 Sample Bottle Identification Labels

Sampling personnel will attach an identification label to each sample bottle. At a minimum, the following information will be recorded on the label, as appropriate:

- Project name
- Project number
- Unique sample identification number and location.
- Quality assurance/quality control (QA/QC) samples shall be identified similarly using a unique sample number or Collection date/time (No time applied to QA/QC samples)
 - Separate times for collected samples and QA/QC samples recorded to the nearest minute
- Analysis constituent
- Sampling Activity Logs: A log of sampling events will identify:
 - Sampling date
 - Unique sample identification number and location
 - Analysis constituent
 - Names of sampling personnel
 - Weather conditions (including precipitation amount)
 - Field analysis results
 - Other pertinent data
- Chain-of-Custody (COC) forms:
 - All samples to be analyzed by a laboratory will be accompanied by a COC form provided by the laboratory. Only the sample collectors will sign the COC form over to the lab. COC procedures will be strictly adhered to for QA/QC purposes.
- BMP Inspection Report: When applicable, the qualified stormwater inspector will document on the report that samples for non-visible pollutants were taken during a rain event.

6.8.6 Data Management and Reporting

Laboratory reports and COC forms will be reviewed for consistency between laboratory methods, sample identifications, dates, and times for both primary samples and QA/QC samples. All data, including COC forms and Sampling Activity Logs, shall be kept with the SWPPP document, which is to remain at the construction site at all times until a Notice of Termination has been submitted and approved.

6.8.7 Data Evaluation

Inspection results, site observations and comparative laboratory sample analysis of up and downstream locations (where applicable) will be evaluated for evidence of and potential for pollution. Once these are understood:

- Evaluate BMPs for their adequacy and effectiveness.
- If inadequate or not effective, BMPs will be changed to address the existing conditions.

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- If/when BMPs are overwhelmed, an immediate and effective response is required to correct potential issues.
- All changes will be documented in the SWPPP and on the Site Map.
- If different BMPs are needed not already designated in the SWPPP, the QSP will contact the QSD and an appropriate amendment will be made to the SWPPP.

6.8.8 Change in Conditions

Whenever SWPPP monitoring indicates a change in site conditions that might affect the appropriateness of sampling locations or introduce additional non-visible pollutants of concern, testing protocols will be revised accordingly. All such revisions will be recorded as amendments to the SWPPP by the QSD and filed in Appendix C.

6.9 SPILL RESPONSE PROCEDURES

6.9.1 Accidental Minor Spills

Minor spills involve small quantities of oil, gasoline, paint, etc., easily controlled by the first responder at the discovery of the spill. The practices followed for minor spills are to:

- Contain the spill.
 - Stop the spill from continuing and berm around spill area if necessary.
- Recover spilled materials.
 - Sweep up spilled dry materials. Do not wash them away with water or bury.
 - Recover liquid spills on paved or impermeable surfaces using dry absorbent materials such as cat litter, and/or rags.
- Clean the contaminated area and/or dispose of contaminated materials.
 - Cleanup rags may be considered hazardous waste that must be sent to a certified industrial laundry or dry cleaner, or disposed of properly. Place small, non-hazardous spill residues and materials inside a sealed container before discarding into garbage or dumpster.
 - Dispose of contaminated materials in a proper waste container. Toxic liquid wastes (used oils, solvents, and paints) and chemicals (acids, pesticides, additives, and curing compound) shall not be disposed of in dumpsters designated for construction materials.
 - Examine labels of spilled materials for proper waste disposal instructions.

6.9.2 Accidental Semi-Significant Spills

Semi-significant spills can be controlled by the first responder along with the aid of other personnel such as laborers, foremen, contractors, etc. Spills should be cleaned up immediately. Spill control measures should be consistent with those used for minor spills and as recommended in Appendix G, WM-4. In addition, the following actions should occur upon discovery of a semi-significant spill.

- If the spill occurs in a dirt area, contain the spill by constructing an earthen dike. Dig and properly dispose of all contaminated soil.

EXHIBIT "C" (Stormwater Pollution Prevention Plan)

- If the spill occurs on a paved or impermeable surface, clean up using “dry” methods, i.e. absorbent materials, cat litter and/or rags. Contain the spill by encircling with absorbent materials and do not let the spill spread.
- If the spill occurs during rain, cover the affected area if possible to avoid runoff.
- Notify the project foreman immediately.

6.9.3 Accidental Significant/Hazardous Spills

Significant or hazardous spills cannot be completely controlled by on-site personnel or are deemed too hazardous to control by on-site personnel. The following steps should be taken:

- Notify the local emergency response agency by dialing **911** and notify the proper City officials. All necessary emergency telephone numbers must be made available at the construction trailer.
- Notify the Governor’s Office of Emergency Services Warning Center at **(916) 845-8911**.
- For spills of federally reportable quantities, in conformance with the requirements in 40 CFR, notify the National Response Center at **(800) 424-8802**.
- Notification should first be made by telephone and followed with a written report as soon as possible.
- A spill cleanup contractor or Haz-Mat team should be contacted immediately. Construction personnel should not attempt to clean up until the appropriate qualified personnel have arrived and given instructions.
- Other agencies which may need to be consulted include but are not limited to the local Fire Protection District, the local police, the Highway Patrol, the State Department of Toxic Substance Control, the California Division of Oil and Gas, the California Department of Fish and Game and Cal/OSHA.

EXHIBIT "C" (Stormwater Pollution Prevention Plan)

APPENDIX M

Non-Visible Pollutant Sampling Form

EXHIBIT "C" (Stormwater Pollution Prevention Plan)

Non-Visible Pollutant Sampling Form

RAIN EVENT GENERAL INFORMATION				
Project Name				
Project Number				
Contractor				
Sampler's Name				
Signature				
Date of Sampling				
Season (Check Applicable)	<input type="checkbox"/> Rainy		<input type="checkbox"/> Non-Rainy	
Storm Data	Storm Start Date & Time:		Storm Duration (hrs):	
	Time elapsed since last storm (Circle Applicable Units)	Min. Hr. Days	Approximate Rainfall Amount (inches)	

For rainfall information: <http://cdec.water.ca.gov/weather.html> or <http://www.wrh.noaa.gov/wrhq/nwspage.html>

SAMPLE LOG		
Sample Identification	Sample Location	Sample Collection Date and Time

Specific sample locations descriptions may include: 100 ft upstream from discharge at eastern boundary, runoff from northern waste storage area, downgradient of inlet located near the intersection of A Street and B avenue, etc.

LABORATORY ANALYSIS		
<input type="checkbox"/> Yes <input type="checkbox"/> No		
Sample Identification	Test	Result

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FIELD OPERATION PROTOCOL

Sampling Preparations

1. Laboratory Coordination
 - a. Call specified labs approximately one week prior to the proposed sampling date to confirm and order glassware required for the sampling. Test for the analytes listed in SWPPP.
 - b. Arrange for appropriate type and quantity of bottles to be delivered or arrange for pick-up.
 - c. Confirm holding time and other details applicable for the proposed testing.
 - d. Check requirements for sample preservation, such as ice packs, etc. and request ice-chests to transport samples.
 - e. Carry ice for sample preservation, if needed.
2. Print out the following and make sure to carry some extra copies:
 - a. Checklist of field equipment and supplies needed for the tasks (see below).
 - b. Chain of Custody forms (see attachment).
3. Field equipment and supplies checklist.
 - a. Chain of Custody forms
 - b. Field Sampling Data forms
 - c. Sampling bottles
 - d. Pencil/pen
 - e. Disposable gloves
 - f. Digital camera
 - g. Cooler with ice
 - h. 5-gallon bucket
 - i. Orange vest, hard hat, and other appropriate safety equipment
 - j. Consider taking a 4-wheel-drive vehicle if sampling in rainy season
 - k. Rubber boots

Sampling Procedures

1. Complete the Sampling Data forms for each sampling location.
2. Take precautions to avoid contamination of the samples by using gloves and avoid touching the rims and caps of the sample bottles.

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3. If sampling for Coliform test, sample it last.
4. Avoid sampling surface scum; grab samples should be taken from middle of flow approximately 1/3 of the way down from the water surface.
5. Label all samples with location and Project name/number. Record the time samples were taken. All samples should be transported to the lab within the holding time limit.
6. In the comments section, add any useful information such as color, odor, etc.
7. Cap the samples tightly to prevent spills and contamination.
8. Place all samples collected in the ice chest, filled with ice and follow any other appropriate and applicable sample handling procedures.
9. Place the samples and ice-chest in a shady area, away from direct sunlight.

Post-Sampling Procedures

1. Make sure vehicle tires are clean before leaving the site.
2. Transport collected samples to the laboratory within any holding time requirements.
3. Hand over the Chain of Custody forms after filling, executing and relinquishing, and retain a copy for the project's records.
4. Return unopened extra bottle boxes to the laboratory or to the storage shed.
5. Note the condition of equipment at the end of the day. Inform Project Manager regarding any malfunctioning or broken equipment.
6. Return empty ice-chests to the office or storage shed.
7. File the Field Irrigation Well Sampling Data forms in the project folder.
8. File the Chain of Custody forms in the project folder. Give a copy to the project manager.

Important Points to Note

1. Do not drive through planted crops, areas of erosion hydroseeding, fabric, tilled areas or drainages for any reason. Keep your vehicle on existing construction roads.
2. Follow the posted speed limit. For construction roads, drive at or below 10 miles per hour to minimize dust.

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3. Do not drive on saturated roads.
4. Do not litter.

Quality Assurance

1. For QA/QC purposes, duplicate samples should be collected at 10 percent of the site locations. Mark them with unique location name/number.

EXHIBIT "C" (Stormwater Pollution Prevention Plan)

APPENDIX N

Pollutant Testing Guidance Table

EXHIBIT "C" (Stormwater Pollution Prevention Plan)

Pollutant Testing Guidance Table

Appendix N Pollutant Testing Guidance Table ¹

Category	Construction Site Material	Visually Observable?	Pollutant Indicators ²	Suggested Analyses Field ³	Laboratory	
Asphalt Products	Hot Asphalt	Yes - Rainbow Surface or Brown Suspension		Visually Observable - No Testing Required		
	Asphalt Emulsion					
	Liquid Asphalt (tack coat)					
	Cold Mix					
	Crumb Rubber	Yes – Black, solid material				Visually Observable - No Testing Required
	Asphalt Concrete (Any Type)	Yes - Rainbow Surface or Brown Suspension				Visually Observable - No Testing Required
Cleaning Products	Acids	No	pH Acidity Anions (acetic acid, phosphoric acid, sulfuric acid, nitric acid, hydrogen chloride)	pH Meter Acidity Test Kit	EPA 150.1 (pH)	
					SM 2310B (Acidity)	
					EPA 300.0 (Anion)	
	Bleaches	No	Residual Chlorine	Chlorine	SM 4500-CL G (Res. Chlorine)	
	Detergents	Yes - Foam	Visually Observable - No Testing Required			
	TSP	No	Phosphate	Phosphate	EPA 365.3 (Phosphate)	
	Solvents	No	VOC	None	EPA 601/602 or EPA 624 (VOC)	
SVOC			None	EPA 625 (SVOC)		

Appendix N Pollutant Testing Guidance Table ¹

Category	Construction Site Material	Visually Observable?	Pollutant Indicators ²	Suggested Analyses Field ³	Laboratory
Portland Concrete Cement & Masonry Products	Portland Cement (PCC)	Yes - Milky Liquid	Visually Observable - No Testing Required		
	Masonry products	No	pH	pH Meter Alkalinity or Acidity Test Kit	EPA 150.1 (pH)
			Alkalinity		SM 2320 (Alkalinity)
	Sealant (Methyl Methacrylate - MMA)	No	Methyl Methacrylate	None	EPA 625 (SVOC)
			Cobalt		EPA 200.8 (Metal)
			Zinc		
	Incinerator Bottom Ash Bottom Ash Steel Slag Foundry Sand Fly Ash Municipal Solid Waste	No	Aluminum Calcium Vanadium Zinc	Calcium Test	EPA 200.8 (Metal) EPA 200.7 (Calcium)
	Mortar	Yes - Milky Liquid	Visually Observable - No Testing Required		
	Concrete Rinse Water	Yes - Milky Liquid	Visually Observable - No Testing Required		
	Non-Pigmented Curing Compounds	No	Acidity	pH Meter Alkalinity or Acidity Test Kit	SM 2310B (Acidity)
Alkalinity			SM 2320 (Alkalinity)		
pH			EPA 150.1 (pH)		
VOC			EPA 601/602 or EPA 624 (VOC)		
SVOC			EPA 625 (SVOC)		
Landscaping and Other	Aluminum Sulfate	No	Aluminum	TDS Meter	EPA 200.8 (Metal)

Appendix N Pollutant Testing Guidance Table ¹

Category	Construction Site Material	Visually Observable?	Pollutant Indicators ²	Suggested Analyses Field ³	Laboratory
Products			TDS	Sulfate	EPA 160.1 (TDS)
			Sulfate		EPA 300.0 (Sulfate)
	Sulfur-Elemental	No	Sulfate	Sulfate	EPA 300.0 (Sulfate)
	Fertilizers-Inorganic ⁴	No	Nitrate	Nitrate	EPA 300.0 (Nitrate)
			Phosphate	Phosphate	EPA 365.3 (Phosphate)
			Organic Nitrogen	None	EPA 351.3 (TKN)
			Potassium	None	EPA 200.8 (Metal)
	Fertilizers-Organic	No	TOC	Nitrate	EPA 415.1 (TOC)
			Nitrate		EPA 300.0 (Nitrate)
			Organic Nitrogen		EPA 351.3 (TKN)
			COD		EPA 410.4 (COD)
	Natural Earth (Sand, Gravel, and Topsoil)	Yes - Cloudiness and turbidity	Visually Observable - No Testing Required		
	Herbicide	No	Herbicide	None	Check lab for specific herbicide or pesticide
	Pesticide		Pesticide		
	Lime		Alkalinity	pH Meter Alkalinity or Acidity Test Kit	SM 2320 (Alkalinity)
			pH		EPA 150.1 (pH)
Painting Products	Paint	Yes	Visually Observable - No Testing Required		
	Paint Strippers	No	VOC	None	EPA 601/602 or EPA 624 (VOC)

Appendix N Pollutant Testing Guidance Table ¹

Category	Construction Site Material	Visually Observable?	Pollutant Indicators ²	Suggested Analyses Field ³	Laboratory
	Resins	No	SVOC	None	EPA 625 (SVOC)
			COD	None	EPA 410.4 (COD)
			SVOC		EPA 625 (SVOC)
	Sealants	No	COD	None	EPA 410.4 (COD)
	Solvents	No	COD	None	EPA 410.4 (COD)
			VOC		EPA 601/602 or EPA 624 (VOC)
			SVOC		EPA 625 (SVOC)
	Lacquers, Varnish, Enamels, and Turpentine	No	COD	None	EPA 410.4 (COD)
			VOC		EPA 601/602 or EPA 624 (VOC)
			SVOC		EPA 625 (SVOC)
	Thinners	No	VOC	None	EPA 601/602 or EPA 624 (VOC)
			COD		EPA 410.4 (COD)
	Portable Toilet Waste Products	Portable Toilet Waste	Yes	Visually Observable - No Testing Required	
Contaminated Soil ⁵	Aerially Deposited Lead ³	No	Lead	None	EPA 200.8 (Metal)
	Petroleum	Yes – Rainbow Surface Sheen and Odor	Visually Observable - No Testing Required		
	Other	No	Contaminant Specific	Contaminant Specific	Contaminant Specific

Appendix N Pollutant Testing Guidance Table ¹

Category	Construction Site Material	Visually Observable?	Pollutant Indicators ²	Suggested Analyses Field ³	Laboratory
Line Flushing Products	Chlorinated Water	No	Total chlorine	Chlorine	SM 4500-CL G (Res. Chlorine)
Adhesives	Adhesives	No	COD	None	EPA 410.4 (COD)
			Phenols	Phenol	EPA 420.1 (Phenol)
			SVOC	None	EPA 625 (SVOC)
Dust Palliative Products	Salts (Magnesium Chloride, Calcium Chloride, and Natural Brines)	No	Chloride	Chloride	EPA 300.0 (Chloride)
			TDS	TDS Meter	EPA 160.1 (TDS)
			Cations (Sodium, Magnesium, Calcium)	None	EPA 200.7 (Cations)
Vehicle	Antifreeze and Other Vehicle Fluids	Yes - Colored Liquid	Visually Observable - No Testing Required		
	Batteries	No	Sulfuric Acid	None	EPA 300.0 (Sulfate)
			Lead	None	EPA 200.8 (Metal)
			pH	pH Meter Alkalinity or Acidity Test Kit	EPA 150.1 (pH)
Fuels, Oils, Lubricants	Yes - Rainbow Surface Sheen and Odor	Visually Observable - No Testing Required			
Soil Amendment/Stabilization Products	Polymer/Copolymer ^{6,7}	No	Organic Nitrogen	None	EPA 351.3 (TKN)
			BOD	None	EPA 405.1 (BOD)
			COD	None	EPA 410.4 (COD)
			DOC	None	EPA 415.1 (DOC)
			Nitrate	Nitrate	EPA 300.0 (Nitrate)
			Sulfate	Sulfate	EPA 300.0 (Sulfate)

Appendix N Pollutant Testing Guidance Table ¹

Category	Construction Site Material	Visually Observable?	Pollutant Indicators ²	Suggested Analyses Field ³	Laboratory
			Nickel	None	EPA 200.8 (Metal)
	Straw/Mulch	Yes - Solids	Visually Observable - No Testing Required		
	Lignin Sulfonate	No	Alkalinity	Alkalinity	SM 2320 (Alkalinity)
			TDS	TDS Meter	EPA 160.1 (TDS)
	Psyllium	No	COD	None	EPA 410.4 (COD)
			TOC		EPA 415.1 (TOC)
	Guar/Plant Gums	No	COD	None	EPA 410.4 (COD)
			TOC		EPA 415.1 (TOC)
			Nickel		EPA 200.8 (Metal)
	Gypsum	No	pH	pH Meter Alkalinity or Acidity Test Kit	EPA 150.1 (pH)
			Calcium	Calcium	EPA 200.7 (Calcium)
			Sulfate	Sulfate	EPA 300.0 (Sulfate)
			Aluminum	None	EPA 200.8 (Metal)
			Barium		
			Manganese		
		Vanadium			
Treated Wood Products	Ammoniacal-Copper-Zinc-Arsenate (ACZA) Copper-Chromium-Arsenic (CCA)	No	Arsenic	Total Chromium	EPA 200.8 (Metal)
			Total Chromium		
			Copper		

Appendix N Pollutant Testing Guidance Table ¹

Category	Construction Site Material	Visually Observable?	Pollutant Indicators ²	Suggested Analyses Field ³	Laboratory
	Ammoniacal-Copper-Arsenate (ACA) Copper Naphthenate		Zinc		
	Creosote	Yes - Rainbow Surface or Brown Suspension	Visually Observable - No Testing Required		

Notes:

1. 1 If specific pollutant is known, analyze only for that specific pollutant. See MSDS to verify.
2. For each construction material, test for one of the pollutant indicators. Bolded pollutant indicates lowest analysis cost or best indicator. However, the composition of the specific construction material, if known, is the first criterion for selecting which analysis to use.
3. See www.hach.com, www.lamotte.com, www.ysi.com and www.chemetrics.com for some of the test kits
4. If the type of inorganic fertilizer is unknown, analyze for all pollutant indicators listed.
5. Only if special handling requirements are required in the contract documents for aerially deposited lead (ADL)
6. If used with a dye or fiber matrix, it is considered visually observable and no testing is required.
7. Based upon research conducted by the State of California Department of Transportation (Caltrans), the following copolymers/polymers do not discharge pollutants and water quality sampling and analysis is **not** required: Super Tak™, M-Binder™, Fish Stik™, Pro40dc™, Fisch-Bond™, and Soil Master WR™.

APPENDIX O

Completed Construction Site Inspection Reports (SIRs)

EXHIBIT "C" (Stormwater Pollution Prevention Plan)

APPENDIX Q

Completed Stormwater Sample Logs (SSLs)

EXHIBIT "C" (Stormwater Pollution Prevention Plan)

APPENDIX R

Completed NAL Exceedance Reports

EXHIBIT "C" (Stormwater Pollution Prevention Plan)

APPENDIX S

Completed Annual Compliance Reports

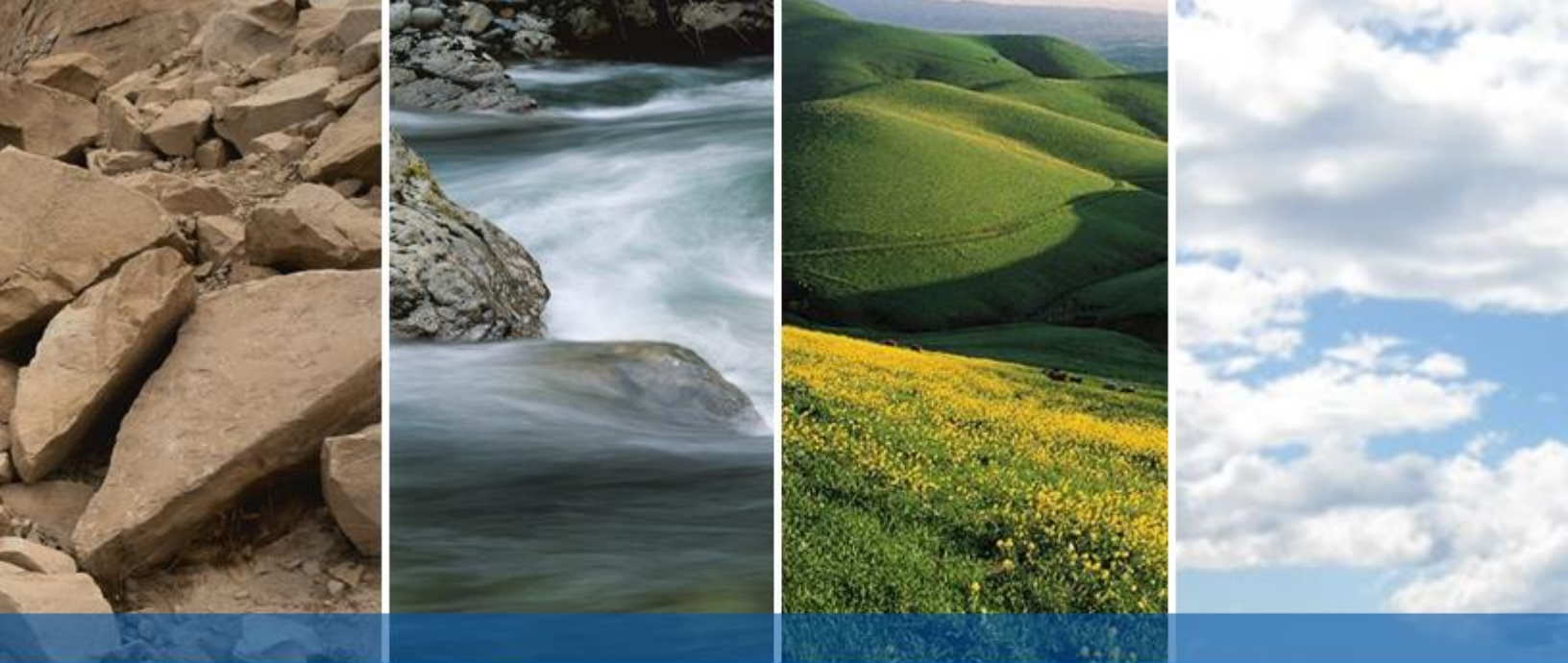
EXHIBIT "C" (Stormwater Pollution Prevention Plan)

EXHIBIT D

WATER POLLUTION CONTROL PLAN (WPCP)

PREPARED BY ENGEO, INC.

DATED DECEMBER 11, 2023



**GOLETA TRAIN DEPOT
27 SOUTH LA PATERA LANE
GOLETA, CALIFORNIA**

STORMWATER CONTROL PLAN

SUBMITTED TO
Mr. Jim Keenan
Anil Verna Associates
444 South Flower Street
Los Angeles, CA 90071

PREPARED BY
ENGEO Incorporated

~~September 28, 2022~~
Revised: December 11, 2023

PROJECT NO.
16370.000.000

EXHIBIT "D" (SWCP)

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ENGEO
— Expect Excellence —

Project No.
16370.000.000

~~September 28, 2022~~
Revised: December 11, 2023

Mr. Jim Keenan
Anil Verna Associates
444 South Flower Street
Los Angeles, CA 90071

Subject: Goleta Train Depot
27 South La Patera Lane
Goleta, California

STORMWATER CONTROL PLAN

Dear Mr. Keenan:

We are pleased to present this Stormwater Control Plan (SWCP) for the subject project, Goleta Train Depot, located at 27 South La Patera Lane in Goleta, California. This SWCP has been prepared according to the Santa Barbara County Stormwater Technical Guide standards.

If you have any questions regarding this report, please do not hesitate to contact us.

Sincerely,

ENGEO Incorporated



Randall Rettig

rr/jb/dt



Jonathan D. Buck, GE



EXHIBIT "D" (SWCP)

Stormwater Control Plan
Goleta Train Depot Project
27 South La Patera Lane
Goleta, CA 93117
APN 073-050-033

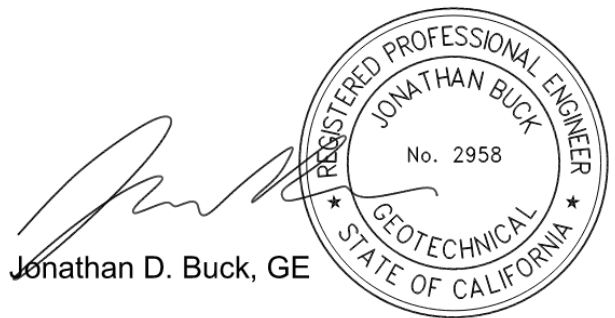
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EXHIBIT "D" (SWCP)

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EXHIBIT "D" (SWCP)

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This Stormwater Control Plan was prepared using the Santa Barbara County Commercial Stormwater Control template dated January 2017.

EXHIBIT "D" (SWCP)

I. Project Data

Table 1. Project Data

Project Name/Job Number	Goleta Train Depot/16370.000.000 APN 073-050-033	
Project Location	27 South La Patera Lane, Goleta, CA 93117	
Project Phase No.	Not Applicable	
Project Type and Description	Demolition of existing warehouse and construction of an 8,500 square foot (SF) single-story train depot with a lobby, ticketing area, café, community room and improvements along railroad right-of-way and along South La Patera between Hollister Avenue and proposed depot.	
Total Project Site Area (acres)	2.6 acres / 113,065 SF	
Total New Impervious Surface Area	83,135 SF	
Total Replaced Impervious Surface Area	98,269 SF	(A portion of the existing concrete paving will be protected in place)
Total Pre-Project Impervious Surface Area	109,576 SF±	
Total Post-Project Impervious Surface Area	83,135 SF	
Reduced Impervious Area Credit	26,441 SF	
Net Impervious Area	83,135 SF	
Applicable Requirements	Tier 4	
Watershed Management Zone	1	
Design Storm Frequency and Depth	2.2 inches (95th percentile)	
Urban Sustainability Area	The project is not in an Urban Sustainability Area	

II. Setting

II.A. Project Location and Description

This project involves the demolition of an existing warehouse building and parking lot and replacement with a new train depot building, lobby, ticketing area, waiting room, café, community room, restrooms/showers, storage lockers, and parking lot. The parcel fronts an arterial roadway, as shown in Figure 1.

The proposed use is consistent with current commercial zoning.



EXHIBIT "D" (SWCP)

II.B. Existing Site Features and Conditions

The rectangular, relatively flat site lies in a commercial region of Goleta, California, as shown on Figure 2. Most of the existing site is covered with a paved parking lot and warehouse. Based on a geotechnical study performed by ENGE0, on-site soil is silty clay, typical of the area. This soil is classified as Hydrologic Soil Group ("D") according to the United States Soil Conservation Service, with little ability to infiltrate stormwater. The existing on-site storm drainage system is connected to a municipal storm drain on South La Patera Lane along the north and east of the site.



II.C. Opportunities and Constraints for Stormwater Control

Constraints include low infiltration rate soil (Hydrologic Soil Group D), high intensity land use, expansive soil, and flat topography. Disposal of runoff to deep infiltration is not feasible on this site due to the low permeability of the on-site silty clay soil. High land values, the objective of creating a dense retail area, and parking requirements limit opportunities to reduce site imperviousness.

Stormwater controls for the project are to be included in the center and northwest corner of the site. The City storm drain system along South La Patera Lane is deep enough to provide sufficient hydraulic head to route runoff across the surface of the site to the proposed stormwater treatment facilities.

III. Low Impact Development Design Strategies

III.A. Site Design and Runoff Reduction

The site is densely developed infill within the existing urbanized area. The future train depot complex is proposed to include biofiltration regions for reducing stormwater runoff in general conformance with the Santa Barbara County Stormwater Technical Guide to address the County's stormwater requirements.

III.B. Site Constraints

Conventional Portland cement and asphalt concrete are to be used to construct the circulation and parking areas. Permeable pavements were considered but were not found to be cost-effective for this site, in part because the pavements overlie expansive clay soil. This condition would necessitate a very deep gravel base course, which would, in turn, require large quantities of excavation and offhaul.

EXHIBIT "D" (SWCP)

IV. Documentation of Drainage Design

IV.A. Descriptions of Each Drainage Management Area

IV.A.1. Drainage Management Areas

Table 2. Drainage Management Areas (DMAs), as shown on Appendix A.

DMA Name	DMA Type	Area (SF)	Surface Type
DMA-1	Drains to SCM-1	68,899 SF	Paving/Roof
DMA-2	Drains to SCM-2	29,380 SF	Paving/Roof

IV.A.2. Drainage Management Area Descriptions

DMA 1, totaling 68,889 square feet, drains the perimeter of the parking areas, the full roof area of the train depot building, and a portion of a paved traffic island. DMA-1 drains to the Bioretention Facility SCM 1 in the northwestern corner of the property.

DMA 2, totaling 29,380 square feet, drains the central sections of the property. DMA-2 drains to the Bioretention Facility SCM 2 in the center of the property; all three planters are to be hydraulically connected via an 8-inch pipe.

IV.B. Stormwater Control Measures

Runoff from all impervious areas on the site, including roofs and paved areas, will be routed to two bioretention facilities (see Figure 4 in Appendix A). The facilities will be designed and constructed in accordance with the Santa Barbara County Project Clean Water Stormwater Technical Guide (February 2017). Design features will include:

- A perimeter concrete curb. Where adjacent to pavement, curbs will be thickened, and an impermeable vertical cutoff wall will be included.
- Each layer is built level, and to the elevations specified in the plans.
 - Bottom of Gravel Layer (BGL)
 - Top of Gravel Layer (TGL)
 - Top of Soil Layer (TSL)
 - Overflow Grate
 - Facility Rim
- Caltrans Class 2 permeable per Caltrans Standard Specifications Section 68-2.02F (3), depth as specified in the Stormwater Control Measure Sizing Calculator output
- 24 inches sand/compost mix meeting BASMAA specifications
- 4-inch-diameter PVC SDR 35 perforated pipe underdrain, installed with the invert at the top of the Class 2 permeable layer with holes facing down, and connected to the overflow structure at that same elevation
- 6-inch-deep reservoir between top of soil and overflow grate

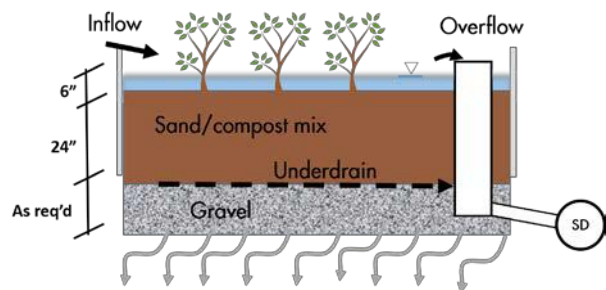


Figure 3. Bioretention Facility Cross-Section (Schematic)

EXHIBIT "D" (SWCP)

- Concrete drop inlet with frame overflow structure, with grate set to specified elevation, connected to storm drain in Main Street
- Vertical cutoff walls to protect adjacent pavement
- Plantings selected for water conservation
- Irrigation system on a separate zone, with drip emitters and “smart” irrigation controllers
- Sign identifying the facility as a stormwater treatment facility.

IV.C. Tabulation and Sizing Calculations

IV.C.1. Information Summary for LID Facility Design

See the entries and output from the Central Coast Region Stormwater Control Measure Sizing Calculator Spreadsheet in Appendix B.

IV.D. HydroCAD Calculation: Pre and Post Development Peak Flows

The Goleta Train Depot will be replacing 102,955 square feet of existing development, as shown in the Project Data summary. This places the Project under a Tier 4 classification as defined by the Santa Barbara County Stormwater Technical Guide. Santa Barbara County requires the utilization of software, such as HydroCAD, to demonstrate that peak flows from the 2-year through 100-year, 24-hour recurrence interval storms will be reduced in the post-project condition. Due to the incorporation of LID measures, the Project will result in lower peak flows than the predevelopment condition. HydroCAD calculation summary (pre and post development) are included in Appendix C; we provide a summary in Table 3.

Table 3. HydroCAD Summary of Pre and Post Development Peak Flows

	Design Storm ¹					
	2-year 3.35in ¹	5-year 4.29in ¹	10-year 5.04in ¹	25-year 6.02in ¹	50-year 6.76in ¹	100-year 7.49in ¹
Pre-Project Peak Runoff (cfs)	1.12	1.44	1.70	2.04	2.28	2.54
Post-Project Peak Runoff (cfs)	1.07	1.40	1.66	2.00	2.26	2.51
Percent Reduction	-4.46%	-2.78%	-2.35%	-1.96%	-0.88%	-1.18%

¹Source: Precipitation Frequency Data Server (PFDS) Frequency Interval per duration of 24 hours
<https://hdsc.nws.noaa.gov/hdsc/pfds/>

V. Source Control Measures

V.A. Site activities and potential sources of pollutants

On-site activities that could potentially produce stormwater pollutants include:

- Driveways and parking lots
- Food Service
- Trash Management

EXHIBIT "D" (SWCP)

V.B. Potential Pollutant Sources and Source Control Measures

Table 4. Pollutant Sources and Source Control Measures

Potential Source of Runoff Pollutants	Permanent Source Control BMPs	Operational Source Control BMPs
Inlets (bioretention overflows)	All inlets will be marked with “No Dumping! Flows to Local Waterways” or similar	Markings will be regularly inspected and repainted or replaced as needed. Lessees will receive stormwater pollution prevention brochures. Lease agreements will include the following provision: “Tenant shall not allow anyone to discharge anything to storm drains or to store or deposit materials so as to create a potential discharge to storm drains.”
Indoor and Structural Pest Control		Owner will retain only companies that are certified in Integrated Pest Management (IPM) for on-site pest management.
Landscape Maintenance	Landscaping will minimize irrigation and runoff and be selected for pest resistance and will minimize the need for fertilizers and pesticides. Plants will be selected appropriate to site soil, slopes, climate, sun, wind rain, land use, air movement, ecological consistency, and plant interactions.	Landscaping will be maintained using minimum or no pesticides. IPM information will be provided to new owners, lessees, and operators.
Food Service	Café will include a floor sink for cleaning floor mats, containers, and equipment. The floor sink will be connected to a grease interceptor before discharging to the sanitary sewer.	
Refuse Area	Refuse and recycled materials will be handled in the refuse area. This area is to be roofed and bermed.	All dumpsters will be posted with signs stating “Do not dump hazardous materials here” or similar.
Plazas, Sidewalks, and Parking Lots		Trash receptacles to be provided in plaza area and on drive-through and emptied daily. Site to be regularly maintained for trash. Plazas, sidewalks, and parking lots will be swept regularly. Debris and wash water from periodic pressure washing will be collected and disposed of to the sanitary sewer.

EXHIBIT "D" (SWOP)

VI. Stormwater Facility Maintenance

VI.A. Ownership and Responsibility for Maintenance in Perpetuity

The owner accepts responsibility for the operation and maintenance of stormwater treatment and flow-control facilities for the life of the project until such time as this responsibility is formally transferred to subsequent owners. The facility maintenance for this project will be financed publicly and implemented by the City of Goleta in perpetuity for the life of the project. Any future change or alteration, or the failure to maintain any feature described herein can result in penalties including but not limited to fines, property liens, and other actions for enforcement of a civil judgment.

VI.B. Summary of Maintenance Requirements for Each Stormwater Facility

The two bioretention facilities will be maintained on the following minimum schedule. Details of maintenance responsibilities and procedures will be included in a Stormwater Facility Operation and Maintenance Plan to be submitted for approval, as required in the conditions of approval.

At no time will synthetic pesticides or fertilizers be applied, nor will any soil amendments, other than aged compost mulch or sand/compost mix, be introduced.

Daily: The facilities will be examined for visible trash during regular site inspections, and trash will be removed.

After Significant Rain Events: A significant rain event is one that produces approximately ½ inch or more rainfall in a 24-hour period. Within 24 hours after each such event, the following will be conducted.

- The surface of the facility will be observed to confirm there is no ponding.
- Inlets will be inspected, and any accumulations of trash or debris will be removed.
- The surface of the mulch layer will be inspected for movement of material. Mulch will be replaced and raked smooth if needed.

Prior to the Start of the Rainy Season: In September of each year, the facility will be inspected to confirm there is no accumulation of debris that would block flow, and that growth and spread of plantings does not block inlets or the movement of runoff across the surface of the facility.

Annual Landscape Maintenance: In December through February of each year, vegetation will be cut back, as needed, debris removed, and plants and mulch replaced, as needed. The concrete work will be inspected for damage. The elevation of the top of soil and mulch layer will be confirmed to be consistent with the 6-inch reservoir depth.

EXHIBIT "D" (SWCP)

VII. Stormwater Control Plan/Construction Documents Cross-Checklist

See Appendix E for the Bioretention Construction Inspection Checklist and Table 5.

Table 5. Stormwater Control Plan/Construction Documents Cross-Checklist

Stormwater Control Plan Page #	Source Control or LID Facility	See Plan Sheet #s
3 and Exhibit	Drainage from DMAs 1 and 2 are retained by surrounding curbs.	
3 and Exhibit	DMA 1 drains to Bioretention Facility #1; facility is designed as specified	
3 and Exhibit	DMA 2 drains to Bioretention Facility #2; facility is designed as specified	
5	Bioretention Facility #1 and #2 overflows are marked with "No Dumping" message	
6	Café/food service facility is equipped with a floor sink connected to a grease interceptor and then to sanitary sewer	
6	Trash receptacles are located in plaza area and are accessible to drive-through lane	

VIII. Certifications

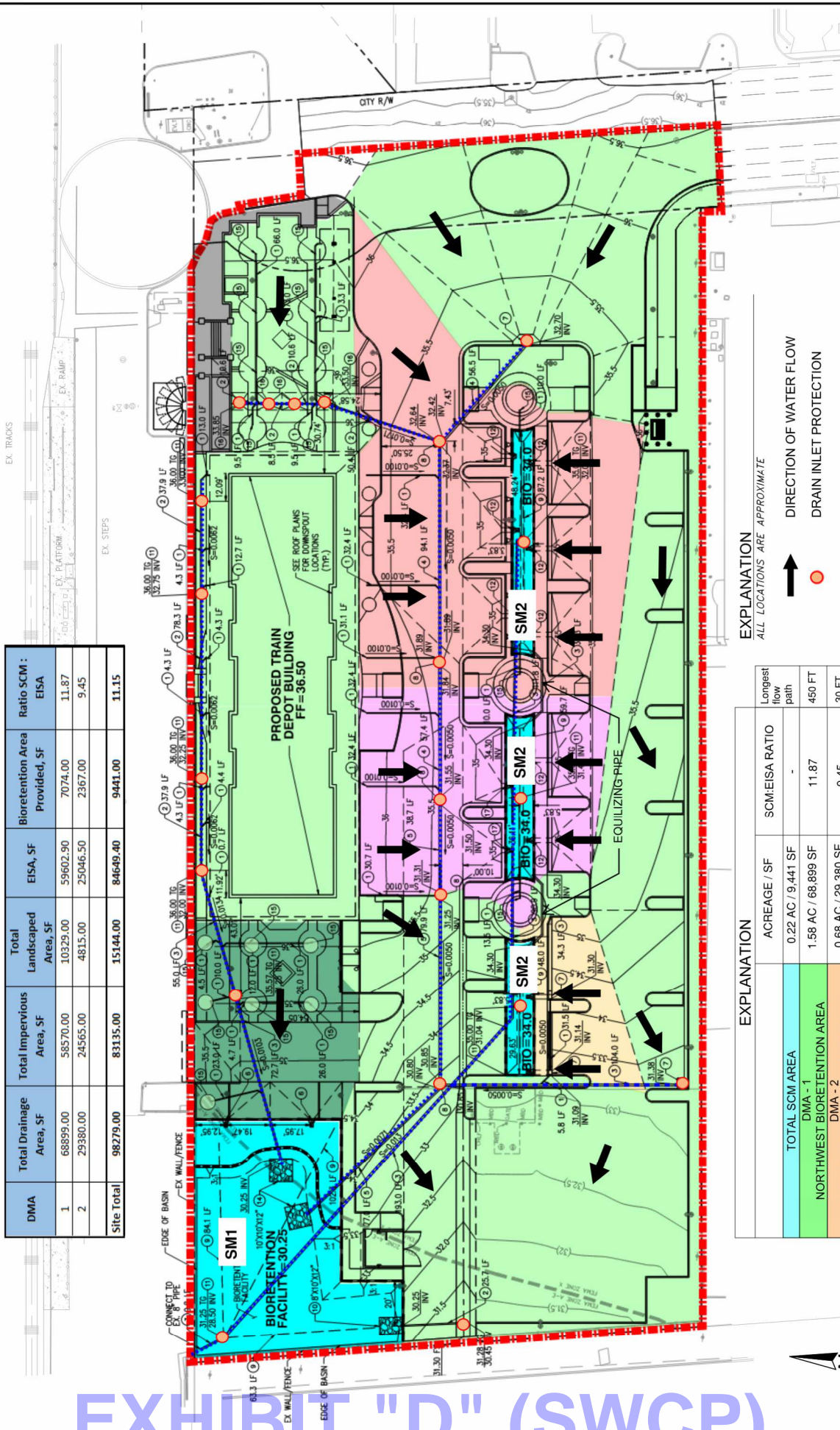
The preliminary design of Stormwater Control Measures and other stormwater pollution control measures in this plan are in accordance with the current edition of the Santa Barbara County Project Clean Water's Stormwater Technical Guide.

EXHIBIT "D" (SWCP)

APPENDIX A
Stormwater Control Plan Exhibit

EXHIBIT "D" (SWCP)

DMA	Total Drainage Area, SF	Total Impervious Area, SF	Total Landscaped Area, SF	EISA, SF	Bioretention Area Provided, SF	Ratio SCM : EISA
1	68899.00	58570.00	10329.00	59602.90	7074.00	11.87
2	29380.00	24565.00	4815.00	25046.50	2367.00	9.45
Site Total	98279.00	83135.00	15144.00	84649.40	9441.00	11.15



EXPLANATION
 ALL LOCATIONS ARE APPROXIMATE

➔ DIRECTION OF WATER FLOW

● DRAIN INLET PROTECTION

BASE MAP SOURCE: RAIL PROS, 2021

EXPLANATION	ACREAGE / SF	SCM:EISA RATIO	Longest flow path
TOTAL SCM AREA	0.22 AC / 9,441 SF	-	450 FT
DMA - 1	1.58 AC / 68,899 SF	11.87	30 FT
DMA - 2	0.68 AC / 29,380 SF	9.45	
OVERALL TOTAL	2.26 AC / 98,279 SF	11.15	

PROJECT NO.: 16370.000.000
 SCALE: AS SHOWN
 DRAWN BY: CC
 CHECKED BY: JDB

ENGEO
Expect Excellence

STORMWATER MANAGEMENT PLAN
 GOLETA TRAIN DEPOT
 GOLETA, CALIFORNIA

FIGURE NO. **4**
 REVISED: DECEMBER 11, 2023

APPENDIX B

Central Coast Post-Construction Requirements Calculator Spreadsheet

EXHIBIT "D" (SWCP)

Central Coast Region Stormwater Control Measure Sizing Calculator

1. Project Information

Project name:	Goleta Train Depot
Project location:	27 S La Patera Lane, Goleta, CA 93117
Tier 2/Tier 3:	Tier 3 - Retention
Design rainfall depth (in):	2.2
Total project area (ft2):	109567
Total DMA area (ft2):	98279
Total new impervious area (ft2):	83135
Total replaced impervious within a USA (ft2):	0
Total replaced impervious not in a USA (ft2):	0
Total pervious/landscape area (ft2):	15144
Total SCM area (ft2):	9441

2. DMA Characterization

Name	DMA Type	Area (ft2)	Surface Type	New, Replaced?	Connection
DMA 1	Drains to SCM	68899	Concrete or asphalt	Replaced	SCM 1
DMA 2	Drains to SCM	29380	Concrete or asphalt	Replaced	SCM 2

DMA Summary Area

Total assigned DMA area (ft2):	98279
New impervious area (ft2):	0
Replaced impervious within a USA (ft2):	0
Replaced impervious not in a USA (ft2):	98279
Total pervious/landscape area (ft2):	0

Check DMA table areas against plan sheet areas

Check DMA table areas against plan sheet areas

Check DMA table areas against plan sheet areas

3. SCM Characterization

Name	SCM Type	Safety Factor	SCM Soil Type	Infiltr. Rate (in/hr)	Area (ft2)
SCM 1	Bioretention	1	Site-Specific	0.15	7074
SCM 2	Bioretention	1	Site-Specific	0.15	2367

4. Run SBUH Model

5. SCM Minimum Sizing Requirements

SCM Name	Min. Required Storage Vol. (ft3)	Depth Below Underdrain (ft)	Drain Time (hours)	Orifice Diameter (in)	Results are out of Click 'Launch Moc
SCM 1	5929	2.01	53.5		
SCM 2	2055	1.36	43.6		

6. Self-Retaining Area Sizing Checks

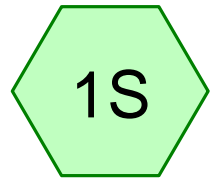
Self-Retaining DMA Name	Self-Retaining DMA Area (ft2)	Tributary DMA Name(s)	Eff. Tributary DMA Area (ft2)	Effective Tributary / SRA Area Ratio

EXHIBIT "D" (SWCP)

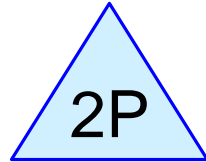
APPENDIX C

HydroCAD Calculation Summary, Pre and Post Development

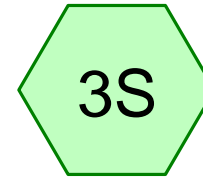
EXHIBIT "D" (SWCP)



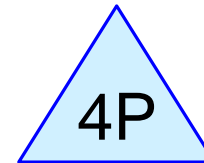
DMA 1



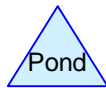
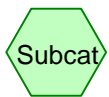
SCM 1



DMA 2



SCM 2



Routing Diagram for Goleta Train Depot_PreCond
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Goleta Train Depot_PreCond

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Page 2

Rainfall Events Listing

Event#	Event Name	Storm Type	Curve	Mode	Duration (hours)	B/B	Depth (inches)	AMC
1	2yr, 24hr	CA 24-hr	1	Default	24.00	1	3.35	2
2	5yr, 24 hr	CA 24-hr	1	Default	24.00	1	4.29	2
3	10yr, 24 hr	CA 24-hr	1	Default	24.00	1	5.04	2
4	25yr, 24 hr	CA 24-hr	1	Default	24.00	1	6.02	2
5	50yr, 24 hr	CA 24-hr	1	Default	24.00	1	6.76	2
6	100yr, 24 hr	CA 24-hr	1	Default	24.00	1	7.49	2

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Page 3

Area Listing (selected nodes)

Area (acres)	CN	Description (subcatchment-numbers)
2.163	98	Paved parking, HSG D (1S, 3S)
0.090	76	Woods/grass comb., Fair, HSG C (1S)
0.003	72	Woods/grass comb., Good, HSG C (3S)
2.256	97	TOTAL AREA

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Soil Listing (selected nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.000	HSG A	
0.000	HSG B	
0.093	HSG C	1S, 3S
2.163	HSG D	1S, 3S
0.000	Other	
2.256		TOTAL AREA

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Ground Covers (selected nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.000	0.000	0.000	2.163	0.000	2.163	Paved parking	1S, 3S
0.000	0.000	0.090	0.000	0.000	0.090	Woods/grass comb., Fair	1S
0.000	0.000	0.003	0.000	0.000	0.003	Woods/grass comb., Good	3S
0.000	0.000	0.093	2.163	0.000	2.256	TOTAL AREA	

EXHIBIT "D" (SWCP)

Goleta Train Depot_PreCond

CA 24-hr 1 2yr, 24hr Rainfall=3.35"

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Time span=1.00-55.00 hrs, dt=0.05 hrs, 1081 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: DMA 1

Runoff Area=1.582 ac 94.31% Impervious Runoff Depth>3.00"
Flow Length=300' Slope=0.0090 '/ Tc=3.9 min CN=97 Runoff=0.78 cfs 0.396 af

Subcatchment 3S: DMA 2

Runoff Area=0.674 ac 99.55% Impervious Runoff Depth>3.10"
Flow Length=100' Slope=0.0100 '/ Tc=1.6 min CN=98 Runoff=0.34 cfs 0.174 af

Total Runoff Area = 2.256 ac Runoff Volume = 0.570 af Average Runoff Depth = 3.03"
4.12% Pervious = 0.093 ac 95.88% Impervious = 2.163 ac

EXHIBIT "D" (SWCP)

Goleta Train Depot_PreCond

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CA 24-hr 1 2yr, 24hr Rainfall=3.35"

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Summary for Subcatchment 1S: DMA 1

DMA 1 drains to SCM 1

[49] Hint: Tc<2dt may require smaller dt

Runoff = 0.78 cfs @ 12.10 hrs, Volume= 0.396 af, Depth> 3.00"
 Routed to Pond 2P : SCM 1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-55.00 hrs, dt= 0.05 hrs
 CA 24-hr 1 2yr, 24hr Rainfall=3.35"

Area (ac)	CN	Description
1.492	98	Paved parking, HSG D
0.090	76	Woods/grass comb., Fair, HSG C
1.582	97	Weighted Average
0.090		5.69% Pervious Area
1.492		94.31% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.9	300	0.0090	1.27		Sheet Flow, DMA 1 Depot Sheet Flow Smooth surfaces n= 0.011 P2= 3.35"

Subcatchment 1S: DMA 1

Hydrograph

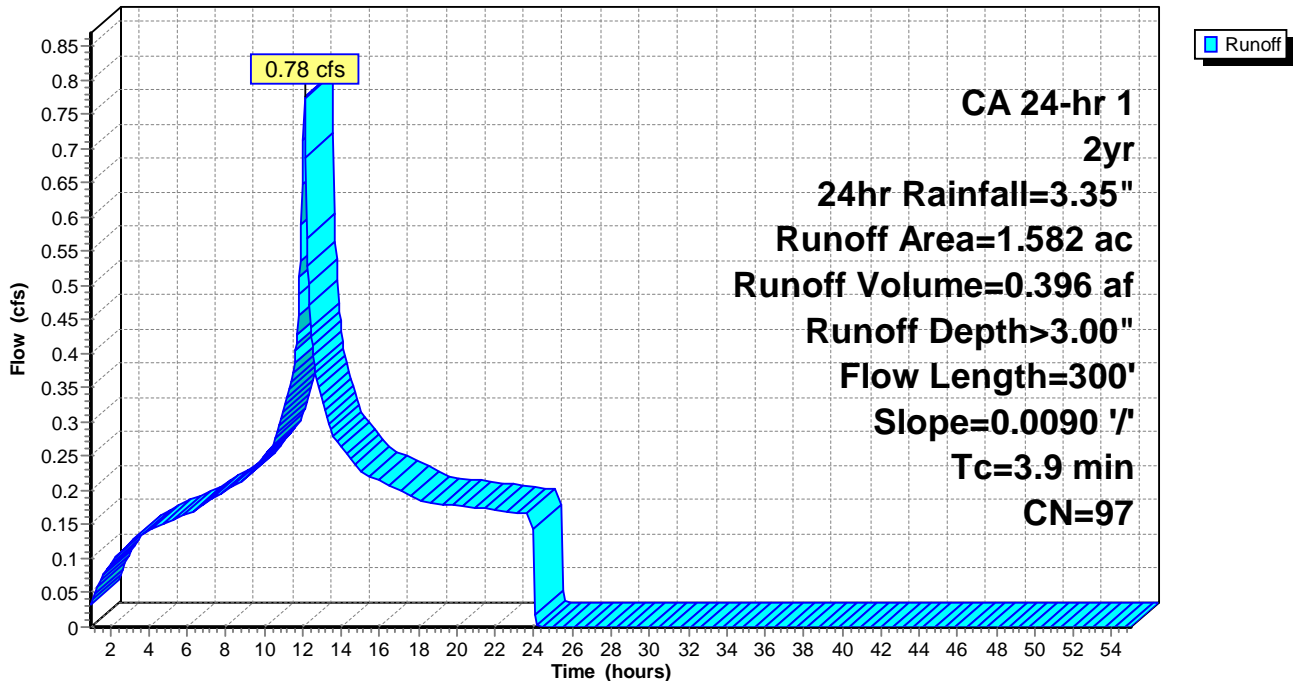


EXHIBIT "D" (SWCP)

Summary for Subcatchment 3S: DMA 2

DMA 2 Drains to SCM Bioinfiltration Facility #2

[49] Hint: Tc<2dt may require smaller dt

Runoff = 0.34 cfs @ 12.07 hrs, Volume= 0.174 af, Depth> 3.10"
 Routed to Pond 4P : SCM 2

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-55.00 hrs, dt= 0.05 hrs
 CA 24-hr 1 2yr, 24hr Rainfall=3.35"

Area (ac)	CN	Description
0.671	98	Paved parking, HSG D
0.003	72	Woods/grass comb., Good, HSG C
0.674	98	Weighted Average
0.003		0.45% Pervious Area
0.671		99.55% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.6	100	0.0100	1.07		Sheet Flow, DMA 2 Depot Sheet Flow Smooth surfaces n= 0.011 P2= 3.35"

Subcatchment 3S: DMA 2

Hydrograph

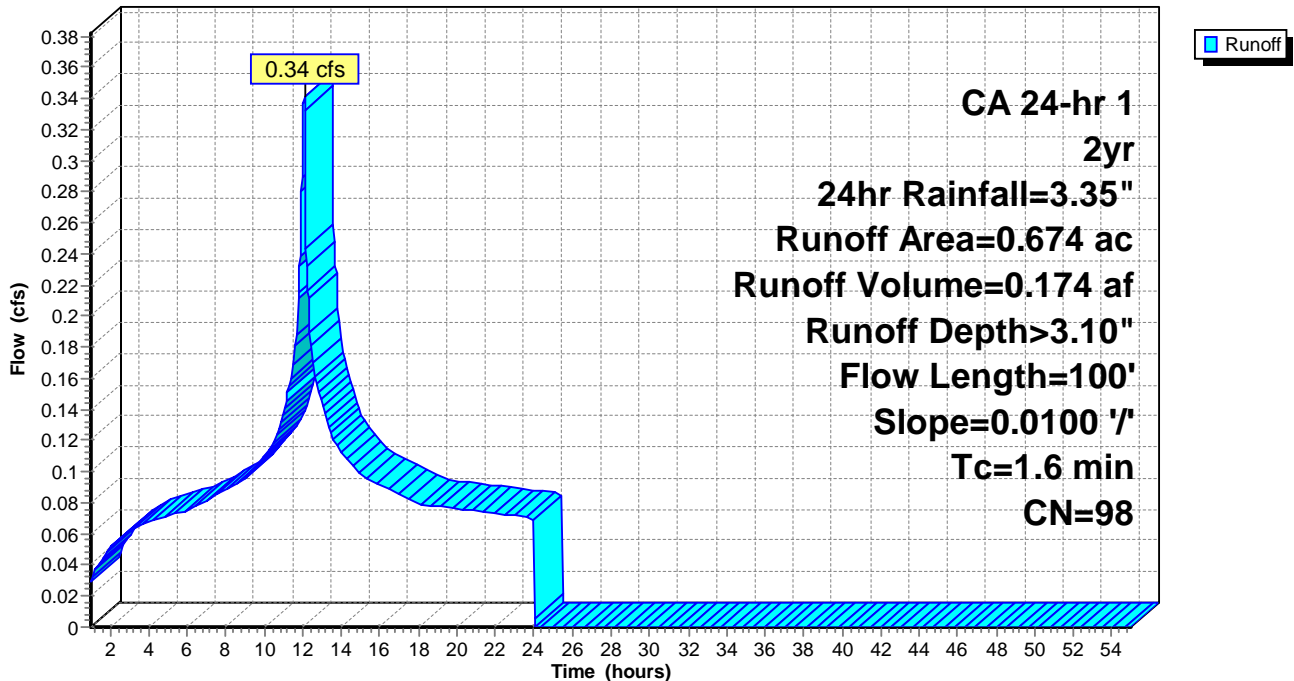


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Goleta Train Depot_PreCond

CA 24-hr 1 5yr, 24 hr Rainfall=4.29"

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Time span=1.00-55.00 hrs, dt=0.05 hrs, 1081 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: DMA 1

Runoff Area=1.582 ac 94.31% Impervious Runoff Depth>3.93"
Flow Length=300' Slope=0.0090 '/ Tc=3.9 min CN=97 Runoff=1.00 cfs 0.518 af

Subcatchment 3S: DMA 2

Runoff Area=0.674 ac 99.55% Impervious Runoff Depth>4.03"
Flow Length=100' Slope=0.0100 '/ Tc=1.6 min CN=98 Runoff=0.44 cfs 0.226 af

Total Runoff Area = 2.256 ac Runoff Volume = 0.744 af Average Runoff Depth = 3.96"
4.12% Pervious = 0.093 ac 95.88% Impervious = 2.163 ac

EXHIBIT "D" (SWCP)

Summary for Subcatchment 1S: DMA 1

DMA 1 drains to SCM 1

[49] Hint: Tc<2dt may require smaller dt

Runoff = 1.00 cfs @ 12.10 hrs, Volume= 0.518 af, Depth> 3.93"
 Routed to Pond 2P : SCM 1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-55.00 hrs, dt= 0.05 hrs
 CA 24-hr 1 5yr, 24 hr Rainfall=4.29"

Area (ac)	CN	Description
1.492	98	Paved parking, HSG D
0.090	76	Woods/grass comb., Fair, HSG C
1.582	97	Weighted Average
0.090		5.69% Pervious Area
1.492		94.31% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.9	300	0.0090	1.27		Sheet Flow, DMA 1 Depot Sheet Flow Smooth surfaces n= 0.011 P2= 3.35"

Subcatchment 1S: DMA 1

Hydrograph

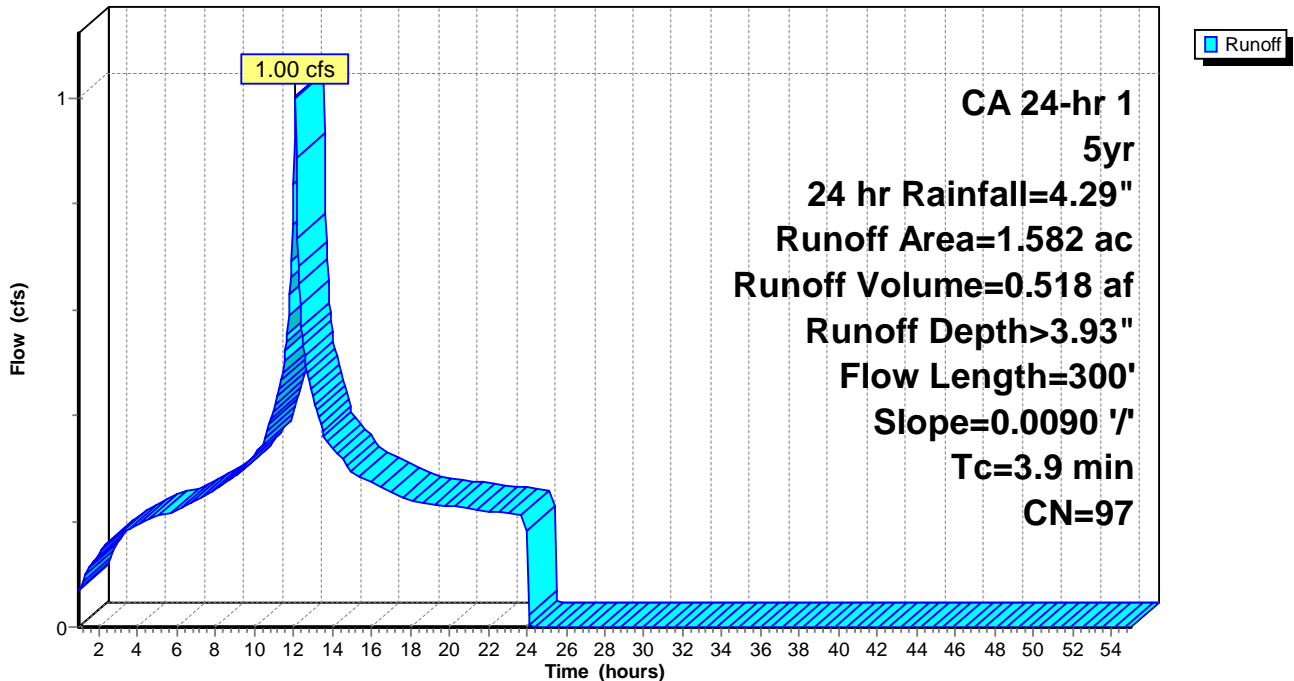


EXHIBIT "D" (SWCP)

Summary for Subcatchment 3S: DMA 2

DMA 2 Drains to SCM Bioinfiltration Facility #2

[49] Hint: Tc<2dt may require smaller dt

Runoff = 0.44 cfs @ 12.07 hrs, Volume= 0.226 af, Depth> 4.03"
 Routed to Pond 4P : SCM 2

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-55.00 hrs, dt= 0.05 hrs
 CA 24-hr 1 5yr, 24 hr Rainfall=4.29"

Area (ac)	CN	Description
0.671	98	Paved parking, HSG D
0.003	72	Woods/grass comb., Good, HSG C
0.674	98	Weighted Average
0.003		0.45% Pervious Area
0.671		99.55% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.6	100	0.0100	1.07		Sheet Flow, DMA 2 Depot Sheet Flow Smooth surfaces n= 0.011 P2= 3.35"

Subcatchment 3S: DMA 2

Hydrograph

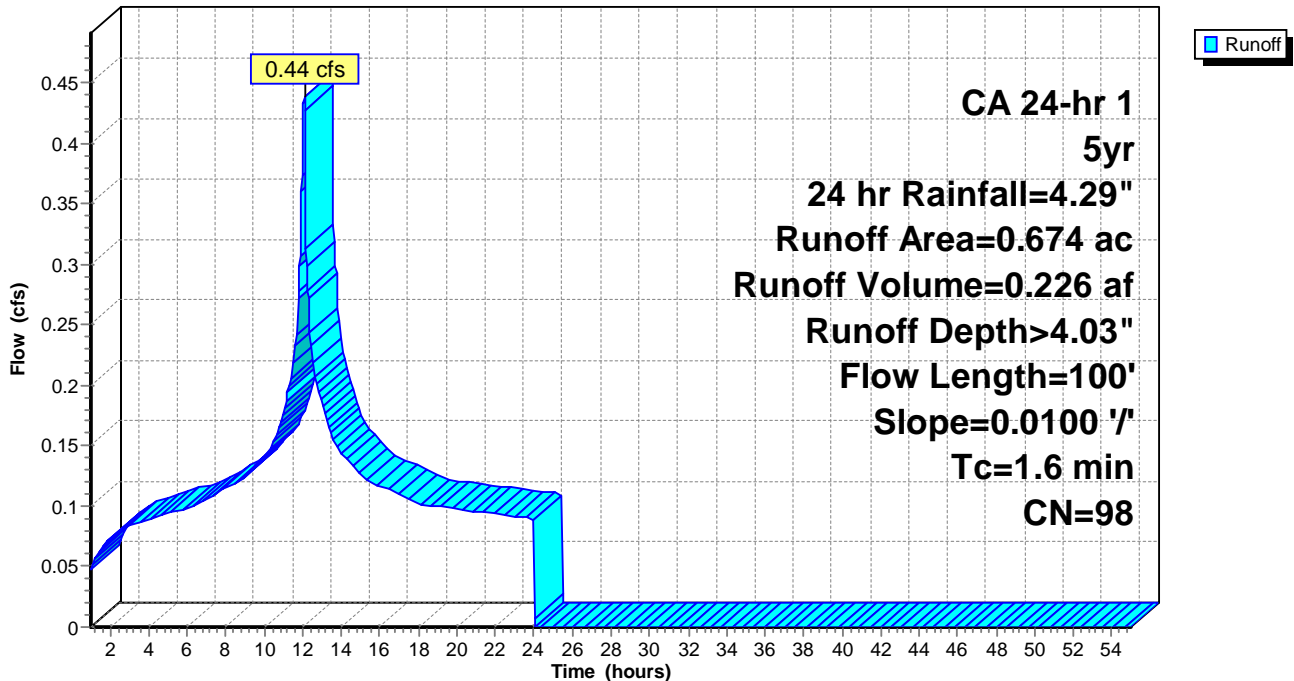


EXHIBIT "D" (SWCP)

Goleta Train Depot_PreCond

CA 24-hr 1 10yr, 24 hr Rainfall=5.04"

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Time span=1.00-55.00 hrs, dt=0.05 hrs, 1081 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: DMA 1

Runoff Area=1.582 ac 94.31% Impervious Runoff Depth>4.67"
Flow Length=300' Slope=0.0090 '/ Tc=3.9 min CN=97 Runoff=1.18 cfs 0.616 af

Subcatchment 3S: DMA 2

Runoff Area=0.674 ac 99.55% Impervious Runoff Depth>4.76"
Flow Length=100' Slope=0.0100 '/ Tc=1.6 min CN=98 Runoff=0.52 cfs 0.268 af

Total Runoff Area = 2.256 ac Runoff Volume = 0.883 af Average Runoff Depth = 4.70"
4.12% Pervious = 0.093 ac 95.88% Impervious = 2.163 ac

EXHIBIT "D" (SWCP)

Summary for Subcatchment 1S: DMA 1

DMA 1 drains to SCM 1

[49] Hint: Tc<2dt may require smaller dt

Runoff = 1.18 cfs @ 12.10 hrs, Volume= 0.616 af, Depth> 4.67"
 Routed to Pond 2P : SCM 1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-55.00 hrs, dt= 0.05 hrs
 CA 24-hr 1 10yr, 24 hr Rainfall=5.04"

Area (ac)	CN	Description
1.492	98	Paved parking, HSG D
0.090	76	Woods/grass comb., Fair, HSG C
1.582	97	Weighted Average
0.090		5.69% Pervious Area
1.492		94.31% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.9	300	0.0090	1.27		Sheet Flow, DMA 1 Depot Sheet Flow Smooth surfaces n= 0.011 P2= 3.35"

Subcatchment 1S: DMA 1

Hydrograph

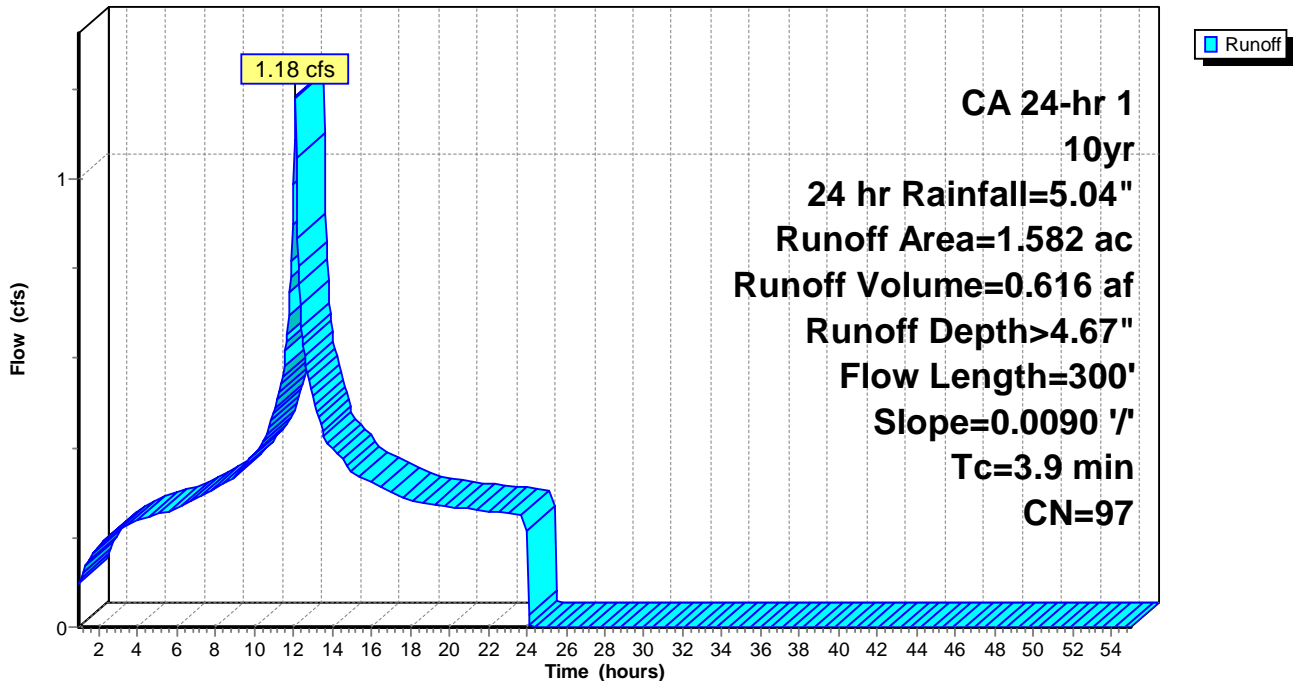


EXHIBIT "D" (SWCP)

Summary for Subcatchment 3S: DMA 2

DMA 2 Drains to SCM Bioinfiltration Facility #2

[49] Hint: Tc<2dt may require smaller dt

Runoff = 0.52 cfs @ 12.07 hrs, Volume= 0.268 af, Depth> 4.76"
 Routed to Pond 4P : SCM 2

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-55.00 hrs, dt= 0.05 hrs
 CA 24-hr 1 10yr, 24 hr Rainfall=5.04"

Area (ac)	CN	Description
0.671	98	Paved parking, HSG D
0.003	72	Woods/grass comb., Good, HSG C
0.674	98	Weighted Average
0.003		0.45% Pervious Area
0.671		99.55% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.6	100	0.0100	1.07		Sheet Flow, DMA 2 Depot Sheet Flow Smooth surfaces n= 0.011 P2= 3.35"

Subcatchment 3S: DMA 2

Hydrograph

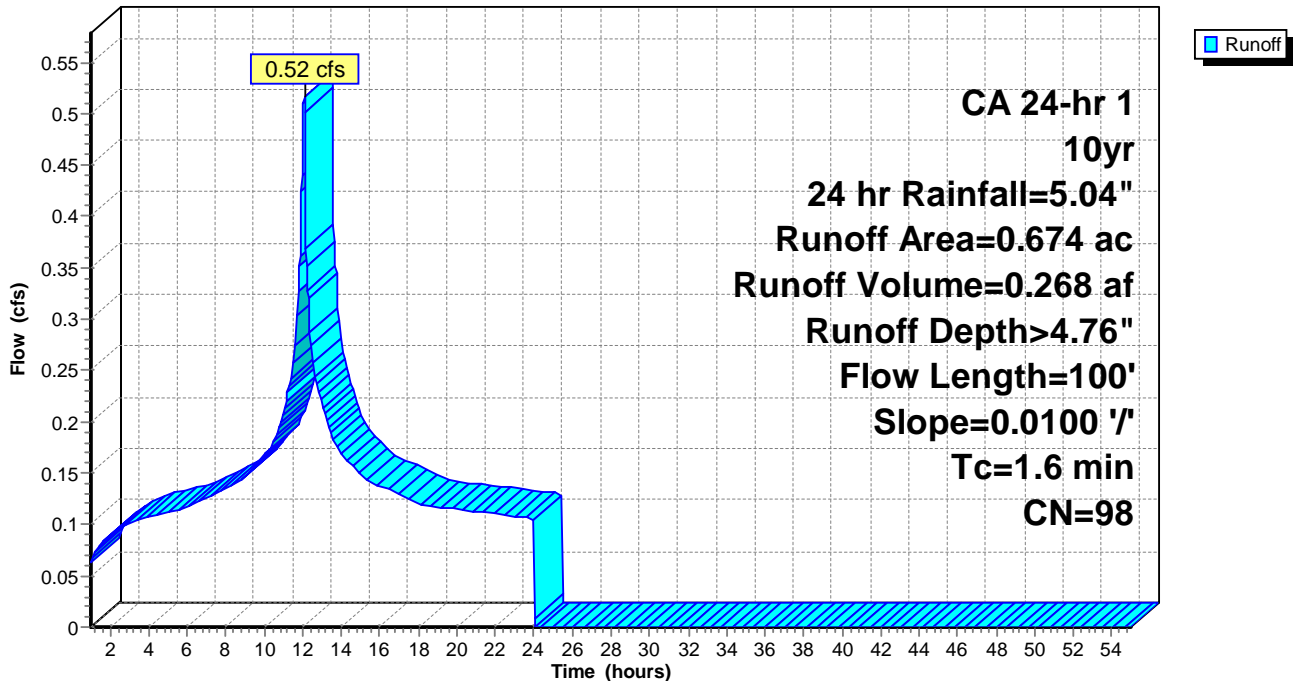


EXHIBIT "D" (SWCP)

Goleta Train Depot_PreCond

CA 24-hr 1 25yr, 24 hr Rainfall=6.02"

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Time span=1.00-55.00 hrs, dt=0.05 hrs, 1081 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: DMA 1 Runoff Area=1.582 ac 94.31% Impervious Runoff Depth>5.63"
Flow Length=300' Slope=0.0090 '/ Tc=3.9 min CN=97 Runoff=1.42 cfs 0.743 af

Subcatchment 3S: DMA 2 Runoff Area=0.674 ac 99.55% Impervious Runoff Depth>5.73"
Flow Length=100' Slope=0.0100 '/ Tc=1.6 min CN=98 Runoff=0.62 cfs 0.322 af

Total Runoff Area = 2.256 ac Runoff Volume = 1.064 af Average Runoff Depth = 5.66"
4.12% Pervious = 0.093 ac 95.88% Impervious = 2.163 ac

EXHIBIT "D" (SWCP)

Summary for Subcatchment 1S: DMA 1

DMA 1 drains to SCM 1

[49] Hint: Tc<2dt may require smaller dt

Runoff = 1.42 cfs @ 12.10 hrs, Volume= 0.743 af, Depth> 5.63"
 Routed to Pond 2P : SCM 1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-55.00 hrs, dt= 0.05 hrs
 CA 24-hr 1 25yr, 24 hr Rainfall=6.02"

Area (ac)	CN	Description
1.492	98	Paved parking, HSG D
0.090	76	Woods/grass comb., Fair, HSG C
1.582	97	Weighted Average
0.090		5.69% Pervious Area
1.492		94.31% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.9	300	0.0090	1.27		Sheet Flow, DMA 1 Depot Sheet Flow Smooth surfaces n= 0.011 P2= 3.35"

Subcatchment 1S: DMA 1

Hydrograph

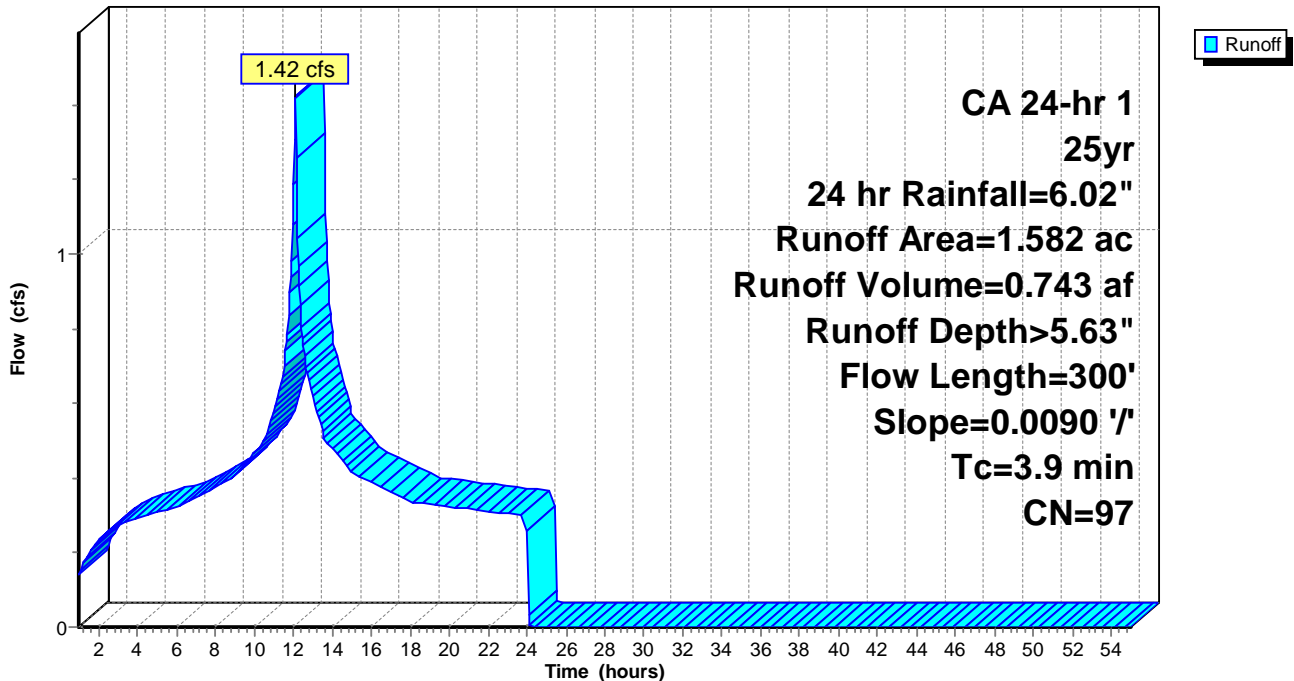


EXHIBIT "D" (SWCP)

Summary for Subcatchment 3S: DMA 2

DMA 2 Drains to SCM Bioinfiltration Facility #2

[49] Hint: Tc<2dt may require smaller dt

Runoff = 0.62 cfs @ 12.07 hrs, Volume= 0.322 af, Depth> 5.73"
 Routed to Pond 4P : SCM 2

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-55.00 hrs, dt= 0.05 hrs
 CA 24-hr 1 25yr, 24 hr Rainfall=6.02"

Area (ac)	CN	Description
0.671	98	Paved parking, HSG D
0.003	72	Woods/grass comb., Good, HSG C
0.674	98	Weighted Average
0.003		0.45% Pervious Area
0.671		99.55% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.6	100	0.0100	1.07		Sheet Flow, DMA 2 Depot Sheet Flow Smooth surfaces n= 0.011 P2= 3.35"

Subcatchment 3S: DMA 2

Hydrograph

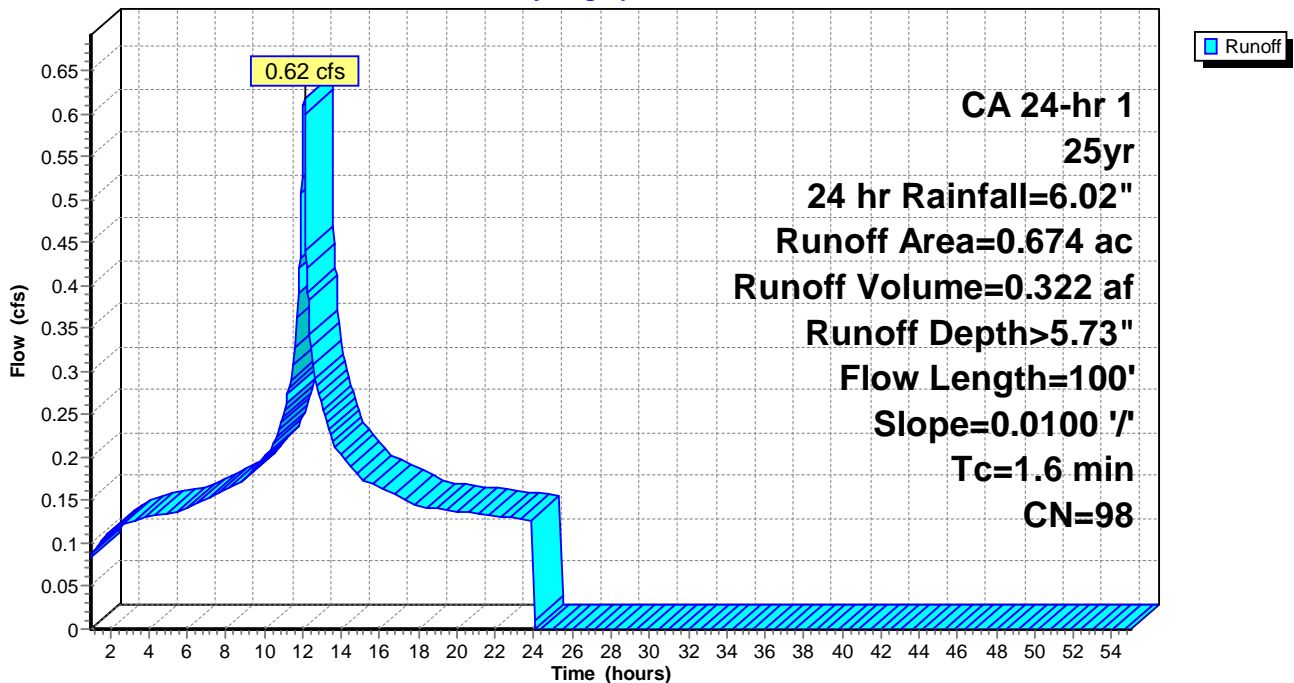


EXHIBIT "D" (SWCP)

Goleta Train Depot_PreCond

CA 24-hr 1 50yr, 24 hr Rainfall=6.76"

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Time span=1.00-55.00 hrs, dt=0.05 hrs, 1081 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: DMA 1

Runoff Area=1.582 ac 94.31% Impervious Runoff Depth>6.36"
Flow Length=300' Slope=0.0090 '/ Tc=3.9 min CN=97 Runoff=1.59 cfs 0.839 af

Subcatchment 3S: DMA 2

Runoff Area=0.674 ac 99.55% Impervious Runoff Depth>6.45"
Flow Length=100' Slope=0.0100 '/ Tc=1.6 min CN=98 Runoff=0.69 cfs 0.362 af

Total Runoff Area = 2.256 ac Runoff Volume = 1.201 af Average Runoff Depth = 6.39"
4.12% Pervious = 0.093 ac 95.88% Impervious = 2.163 ac

EXHIBIT "D" (SWCP)

Summary for Subcatchment 1S: DMA 1

DMA 1 drains to SCM 1

[49] Hint: Tc<2dt may require smaller dt

Runoff = 1.59 cfs @ 12.10 hrs, Volume= 0.839 af, Depth> 6.36"
 Routed to Pond 2P : SCM 1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-55.00 hrs, dt= 0.05 hrs
 CA 24-hr 1 50yr, 24 hr Rainfall=6.76"

Area (ac)	CN	Description
1.492	98	Paved parking, HSG D
0.090	76	Woods/grass comb., Fair, HSG C
1.582	97	Weighted Average
0.090		5.69% Pervious Area
1.492		94.31% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.9	300	0.0090	1.27		Sheet Flow, DMA 1 Depot Sheet Flow Smooth surfaces n= 0.011 P2= 3.35"

Subcatchment 1S: DMA 1

Hydrograph

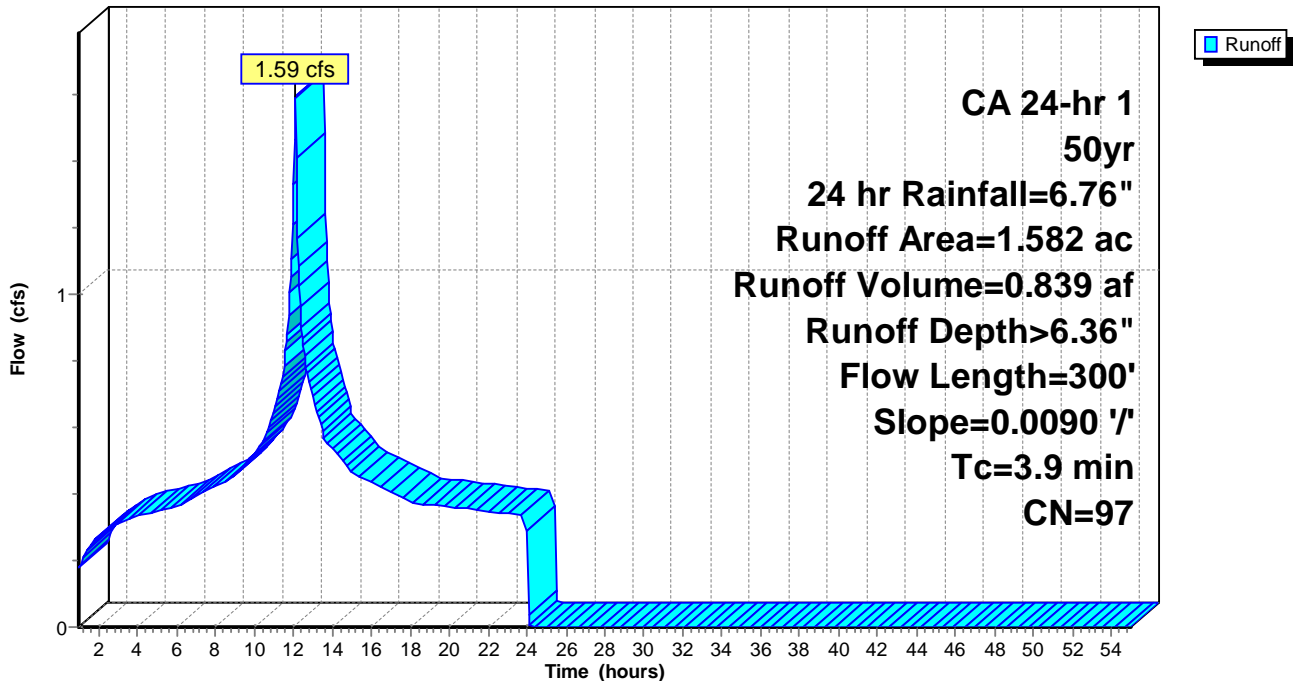


EXHIBIT "D" (SWCP)

Summary for Subcatchment 3S: DMA 2

DMA 2 Drains to SCM Bioinfiltration Facility #2

[49] Hint: Tc<2dt may require smaller dt

Runoff = 0.69 cfs @ 12.07 hrs, Volume= 0.362 af, Depth> 6.45"
 Routed to Pond 4P : SCM 2

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-55.00 hrs, dt= 0.05 hrs
 CA 24-hr 1 50yr, 24 hr Rainfall=6.76"

Area (ac)	CN	Description
0.671	98	Paved parking, HSG D
0.003	72	Woods/grass comb., Good, HSG C
0.674	98	Weighted Average
0.003		0.45% Pervious Area
0.671		99.55% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.6	100	0.0100	1.07		Sheet Flow, DMA 2 Depot Sheet Flow Smooth surfaces n= 0.011 P2= 3.35"

Subcatchment 3S: DMA 2

Hydrograph

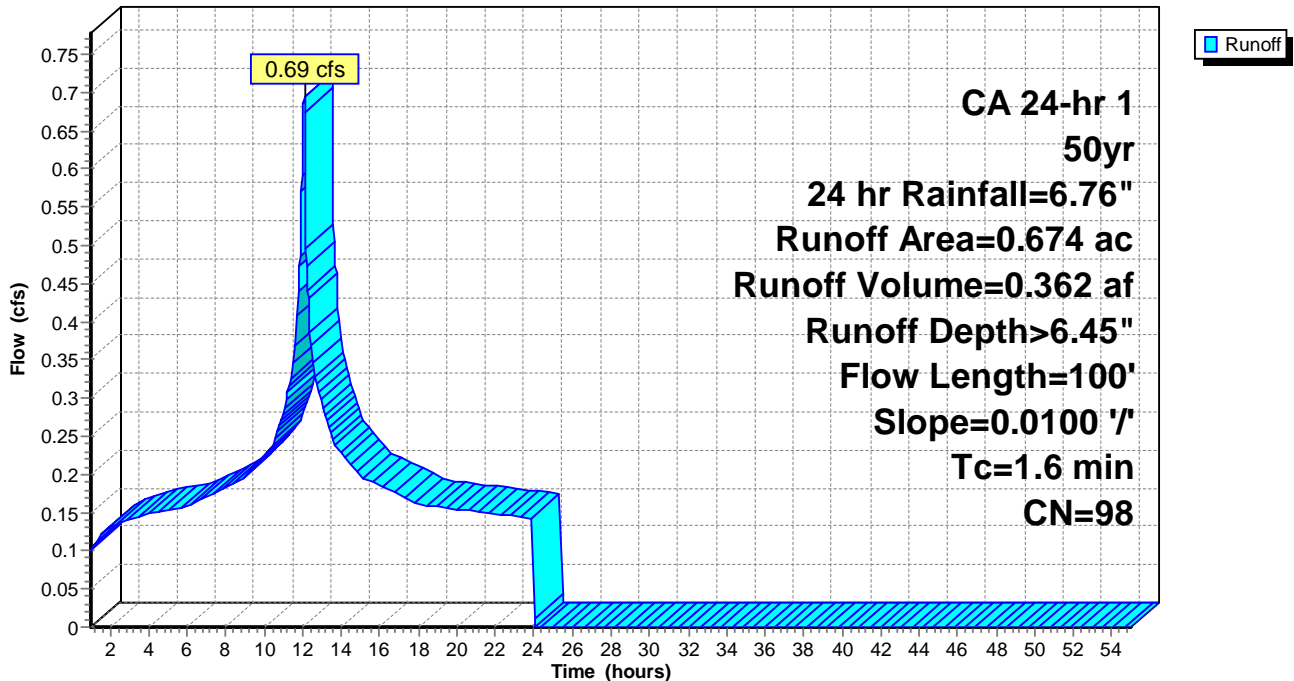


EXHIBIT "D" (SWCP)

Goleta Train Depot_PreCond

CA 24-hr 1 100yr, 24 hr Rainfall=7.49"

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Time span=1.00-55.00 hrs, dt=0.05 hrs, 1081 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: DMA 1

Runoff Area=1.582 ac 94.31% Impervious Runoff Depth>7.08"
Flow Length=300' Slope=0.0090 '/ Tc=3.9 min CN=97 Runoff=1.77 cfs 0.933 af

Subcatchment 3S: DMA 2

Runoff Area=0.674 ac 99.55% Impervious Runoff Depth>7.16"
Flow Length=100' Slope=0.0100 '/ Tc=1.6 min CN=98 Runoff=0.77 cfs 0.402 af

Total Runoff Area = 2.256 ac Runoff Volume = 1.336 af Average Runoff Depth = 7.11"
4.12% Pervious = 0.093 ac 95.88% Impervious = 2.163 ac

EXHIBIT "D" (SWCP)

Summary for Subcatchment 1S: DMA 1

DMA 1 drains to SCM 1

[49] Hint: Tc<2dt may require smaller dt

Runoff = 1.77 cfs @ 12.10 hrs, Volume= 0.933 af, Depth> 7.08"
 Routed to Pond 2P : SCM 1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-55.00 hrs, dt= 0.05 hrs
 CA 24-hr 1 100yr, 24 hr Rainfall=7.49"

Area (ac)	CN	Description
1.492	98	Paved parking, HSG D
0.090	76	Woods/grass comb., Fair, HSG C
1.582	97	Weighted Average
0.090		5.69% Pervious Area
1.492		94.31% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.9	300	0.0090	1.27		Sheet Flow, DMA 1 Depot Sheet Flow Smooth surfaces n= 0.011 P2= 3.35"

Subcatchment 1S: DMA 1

Hydrograph

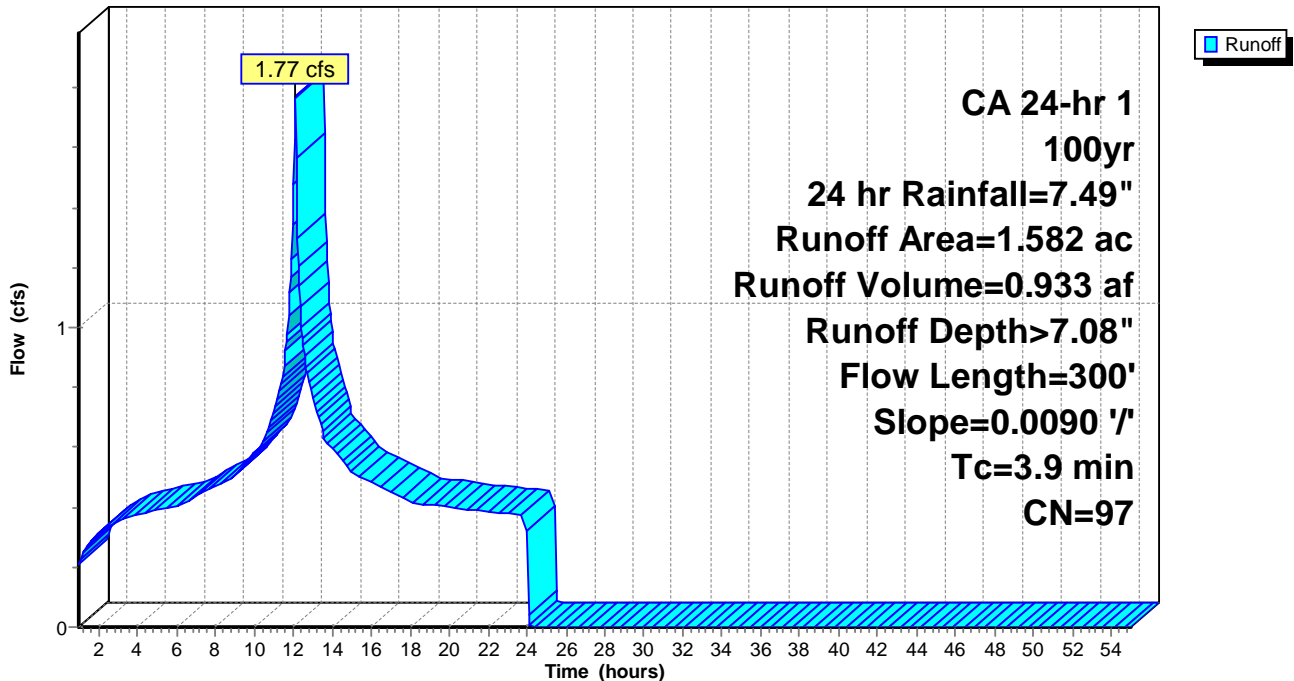


EXHIBIT "D" (SWCP)

Summary for Subcatchment 3S: DMA 2

DMA 2 Drains to SCM Bioinfiltration Facility #2

[49] Hint: Tc<2dt may require smaller dt

Runoff = 0.77 cfs @ 12.07 hrs, Volume= 0.402 af, Depth> 7.16"
 Routed to Pond 4P : SCM 2

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-55.00 hrs, dt= 0.05 hrs
 CA 24-hr 1 100yr, 24 hr Rainfall=7.49"

Area (ac)	CN	Description
0.671	98	Paved parking, HSG D
0.003	72	Woods/grass comb., Good, HSG C
0.674	98	Weighted Average
0.003		0.45% Pervious Area
0.671		99.55% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.6	100	0.0100	1.07		Sheet Flow, DMA 2 Depot Sheet Flow Smooth surfaces n= 0.011 P2= 3.35"

Subcatchment 3S: DMA 2

Hydrograph

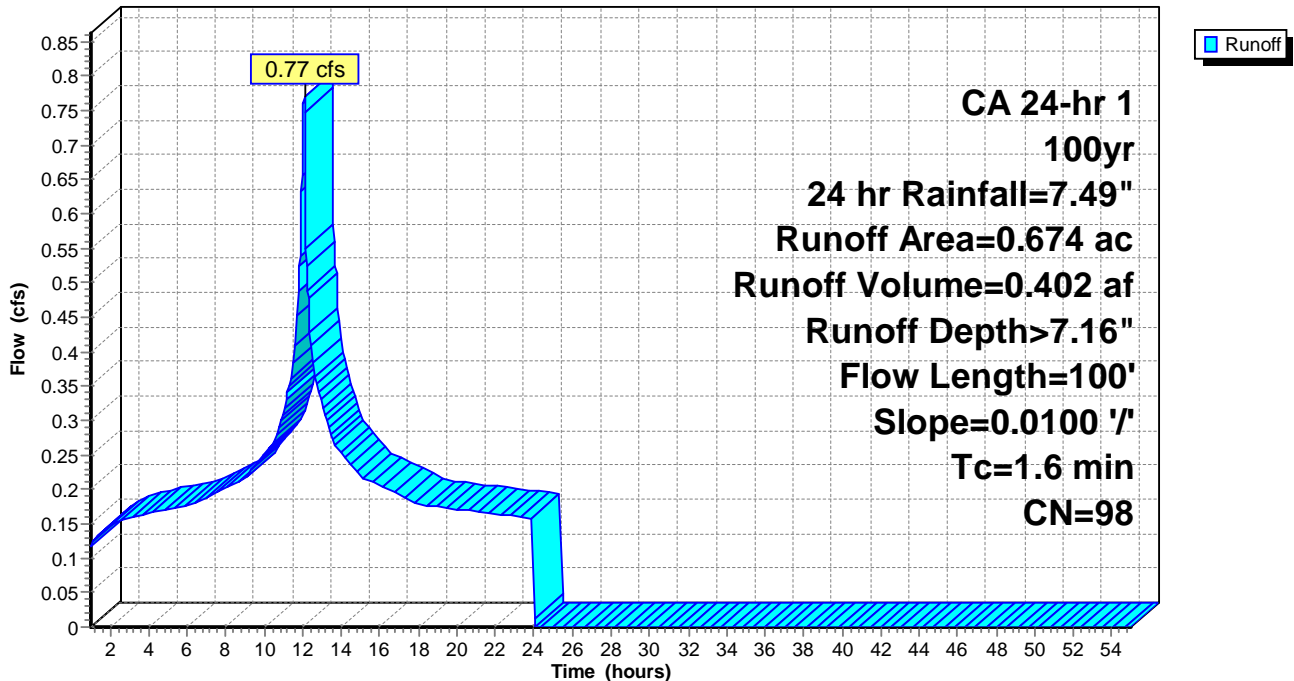


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Rainfall Events Listing

Event#	Event Name	Storm Type	Curve	Mode	Duration (hours)	B/B	Depth (inches)	AMC
1	2yr, 24hr	CA 24-hr	1	Default	24.00	1	3.35	2
2	5yr, 24 hr	CA 24-hr	1	Default	24.00	1	4.29	2
3	10yr, 24 hr	CA 24-hr	1	Default	24.00	1	5.04	2
4	25yr, 24 hr	CA 24-hr	1	Default	24.00	1	6.02	2
5	50yr, 24 hr	CA 24-hr	1	Default	24.00	1	6.76	2
6	100yr, 24 hr	CA 24-hr	1	Default	24.00	1	7.49	2

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Area Listing (selected nodes)

Area (acres)	CN	Description (subcatchment-numbers)
1.909	98	Paved parking, HSG D (1S, 3S)
0.237	76	Woods/grass comb., Fair, HSG C (1S)
0.111	72	Woods/grass comb., Good, HSG C (3S)
2.257	94	TOTAL AREA

EXHIBIT "D" (SWCP)

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Soil Listing (selected nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.000	HSG A	
0.000	HSG B	
0.348	HSG C	1S, 3S
1.909	HSG D	1S, 3S
0.000	Other	
2.257		TOTAL AREA

EXHIBIT "D" (SWCP)

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Ground Covers (selected nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.000	0.000	0.000	1.909	0.000	1.909	Paved parking	1S, 3S
0.000	0.000	0.237	0.000	0.000	0.237	Woods/grass comb., Fair	1S
0.000	0.000	0.111	0.000	0.000	0.111	Woods/grass comb., Good	3S
0.000	0.000	0.348	1.909	0.000	2.257	TOTAL AREA	

EXHIBIT "D" (SWCP)

Goleta Train Depot_PostCond

CA 24-hr 1 2yr, 24hr Rainfall=3.35"

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Time span=1.00-55.00 hrs, dt=0.05 hrs, 1081 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: DMA 1

Runoff Area=1.582 ac 85.02% Impervious Runoff Depth>2.79"
Flow Length=300' Slope=0.0090 '/ Tc=3.9 min CN=95 Runoff=0.75 cfs 0.368 af

Subcatchment 3S: DMA 2

Runoff Area=0.675 ac 83.56% Impervious Runoff Depth=2.69"
Flow Length=100' Slope=0.0100 '/ Tc=1.6 min CN=94 Runoff=0.32 cfs 0.151 af

Total Runoff Area = 2.257 ac Runoff Volume = 0.519 af Average Runoff Depth = 2.76"
15.42% Pervious = 0.348 ac 84.58% Impervious = 1.909 ac

EXHIBIT "D" (SWCP)

Summary for Subcatchment 1S: DMA 1

DMA 1 drains to SCM 1

[49] Hint: Tc<2dt may require smaller dt

Runoff = 0.75 cfs @ 12.10 hrs, Volume= 0.368 af, Depth> 2.79"
 Routed to Pond 2P : SCM 1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-55.00 hrs, dt= 0.05 hrs
 CA 24-hr 1 2yr, 24hr Rainfall=3.35"

Area (ac)	CN	Description
1.345	98	Paved parking, HSG D
0.237	76	Woods/grass comb., Fair, HSG C
1.582	95	Weighted Average
0.237		14.98% Pervious Area
1.345		85.02% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.9	300	0.0090	1.27		Sheet Flow, DMA 1 Depot Sheet Flow Smooth surfaces n= 0.011 P2= 3.35"

Subcatchment 1S: DMA 1

Hydrograph

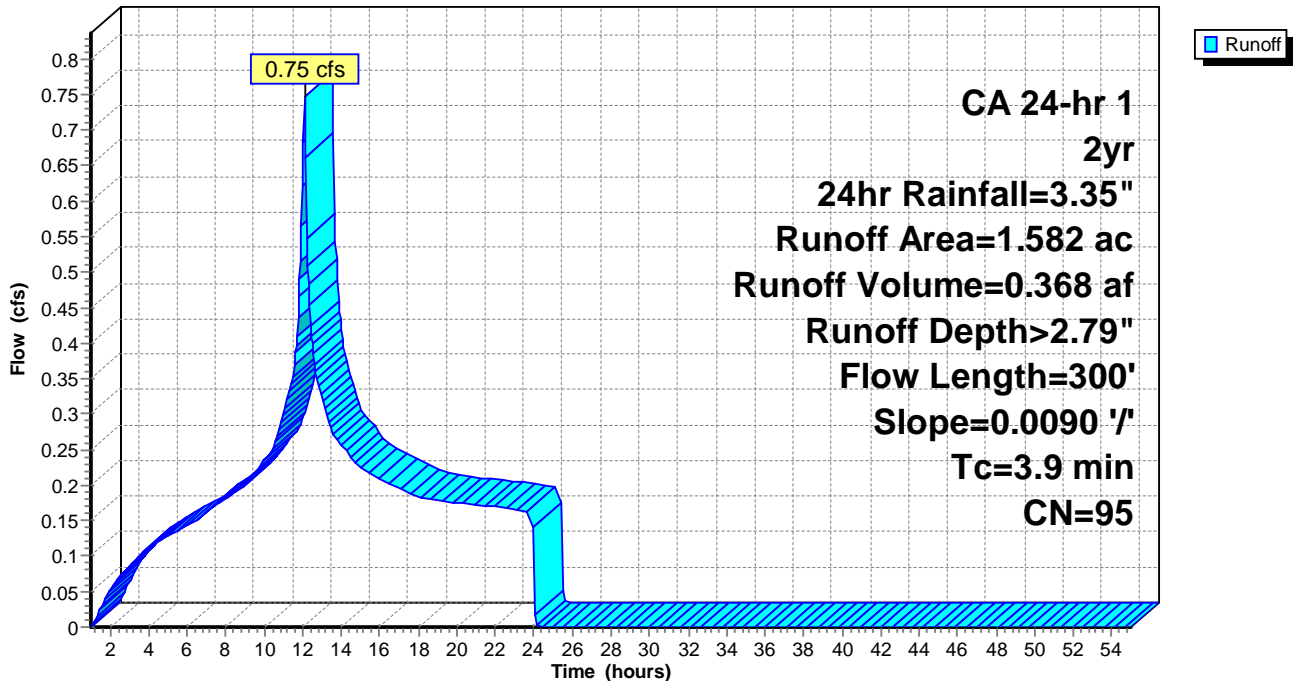


EXHIBIT "D" (SWCP)

Goleta Train Depot_PostCond

CA 24-hr 1 2yr, 24hr Rainfall=3.35"

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Summary for Subcatchment 3S: DMA 2

DMA 2 Drains to SCM Bioinfiltration Facility #2

[49] Hint: Tc<2dt may require smaller dt

Runoff = 0.32 cfs @ 12.07 hrs, Volume= 0.151 af, Depth= 2.69"
 Routed to Pond 4P : SCM 2

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-55.00 hrs, dt= 0.05 hrs
 CA 24-hr 1 2yr, 24hr Rainfall=3.35"

Area (ac)	CN	Description
0.564	98	Paved parking, HSG D
0.111	72	Woods/grass comb., Good, HSG C
0.675	94	Weighted Average
0.111		16.44% Pervious Area
0.564		83.56% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.6	100	0.0100	1.07		Sheet Flow, DMA 2 Depot Sheet Flow Smooth surfaces n= 0.011 P2= 3.35"

Subcatchment 3S: DMA 2

Hydrograph

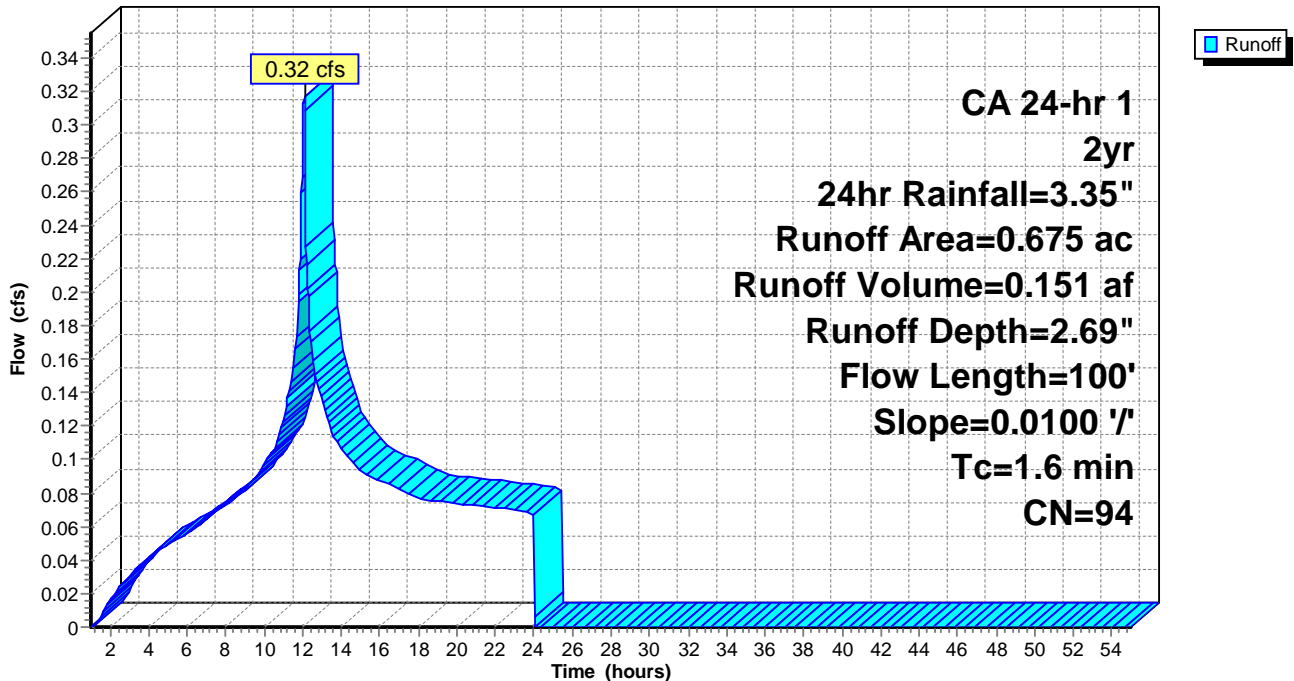


EXHIBIT "D" (SWCP)

Goleta Train Depot_PostCond

CA 24-hr 1 5yr, 24 hr Rainfall=4.29"

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Time span=1.00-55.00 hrs, dt=0.05 hrs, 1081 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: DMA 1

Runoff Area=1.582 ac 85.02% Impervious Runoff Depth>3.72"
Flow Length=300' Slope=0.0090 '/ Tc=3.9 min CN=95 Runoff=0.98 cfs 0.490 af

Subcatchment 3S: DMA 2

Runoff Area=0.675 ac 83.56% Impervious Runoff Depth>3.61"
Flow Length=100' Slope=0.0100 '/ Tc=1.6 min CN=94 Runoff=0.42 cfs 0.203 af

Total Runoff Area = 2.257 ac Runoff Volume = 0.693 af Average Runoff Depth = 3.68"
15.42% Pervious = 0.348 ac 84.58% Impervious = 1.909 ac

EXHIBIT "D" (SWCP)

Summary for Subcatchment 1S: DMA 1

DMA 1 drains to SCM 1

[49] Hint: Tc<2dt may require smaller dt

Runoff = 0.98 cfs @ 12.10 hrs, Volume= 0.490 af, Depth> 3.72"
 Routed to Pond 2P : SCM 1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-55.00 hrs, dt= 0.05 hrs
 CA 24-hr 1 5yr, 24 hr Rainfall=4.29"

Area (ac)	CN	Description
1.345	98	Paved parking, HSG D
0.237	76	Woods/grass comb., Fair, HSG C
1.582	95	Weighted Average
0.237		14.98% Pervious Area
1.345		85.02% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.9	300	0.0090	1.27		Sheet Flow, DMA 1 Depot Sheet Flow Smooth surfaces n= 0.011 P2= 3.35"

Subcatchment 1S: DMA 1

Hydrograph

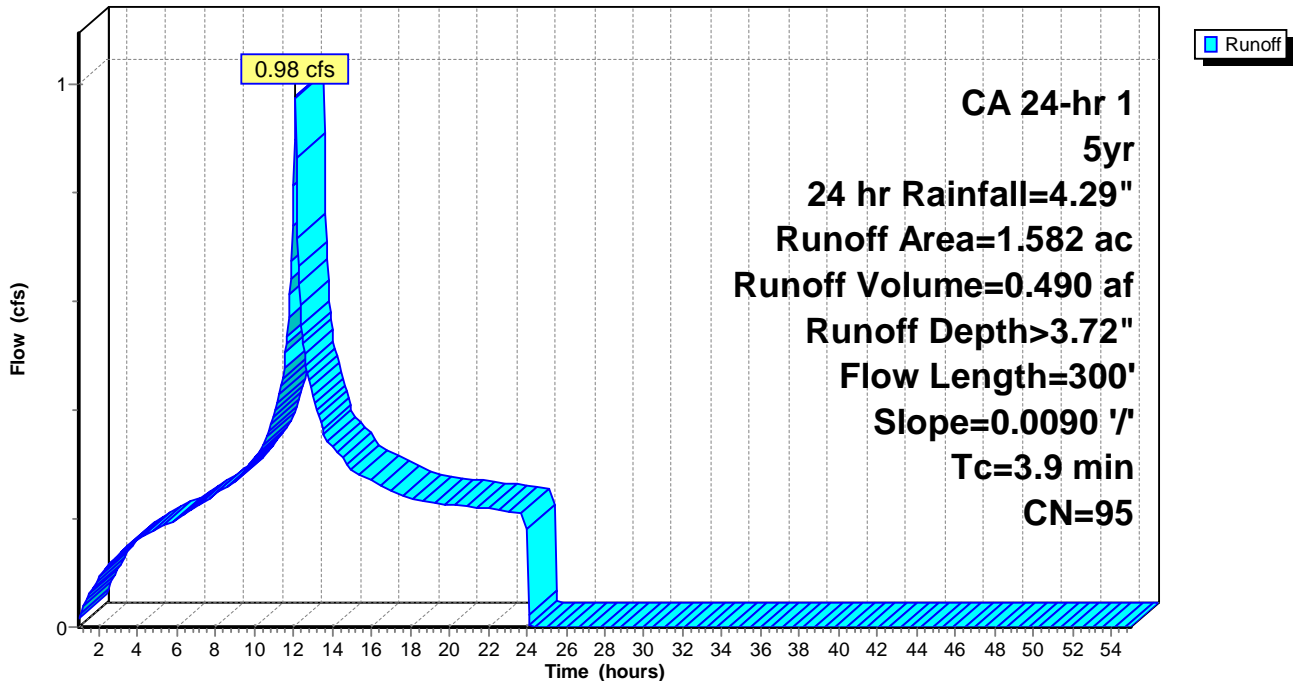


EXHIBIT "D" (SWCP)

Summary for Subcatchment 3S: DMA 2

DMA 2 Drains to SCM Bioinfiltration Facility #2

[49] Hint: Tc<2dt may require smaller dt

Runoff = 0.42 cfs @ 12.07 hrs, Volume= 0.203 af, Depth> 3.61"
 Routed to Pond 4P : SCM 2

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-55.00 hrs, dt= 0.05 hrs
 CA 24-hr 1 5yr, 24 hr Rainfall=4.29"

Area (ac)	CN	Description
0.564	98	Paved parking, HSG D
0.111	72	Woods/grass comb., Good, HSG C
0.675	94	Weighted Average
0.111		16.44% Pervious Area
0.564		83.56% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.6	100	0.0100	1.07		Sheet Flow, DMA 2 Depot Sheet Flow Smooth surfaces n= 0.011 P2= 3.35"

Subcatchment 3S: DMA 2

Hydrograph

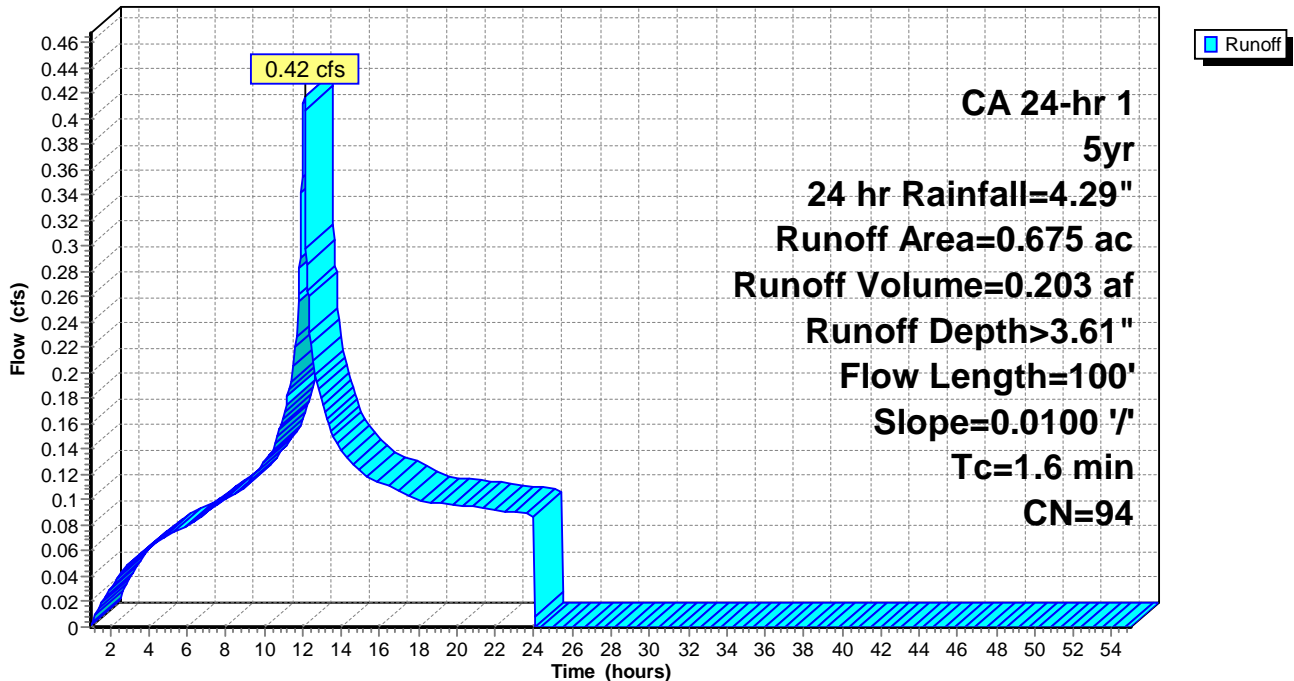


EXHIBIT "D" (SWCP)

Goleta Train Depot_PostCond

CA 24-hr 1 10yr, 24 hr Rainfall=5.04"

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Time span=1.00-55.00 hrs, dt=0.05 hrs, 1081 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: DMA 1

Runoff Area=1.582 ac 85.02% Impervious Runoff Depth>4.46"
Flow Length=300' Slope=0.0090 '/ Tc=3.9 min CN=95 Runoff=1.16 cfs 0.588 af

Subcatchment 3S: DMA 2

Runoff Area=0.675 ac 83.56% Impervious Runoff Depth>4.35"
Flow Length=100' Slope=0.0100 '/ Tc=1.6 min CN=94 Runoff=0.50 cfs 0.245 af

Total Runoff Area = 2.257 ac Runoff Volume = 0.832 af Average Runoff Depth = 4.42"
15.42% Pervious = 0.348 ac 84.58% Impervious = 1.909 ac

EXHIBIT "D" (SWCP)

Summary for Subcatchment 1S: DMA 1

DMA 1 drains to SCM 1

[49] Hint: Tc<2dt may require smaller dt

Runoff = 1.16 cfs @ 12.10 hrs, Volume= 0.588 af, Depth> 4.46"
 Routed to Pond 2P : SCM 1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-55.00 hrs, dt= 0.05 hrs
 CA 24-hr 1 10yr, 24 hr Rainfall=5.04"

Area (ac)	CN	Description
1.345	98	Paved parking, HSG D
0.237	76	Woods/grass comb., Fair, HSG C
1.582	95	Weighted Average
0.237		14.98% Pervious Area
1.345		85.02% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.9	300	0.0090	1.27		Sheet Flow, DMA 1 Depot Sheet Flow Smooth surfaces n= 0.011 P2= 3.35"

Subcatchment 1S: DMA 1

Hydrograph

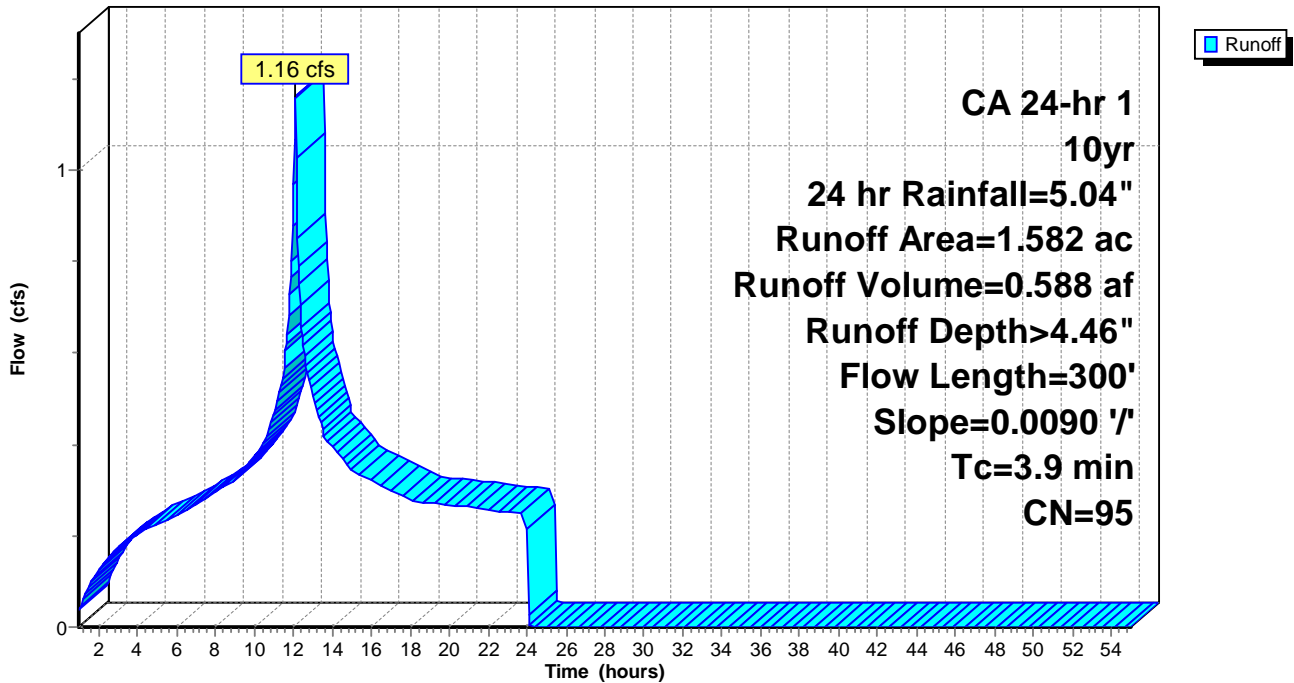


EXHIBIT "D" (SWCP)

Summary for Subcatchment 3S: DMA 2

DMA 2 Drains to SCM Bioinfiltration Facility #2

[49] Hint: Tc<2dt may require smaller dt

Runoff = 0.50 cfs @ 12.07 hrs, Volume= 0.245 af, Depth> 4.35"
 Routed to Pond 4P : SCM 2

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-55.00 hrs, dt= 0.05 hrs
 CA 24-hr 1 10yr, 24 hr Rainfall=5.04"

Area (ac)	CN	Description
0.564	98	Paved parking, HSG D
0.111	72	Woods/grass comb., Good, HSG C
0.675	94	Weighted Average
0.111		16.44% Pervious Area
0.564		83.56% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.6	100	0.0100	1.07		Sheet Flow, DMA 2 Depot Sheet Flow Smooth surfaces n= 0.011 P2= 3.35"

Subcatchment 3S: DMA 2

Hydrograph

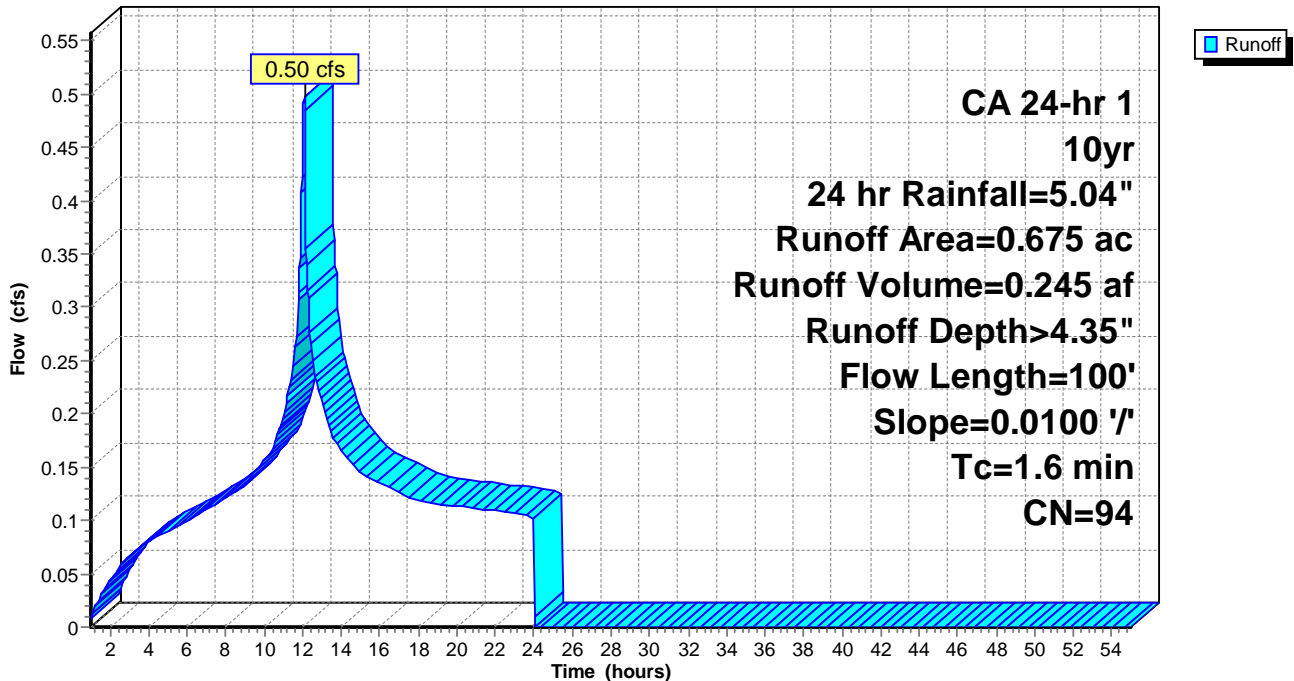


EXHIBIT "D" (SWCP)

Goleta Train Depot_PostCond

CA 24-hr 1 25yr, 24 hr Rainfall=6.02"

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Time span=1.00-55.00 hrs, dt=0.05 hrs, 1081 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: DMA 1

Runoff Area=1.582 ac 85.02% Impervious Runoff Depth>5.42"
Flow Length=300' Slope=0.0090 '/ Tc=3.9 min CN=95 Runoff=1.40 cfs 0.715 af

Subcatchment 3S: DMA 2

Runoff Area=0.675 ac 83.56% Impervious Runoff Depth>5.31"
Flow Length=100' Slope=0.0100 '/ Tc=1.6 min CN=94 Runoff=0.60 cfs 0.299 af

Total Runoff Area = 2.257 ac Runoff Volume = 1.014 af Average Runoff Depth = 5.39"
15.42% Pervious = 0.348 ac 84.58% Impervious = 1.909 ac

EXHIBIT "D" (SWCP)

Summary for Subcatchment 1S: DMA 1

DMA 1 drains to SCM 1

[49] Hint: Tc<2dt may require smaller dt

Runoff = 1.40 cfs @ 12.10 hrs, Volume= 0.715 af, Depth> 5.42"
 Routed to Pond 2P : SCM 1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-55.00 hrs, dt= 0.05 hrs
 CA 24-hr 1 25yr, 24 hr Rainfall=6.02"

Area (ac)	CN	Description
1.345	98	Paved parking, HSG D
0.237	76	Woods/grass comb., Fair, HSG C
1.582	95	Weighted Average
0.237		14.98% Pervious Area
1.345		85.02% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.9	300	0.0090	1.27		Sheet Flow, DMA 1 Depot Sheet Flow Smooth surfaces n= 0.011 P2= 3.35"

Subcatchment 1S: DMA 1

Hydrograph

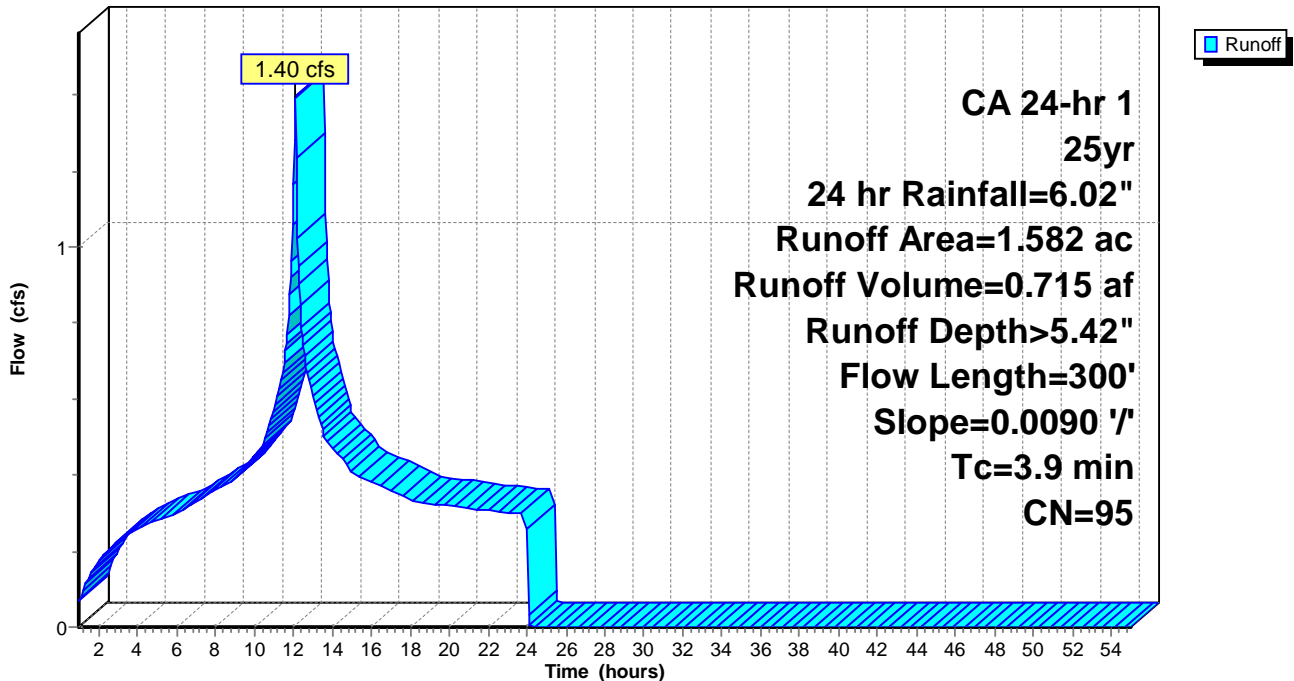


EXHIBIT "D" (SWCP)

Summary for Subcatchment 3S: DMA 2

DMA 2 Drains to SCM Bioinfiltration Facility #2

[49] Hint: Tc<2dt may require smaller dt

Runoff = 0.60 cfs @ 12.07 hrs, Volume= 0.299 af, Depth> 5.31"
 Routed to Pond 4P : SCM 2

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-55.00 hrs, dt= 0.05 hrs
 CA 24-hr 1 25yr, 24 hr Rainfall=6.02"

Area (ac)	CN	Description
0.564	98	Paved parking, HSG D
0.111	72	Woods/grass comb., Good, HSG C
0.675	94	Weighted Average
0.111		16.44% Pervious Area
0.564		83.56% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.6	100	0.0100	1.07		Sheet Flow, DMA 2 Depot Sheet Flow Smooth surfaces n= 0.011 P2= 3.35"

Subcatchment 3S: DMA 2

Hydrograph

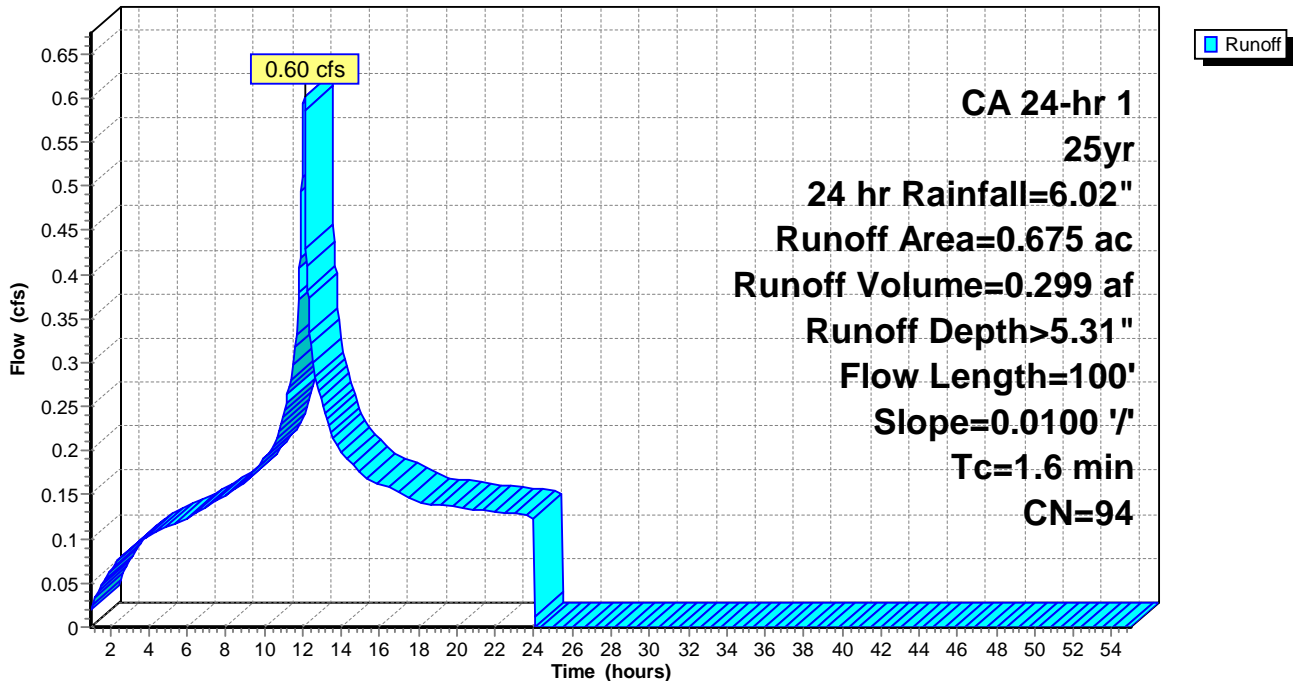


EXHIBIT "D" (SWCP)

Goleta Train Depot_PostCond

CA 24-hr 1 50yr, 24 hr Rainfall=6.76"

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Time span=1.00-55.00 hrs, dt=0.05 hrs, 1081 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: DMA 1

Runoff Area=1.582 ac 85.02% Impervious Runoff Depth>6.15"
Flow Length=300' Slope=0.0090 '/ Tc=3.9 min CN=95 Runoff=1.58 cfs 0.811 af

Subcatchment 3S: DMA 2

Runoff Area=0.675 ac 83.56% Impervious Runoff Depth>6.04"
Flow Length=100' Slope=0.0100 '/ Tc=1.6 min CN=94 Runoff=0.68 cfs 0.340 af

Total Runoff Area = 2.257 ac Runoff Volume = 1.151 af Average Runoff Depth = 6.12"
15.42% Pervious = 0.348 ac 84.58% Impervious = 1.909 ac

EXHIBIT "D" (SWCP)

Summary for Subcatchment 1S: DMA 1

DMA 1 drains to SCM 1

[49] Hint: Tc<2dt may require smaller dt

Runoff = 1.58 cfs @ 12.10 hrs, Volume= 0.811 af, Depth> 6.15"
 Routed to Pond 2P : SCM 1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-55.00 hrs, dt= 0.05 hrs
 CA 24-hr 1 50yr, 24 hr Rainfall=6.76"

Area (ac)	CN	Description
1.345	98	Paved parking, HSG D
0.237	76	Woods/grass comb., Fair, HSG C
1.582	95	Weighted Average
0.237		14.98% Pervious Area
1.345		85.02% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.9	300	0.0090	1.27		Sheet Flow, DMA 1 Depot Sheet Flow Smooth surfaces n= 0.011 P2= 3.35"

Subcatchment 1S: DMA 1

Hydrograph

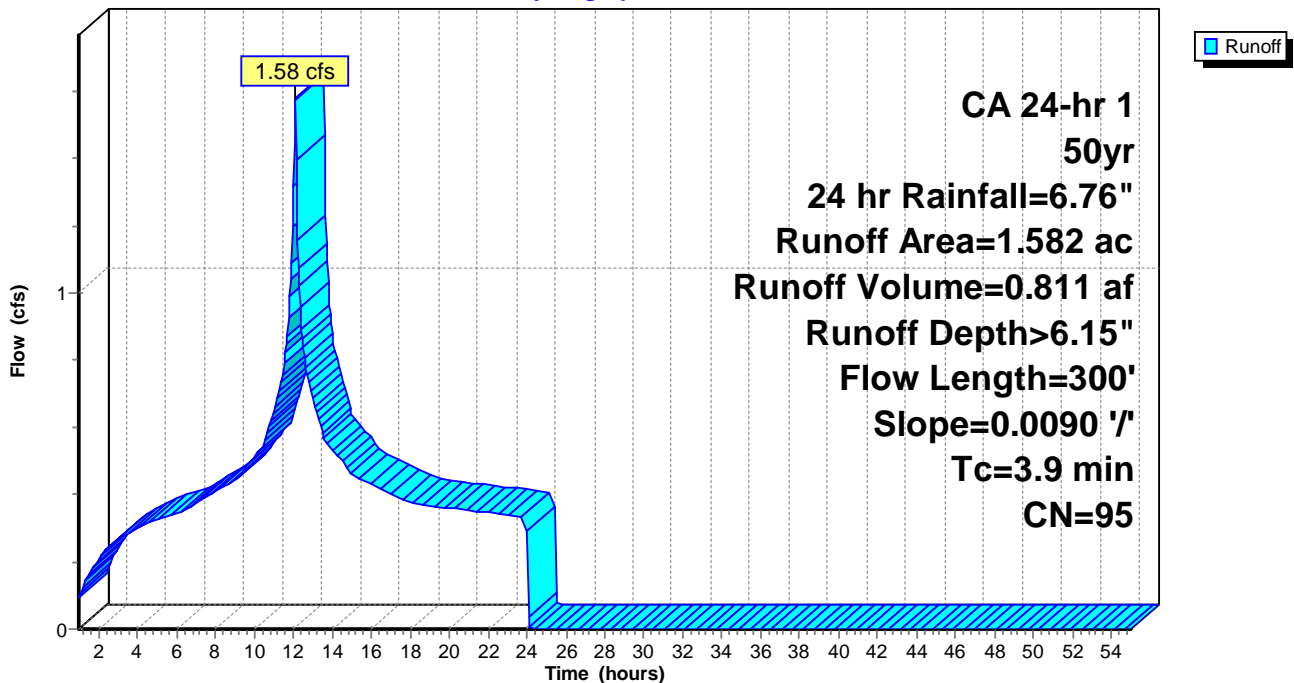


EXHIBIT "D" (SWCP)

Summary for Subcatchment 3S: DMA 2

DMA 2 Drains to SCM Bioinfiltration Facility #2

[49] Hint: Tc<2dt may require smaller dt

Runoff = 0.68 cfs @ 12.07 hrs, Volume= 0.340 af, Depth> 6.04"
 Routed to Pond 4P : SCM 2

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-55.00 hrs, dt= 0.05 hrs
 CA 24-hr 1 50yr, 24 hr Rainfall=6.76"

Area (ac)	CN	Description
0.564	98	Paved parking, HSG D
0.111	72	Woods/grass comb., Good, HSG C
0.675	94	Weighted Average
0.111		16.44% Pervious Area
0.564		83.56% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.6	100	0.0100	1.07		Sheet Flow, DMA 2 Depot Sheet Flow Smooth surfaces n= 0.011 P2= 3.35"

Subcatchment 3S: DMA 2

Hydrograph

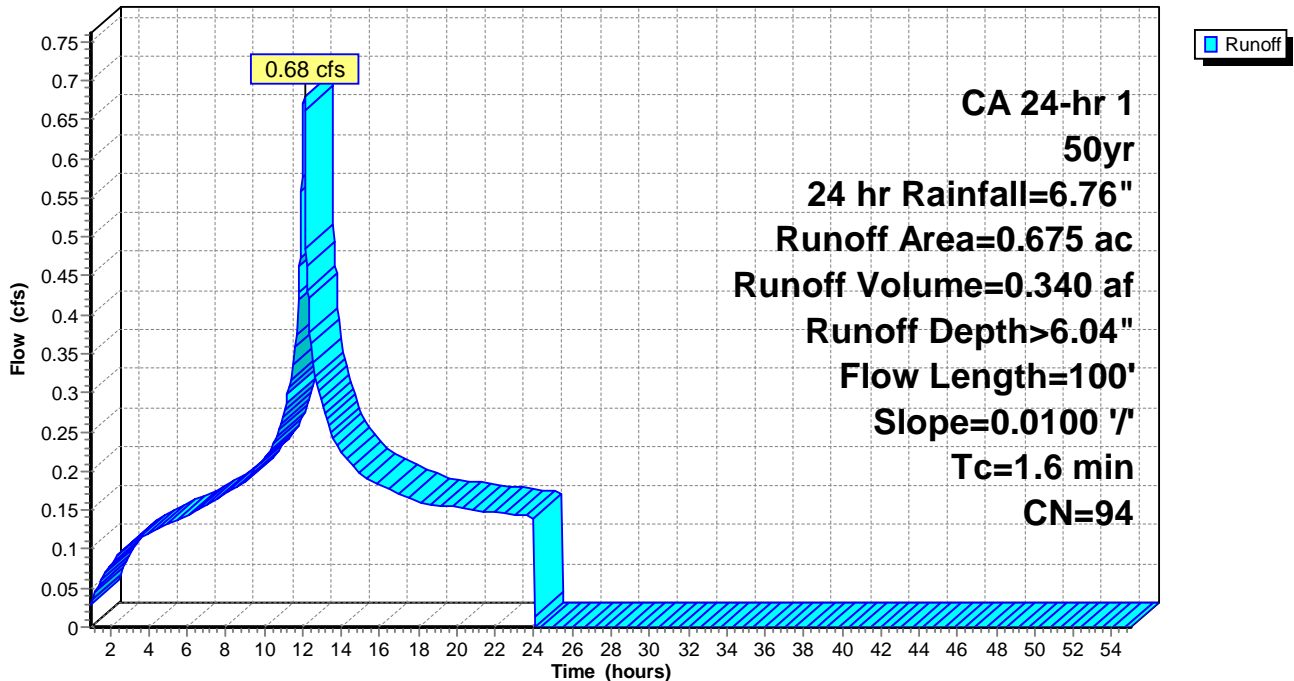


EXHIBIT "D" (SWCP)

Goleta Train Depot_PostCond

CA 24-hr 1 100yr, 24 hr Rainfall=7.49"

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Time span=1.00-55.00 hrs, dt=0.05 hrs, 1081 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: DMA 1

Runoff Area=1.582 ac 85.02% Impervious Runoff Depth>6.87"
Flow Length=300' Slope=0.0090 '/ Tc=3.9 min CN=95 Runoff=1.75 cfs 0.906 af

Subcatchment 3S: DMA 2

Runoff Area=0.675 ac 83.56% Impervious Runoff Depth>6.76"
Flow Length=100' Slope=0.0100 '/ Tc=1.6 min CN=94 Runoff=0.76 cfs 0.380 af

Total Runoff Area = 2.257 ac Runoff Volume = 1.287 af Average Runoff Depth = 6.84"
15.42% Pervious = 0.348 ac 84.58% Impervious = 1.909 ac

EXHIBIT "D" (SWCP)

Summary for Subcatchment 1S: DMA 1

DMA 1 drains to SCM 1

[49] Hint: Tc<2dt may require smaller dt

Runoff = 1.75 cfs @ 12.10 hrs, Volume= 0.906 af, Depth> 6.87"
 Routed to Pond 2P : SCM 1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-55.00 hrs, dt= 0.05 hrs
 CA 24-hr 1 100yr, 24 hr Rainfall=7.49"

Area (ac)	CN	Description
1.345	98	Paved parking, HSG D
0.237	76	Woods/grass comb., Fair, HSG C
1.582	95	Weighted Average
0.237		14.98% Pervious Area
1.345		85.02% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.9	300	0.0090	1.27		Sheet Flow, DMA 1 Depot Sheet Flow Smooth surfaces n= 0.011 P2= 3.35"

Subcatchment 1S: DMA 1

Hydrograph

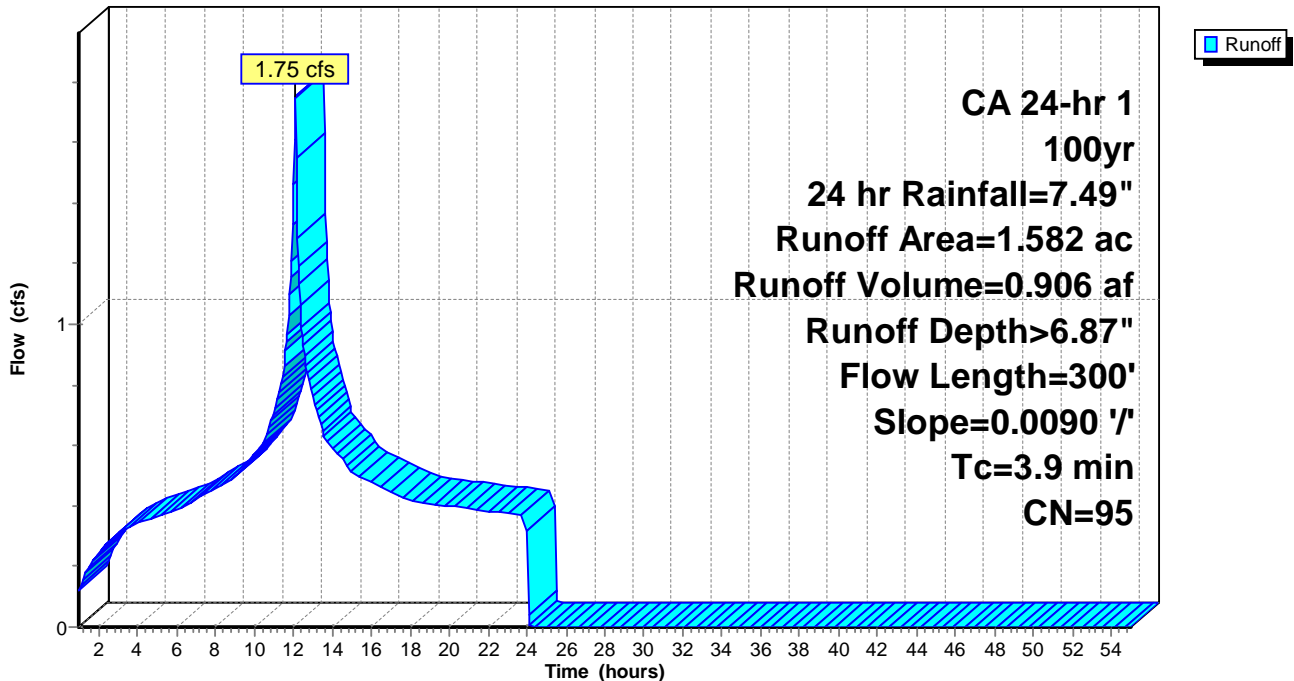


EXHIBIT "D" (SWCP)

Summary for Subcatchment 3S: DMA 2

DMA 2 Drains to SCM Bioinfiltration Facility #2

[49] Hint: Tc<2dt may require smaller dt

Runoff = 0.76 cfs @ 12.07 hrs, Volume= 0.380 af, Depth> 6.76"
 Routed to Pond 4P : SCM 2

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-55.00 hrs, dt= 0.05 hrs
 CA 24-hr 1 100yr, 24 hr Rainfall=7.49"

Area (ac)	CN	Description
0.564	98	Paved parking, HSG D
0.111	72	Woods/grass comb., Good, HSG C
0.675	94	Weighted Average
0.111		16.44% Pervious Area
0.564		83.56% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.6	100	0.0100	1.07		Sheet Flow, DMA 2 Depot Sheet Flow Smooth surfaces n= 0.011 P2= 3.35"

Subcatchment 3S: DMA 2

Hydrograph

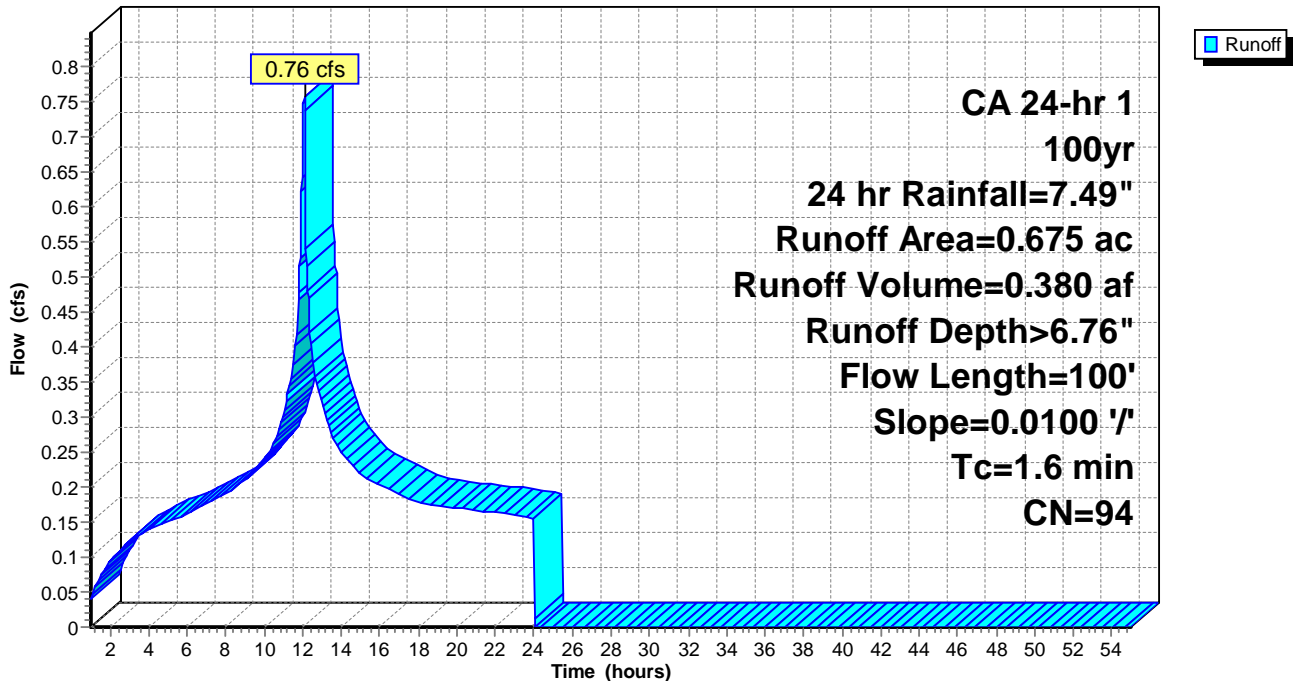


EXHIBIT "D" (SWCP)

Appendix D. Stormwater Pollutant Sources/Source Controls Checklist

How to use this worksheet (also see instructions on page 3-6 of the *Stormwater Technical Guide*):

1. Review Column 1 and identify which of these potential sources of stormwater pollutants apply to your site. Check each box that applies.
2. Review Column 2 and incorporate all of the corresponding applicable BMPs in your Stormwater Control Plan drawings.
3. Review Columns 3 and 4 and incorporate all of the corresponding applicable permanent controls and operational BMPs in a table in your Stormwater Control Plan. Use the format shown in Table 3-1 on page 3-6 of the *Stormwater Technical Guide*. Describe your specific BMPs in an accompanying narrative and explain any special conditions or situations that required omitting BMPs or substituting alternative BMPs for those shown here.

IF THESE SOURCES WILL BE ON THE PROJECT SITE ...	THEN YOUR STORMWATER CONTROL PLAN SHOULD INCLUDE THESE SOURCE CONTROL BMPs		
1 Potential Sources of Runoff Pollutants	2 Structural/Permanent Controls—Show on Stormwater Control Plan Drawings	3 Structural/Permanent Controls—List in Stormwater Control Plan Table and Narrative	4 BMPs—Include in Stormwater Control Plan Table and Narrative
<ul style="list-style-type: none"> ■ A. On-site storm drain inlets (unauthorized non-stormwater discharges and accidental spills or leaks) 	<ul style="list-style-type: none"> ■ Locations of inlets. 	<ul style="list-style-type: none"> ■ Mark all inlets with the words “No Dumping! Flows to Bay” or similar. 	<ul style="list-style-type: none"> ■ Maintain and periodically repaint or replace inlet markings. ■ Provide stormwater pollution prevention information to new site owners, lessees, or operators. <input type="checkbox"/> See applicable operational BMPs in Fact Sheet SC-44, “Drainage System Maintenance,” in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com ■ Include the following in lease agreements: “Tenant shall not allow anyone to discharge anything to storm drains or to store or deposit materials so as to create a potential discharge to storm drains.”

IF THESE SOURCES WILL BE ON THE PROJECT SITE ...	THEN YOUR STORMWATER CONTROL PLAN SHOULD INCLUDE THESE SOURCE CONTROL BMPs		
1 Potential Sources of Runoff Pollutants	2 Structural/Permanent Controls—Show on Stormwater Control Plan Drawings	3 Structural/Permanent Controls—List in Stormwater Control Plan Table and Narrative	4 BMPs—Include in Stormwater Control Plan Table and Narrative
<input type="checkbox"/> B. Interior floor drains and elevator shaft sump pumps		<input type="checkbox"/> State that interior floor drains and elevator shaft sump pumps will be plumbed to sanitary sewer.	<input type="checkbox"/> Inspect and maintain drains to prevent blockages and overflow.
<input type="checkbox"/> C. Interior parking garages		<input type="checkbox"/> State that parking garage floor drains will be plumbed to the sanitary sewer.	<input type="checkbox"/> Inspect and maintain drains to prevent blockages and overflow.
<input type="checkbox"/> D1. Need for future indoor & structural pest control		<input type="checkbox"/> Note building design features that discourage entry of pests.	<input type="checkbox"/> Provide Integrated Pest Management information to owners, lessees, and operators.
<input checked="" type="checkbox"/> D2. Landscape/ Outdoor Pesticide Use/Building and Grounds Maintenance	<input type="checkbox"/> Show locations of native trees or areas of shrubs and ground cover to be undisturbed and retained. <input type="checkbox"/> Show self-retaining landscape areas, if any. <input checked="" type="checkbox"/> Show stormwater treatment and retention SCMs. (See instructions in Chapter 4.)	<p>State that final landscape plans will accomplish all of the following.</p> <input type="checkbox"/> Preserve existing native trees, shrubs, and ground cover to the maximum extent possible. <input checked="" type="checkbox"/> Design landscaping to minimize irrigation and runoff, to promote surface infiltration where appropriate, and to minimize the use of fertilizers and pesticides that can contribute to stormwater pollution. <input type="checkbox"/> Where landscaped areas are used to retain or detain stormwater, specify plants that are tolerant of saturated soil conditions. Consider using pest-resistant plants, <input type="checkbox"/> especially adjacent to hardscape. To ensure successful establishment, select <input checked="" type="checkbox"/> plants appropriate to site soils, slopes, climate, sun, wind, rain, land use, air movement, ecological consistency, and plant interactions.	<input checked="" type="checkbox"/> Maintain landscaping using minimum or no pesticides. <input type="checkbox"/> See applicable operational BMPs in Fact Sheet SC41, “Building and Grounds Maintenance,” in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com <input checked="" type="checkbox"/> Provide IPM information to new owners, lessees, and operators.

IF THESE SOURCES WILL BE ON THE PROJECT SITE ...	THEN YOUR STORMWATER CONTROL PLAN SHOULD INCLUDE THESE SOURCE CONTROL BMPs		
1 Potential Sources of Runoff Pollutants	2 Structural/Permanent Controls—Show on Stormwater Control Plan Drawings	3 Structural/Permanent Controls—List in Stormwater Control Plan Table and Narrative	4 BMPs—Include in Stormwater Control Plan Table and Narrative
<input type="checkbox"/> E. Pools, spas, ponds, decorative fountains, and other water features.	<input type="checkbox"/> Show location of water feature and a sanitary sewer cleanout in an accessible area within 10 feet.	If the local municipality requires pools to be plumbed to the sanitary sewer, place a note on the plans and state in the narrative that this connection will be made according to local requirements.	<input type="checkbox"/> See applicable operational BMPs in Fact Sheet SC-72, “Fountain and Pool Maintenance,” in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com
<input checked="" type="checkbox"/> F. Food service	<input checked="" type="checkbox"/> For restaurants, grocery stores, and other food service operations, show location (indoors or in a covered area outdoors) of a floor sink or other area for cleaning floor mats, containers, and equipment. <input type="checkbox"/> On the drawing, show a note that this drain will be connected to a grease interceptor before discharging to the sanitary sewer.	<input type="checkbox"/> Describe the location and features of the designated cleaning area. <input type="checkbox"/> Describe the items to be cleaned in this facility and how it has been sized to ensure that the largest items can be accommodated.	
<input checked="" type="checkbox"/> G. Refuse areas	<input type="checkbox"/> Show where site refuse and recycled materials will be handled and stored for pickup. See local municipal requirements for sizes and other details of refuse areas. <input type="checkbox"/> If dumpsters or other receptacles are outdoors, show how the designated area will be covered, graded, and paved to prevent run-on and show locations of berms to prevent runoff from the area. <input type="checkbox"/> Any drains from dumpsters, compactors, and tallow bin areas shall be connected to a grease removal device before discharge to sanitary sewer.	<input type="checkbox"/> State how site refuse will be handled and provide supporting detail to what is shown on plans. <input checked="" type="checkbox"/> State that signs will be posted on or near dumpsters with the words “Do not dump hazardous materials here” or similar.	<input checked="" type="checkbox"/> State how the following will be implemented: Provide adequate number of receptacles. Inspect receptacles regularly; repair or replace leaky receptacles. Keep receptacles covered. Prohibit/prevent dumping of liquid or hazardous wastes. Post “no hazardous materials” signs. Inspect and pick up litter daily and clean up spills immediately. Keep spill control materials available on-site. See Fact Sheet SC-34, “Waste Handling and Disposal” in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com

IF THESE SOURCES WILL BE ON THE PROJECT SITE ...	THEN YOUR STORMWATER CONTROL PLAN SHOULD INCLUDE THESE SOURCE CONTROL BMPs		
1 Potential Sources of Runoff Pollutants	2 Structural/Permanent Controls—Show on Stormwater Control Plan Drawings	3 Structural/Permanent Controls—List in Stormwater Control Plan Table and Narrative	4 BMPs—Include in Stormwater Control Plan Table and Narrative
<input type="checkbox"/> H. Industrial processes.	<input type="checkbox"/> Show process area.	<input type="checkbox"/> If industrial processes are to be located on site, state: “All process activities to be performed indoors. No processes to drain to exterior or to storm drain system.”	<input type="checkbox"/> See Fact Sheet SC-10, “Non-Stormwater Discharges” in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com
<input type="checkbox"/> I. Outdoor storage of equipment or materials. (See rows J and K for source control measures for vehicle cleaning, repair, and maintenance.)	<input type="checkbox"/> Show any outdoor storage areas, including how materials will be covered. Show how areas will be graded and bermed to prevent run-on or run-off from area. <input type="checkbox"/> Storage of non-hazardous liquids shall be covered by a roof and/or drain to the sanitary sewer system, and be contained by berms, dikes, liners, or vaults. <input type="checkbox"/> Storage of hazardous materials and wastes must be in compliance with the local hazardous materials ordinance and a Hazardous Materials Management Plan for the site.	<input type="checkbox"/> Include a detailed description of materials to be stored, storage areas, and structural features to prevent pollutants from entering storm drains. <input type="checkbox"/> Where appropriate, reference documentation of compliance with the requirements of programs for: Hazardous Waste Generation Hazardous Materials Release Response and Inventory California Accidental Release (CalARP) Aboveground Storage Tank Uniform Fire Code Article 80 Section 103(b) & (c) 1991 Underground Storage Tank	<input type="checkbox"/> See the Fact Sheets SC-31, “Outdoor Liquid Container Storage” and SC-33, “Outdoor Storage of Raw Materials” in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com

IF THESE SOURCES WILL BE ON THE PROJECT SITE ...	THEN YOUR STORMWATER CONTROL PLAN SHOULD INCLUDE THESE SOURCE CONTROL BMPs		
1 Potential Sources of Runoff Pollutants	2 Structural/Permanent Controls—Show on Stormwater Control Plan Drawings	3 Structural/Permanent Controls—List in Stormwater Control Plan Table and Narrative	4 BMPs—Include in Stormwater Control Plan Table and Narrative
<input type="checkbox"/> J. Vehicle and Equipment Cleaning	<input type="checkbox"/> Show on drawings as appropriate: (1) Commercial/industrial facilities having vehicle/ equipment cleaning needs shall either provide a covered, bermed area for washing activities or discourage vehicle/equipment washing by removing hose bibs and installing signs prohibiting such uses. (2) Multi-dwelling complexes shall have a paved, bermed, and covered car wash area (unless car washing is prohibited on site and hoses are provided with an automatic shut-off to discourage such use). (3) Washing areas for cars, vehicles, and equipment shall be paved, designed to prevent run-on to or runoff from the area, and plumbed to drain to the sanitary sewer. (4) Commercial car wash facilities shall be designed such that no runoff from the facility is discharged to the storm drain system. Wastewater from the facility shall discharge to the sanitary sewer, or a wastewater reclamation system shall be installed.	<input type="checkbox"/> If a car wash area is not provided, describe measures taken to discourage on-site car washing and explain how these will be enforced.	Describe operational measures to implement the following (if applicable): <input type="checkbox"/> Wash water from vehicle and equipment washing operations shall not be discharged to the storm drain system. <input type="checkbox"/> Car dealerships and similar may rinse cars with water only. See Fact Sheet SC-21, “Vehicle and Equipment Cleaning,” in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com

IF THESE SOURCES WILL BE ON THE PROJECT SITE ...	THEN YOUR STORMWATER CONTROL PLAN SHOULD INCLUDE THESE SOURCE CONTROL BMPs		
1 Potential Sources of Runoff Pollutants	2 Structural/Permanent Controls—Show on Stormwater Control Plan Drawings	3 Structural/Permanent Controls—List in Stormwater Control Plan Table and Narrative	4 BMPs—Include in Stormwater Control Plan Table and Narrative
<input type="checkbox"/> K. Vehicle/Equipment Repair and Maintenance	<input type="checkbox"/> Accommodate all vehicle equipment repair and maintenance indoors. Or designate an outdoor work area and design the area to prevent run-on and runoff of stormwater. <input type="checkbox"/> Show secondary containment for exterior work areas where motor oil, brake fluid, gasoline, diesel fuel, radiator fluid, acid-containing batteries or other hazardous materials or hazardous wastes are used or stored. Drains shall not be installed within the secondary containment areas. <input type="checkbox"/> Add a note on the plans that states either (1) there are no floor drains, or (2) floor drains are connected to wastewater pretreatment systems prior to discharge to the sanitary sewer and an industrial waste discharge permit will be obtained.	<input type="checkbox"/> State that no vehicle repair or maintenance will be done outdoors, or else describe the required features of the outdoor work area. <input type="checkbox"/> State that there are no floor drains or if there are floor drains, note the agency from which an industrial waste discharge permit will be obtained and that the design meets that agency’s requirements. <input type="checkbox"/> State that there are no tanks, containers or sinks to be used for parts cleaning or rinsing or, if there are, note the agency from which an industrial waste discharge permit will be obtained and that the design meets that agency’s requirements.	In the Stormwater Control Plan, note that all of the following restrictions apply to use the site: <input type="checkbox"/> No person shall dispose of, nor permit the disposal, directly or indirectly of vehicle fluids, hazardous materials, or rinse water from parts cleaning into storm drains. <input type="checkbox"/> No vehicle fluid removal shall be performed outside a building, nor on asphalt or ground surfaces, whether inside or outside a building, except in such a manner as to ensure that any spilled fluid will be in an area of secondary containment. Leaking vehicle fluids shall be contained or drained from the vehicle immediately. <input type="checkbox"/> No person shall leave unattended drip parts or other open containers containing vehicle fluid unless such containers are in use or in an area of secondary containment.

IF THESE SOURCES WILL BE ON THE PROJECT SITE ...	THEN YOUR STORMWATER CONTROL PLAN SHOULD INCLUDE THESE SOURCE CONTROL BMPs		
1 Potential Sources of Runoff Pollutants	2 Structural/Permanent Controls—Show on Stormwater Control Plan Drawings	3 Structural/Permanent Controls—List in Stormwater Control Plan Table and Narrative	4 BMPs—Include in Stormwater Control Plan Table and Narrative
<input type="checkbox"/> L. Fuel Dispensing Areas	<input type="checkbox"/> Fueling areas shall have impermeable floors (i.e., Portland cement concrete or equivalent smooth impervious surface) that are: a) graded at the minimum slope necessary to prevent ponding; and b) separated from the rest of the site by a grade break that prevents run-on of stormwater to the maximum extent practicable. <input type="checkbox"/> Fueling areas shall be covered by a canopy that extends a minimum of ten feet in each direction from each pump. [Alternative: The fueling area must be covered and the cover’s minimum dimensions must be equal to or greater than the area within the grade break or fuel dispensing area ¹ .] The canopy [or cover] shall not drain onto the fueling area.		<input type="checkbox"/> The property owner shall dry sweep the fueling area routinely. <input type="checkbox"/> See the Business Guide Sheet, “Automotive Service—Service Stations” in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com

¹The fueling area shall be defined as the area extending a minimum of 6.5 feet from the corner of each fuel dispenser or the length at which the hose and nozzle assembly may be operated plus a minimum of one foot, whichever is greater.

IF THESE SOURCES WILL BE ON THE PROJECT SITE ...	THEN YOUR STORMWATER CONTROL PLAN SHOULD INCLUDE THESE SOURCE CONTROL BMPs		
1 Potential Sources of Runoff Pollutants	2 Structural/Permanent Controls—Show on Stormwater Control Plan Drawings	3 Structural/Permanent Controls—List in Stormwater Control Plan Table and Narrative	4 BMPs—Include in Stormwater Control Plan Table and Narrative
<input type="checkbox"/> M. Loading Docks	<input type="checkbox"/> Show a preliminary design for the loading dock area, including roofing and drainage. Loading docks shall be covered and/or graded to minimize run-on to and runoff from the loading area. Roof downspouts shall be positioned to direct stormwater away from the loading area. Water from loading dock areas shall be drained to the sanitary sewer or diverted and collected for ultimate discharge to the sanitary sewer. <input type="checkbox"/> Loading dock areas draining directly to the sanitary sewer shall be equipped with a spill control valve or equivalent device, which shall be kept closed during periods of operation. Provide a roof overhang over the loading area or install door skirts (cowling) at each bay that enclose the end of the trailer. <input type="checkbox"/>		<input type="checkbox"/> Move loaded and unloaded items indoors as soon as possible. <input type="checkbox"/> See Fact Sheet SC-30, “Outdoor Loading and Unloading,” in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com
<input type="checkbox"/> N. Fire Sprinkler Test Water		<input type="checkbox"/> Provide a means to drain fire sprinkler test water to the sanitary sewer.	<input type="checkbox"/> See the note in Fact Sheet SC-41, “Building and Grounds Maintenance,” in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com

IF THESE SOURCES WILL BE ON THE PROJECT SITE ...	THEN YOUR STORMWATER CONTROL PLAN SHOULD INCLUDE THESE SOURCE CONTROL BMPs		
1 Potential Sources of Runoff Pollutants	2 Structural/Permanent Controls—Show on Stormwater Control Plan Drawings	3 Structural/Permanent Controls—List in Stormwater Control Plan Table and Narrative	4 BMPs—Include in Stormwater Control Plan Table and Narrative
<p>O. Miscellaneous Drain or Wash Water or Other Sources</p> <ul style="list-style-type: none"> <input type="checkbox"/> Boiler drain lines <input type="checkbox"/> Condensate drain lines <input type="checkbox"/> Rooftop equipment <input type="checkbox"/> Drainage sumps <input type="checkbox"/> Roofing, gutters, and trim. <input type="checkbox"/> Other sources 		<ul style="list-style-type: none"> <input type="checkbox"/> Boiler drain lines shall be directly or indirectly connected to the sanitary sewer system and may not discharge to the storm drain system. <input type="checkbox"/> Condensate drain lines may discharge to landscaped areas if the flow is small enough that runoff will not occur. Condensate drain lines may not discharge to the storm drain system. <input type="checkbox"/> Rooftop equipment with potential to produce pollutants shall be roofed and/or have secondary containment. <input type="checkbox"/> Any drainage sumps on-site shall feature a sediment sump to reduce the quantity of sediment in pumped water. <input type="checkbox"/> Avoid roofing, gutters, and trim made of copper or other unprotected metals that may leach into runoff. <input type="checkbox"/> Include controls for other sources as specified by local reviewer. 	
<ul style="list-style-type: none"> <input checked="" type="checkbox"/> P. Plazas, sidewalks, and parking lots. 			<ul style="list-style-type: none"> <input checked="" type="checkbox"/> Sweep plazas, sidewalks, and parking lots regularly to prevent accumulation of litter and debris. Collect debris from pressure washing to prevent entry into the storm drain system. Collect wash water containing any cleaning agent or degreaser and discharge to the sanitary sewer not to a storm drain.

APPENDIX E

Bioretention Construction Inspection Checklist

EXHIBIT "D" (SWCP)

Appendix E. Bioretention Construction Inspection Checklist

Layout (to be confirmed prior to beginning excavation)

- Square footage of the facility meets or exceeds minimum shown in Stormwater Control Plan
- Site grading and grade breaks are consistent with the boundaries of the tributary Drainage Management Area(s) (DMAs) shown in the Stormwater Control Plan
- Inlet elevation of the facility is low enough to receive drainage from the entire tributary DMA
- Locations and elevations of overland flow or piping, including roof leaders, from impervious areas to the facility have been laid out and any conflicts resolved
- Rim elevation of the facility is laid out to be level all the way around, or elevations are consistent with a detailed cross-section showing location and height of interior dams
- Locations for vaults, utility boxes, and light standards have been identified so that they will not conflict with the facility
- Location for signage is identified
- Facility is protected as needed from construction-phase runoff and sediment

Excavation (to be confirmed prior to backfilling or pipe installation)

- Excavation conducted with materials and techniques to minimize compaction of soils within the facility area
- Excavation is to accurate area and depth
- Slopes or side walls protect from sloughing of native soils into the facility
- Vertical moisture barrier, if specified, has been added to protect adjacent pavement or structures.
- Native soils at bottom of excavation are ripped or loosened to promote infiltration

Overflow or Surface Connection to Storm Drainage

(to be confirmed prior to backfilling with any materials)

- Overflow is at specified elevation
- No knockouts or side inlets are in overflow riser
- Overflow location selected to minimize surface flow velocity (near, but offset from, inlet recommended)
- Grating excludes mulch and litter (beehive or atrium-style grates with ¼" openings recommended)
- Overflow is connected to storm drain via appropriately sized piping

Underground connection to storm drain/outlet orifice

(to be confirmed prior to backfilling with any materials)

- Perforated pipe underdrain (PVC SDR 35 or approved equivalent) is installed with holes facing down
- Perforated pipe is connected to storm drain at specified elevation (typ. bottom of soil elevation)
- Cleanouts are in accessible locations and connected via sweep bends
- Monitoring well, if required, is installed.
- Structures (arches or large diameter pipes) for additional surface storage are installed as shown in plans and specifications and have the specified volume

EXHIBIT "D" (SWCP)

Drain Rock/Subdrain (to be confirmed prior to installation of soil mix)

- Rock is installed as specified. Class 2 permeable, Caltrans specification 68-2.02(F)(3) recommended, or 4"-6" depth of pea gravel is installed at the top of the crushed rock layer to prevent migration of fines into gravel layer
- Rock is smoothed to a level top elevation. Depth and top elevation are as shown in plans
- Slopes or side walls protect from sloughing of native soils into the facility
- No filter fabric is placed between the subdrain and soil mix layers

Soil Mix

- Soil mix is as specified.
- Mix installed in lifts not exceeding 12"
- Mix is not compacted during installation but may be thoroughly wetted to encourage consolidation
- Mix is smoothed to a level top elevation. Depth of mix (24" min.) and top elevation are as shown in plans, accounting for depth of mulch to follow and required reservoir depth

Irrigation

- Irrigation system is installed so it can be controlled separately from other landscaped areas. Smart irrigation controllers and drip emitters are recommended
- Spray heads, if any, are positioned to avoid direct spray into outlet structures

Planting

- Plants are installed consistent with approved planting plan
- Any trees and large shrubs are staked securely
- No fertilizer is added; compost tea may be used
- No native soil or clayey material are imported into the facility with plantings
- 1"-2" mulch may be applied following planting; mulch selected to avoid floating
- Final elevation of soil mix maintained following planting
- Curb openings are free of obstructions

Final Engineering Inspection

- Drainage Management Area(s) are free of construction sediment and landscaped areas are stabilized
- Inlets are installed to ensure entry of runoff from adjoining pavement, have sufficient reveal (drop from the adjoining pavement to the top of the mulch or soil mix, and are not blocked)
- Rock or other energy dissipation at piped or surface inlets is adequate
- Inflows from roof leaders and pipes are connected and operable
- Temporary flow diversions are removed
- Overflow outlets are configured to allow the facility to flood and fill to near rim before overflow
- Plantings are healthy and becoming established
- Irrigation is operable
- Facility drains rapidly; no surface ponding is evident
- Any accumulated construction debris, trash, or sediment is removed from facility
- Permanent signage is installed and is visible to site users and maintenance personnel

EXHIBIT "D" (SWCP)

APPENDIX F

Technical Criteria for Non-LID Treatment Facilities

EXHIBIT "D" (SWCP)

Appendix C. Technical Criteria for Non-LID Treatment Facilities

Non-LID Treatment Facilities may be either tree-box-type high-flowrate biofilters or vault-based high-flowrate media filters.

General

- Design inflow rate is that generated by a continuous rainfall intensity of 0.2 inches per hour.
- Landscape and non-impervious surfaces should be made self-treating or self-retaining and not drain to treatment facilities, if feasible.
- Use the runoff factors in Table 4-1 (on p. 4-4) of the *Stormwater Technical Guide*.
- The applicant's Stormwater Control Plan (Plan) must include, as an attachment, a letter from the manufacturer stating the manufacturer has reviewed the Plan, the proposed device meets these technical criteria, and the manufacturer will provide a warranty for two years following activation of the facility.

High-Flowrate Tree-Box-Type Biofilters

- Maximum design surface loading rate of 50 inches per hour.
- Precast concrete construction.
- Inlet design to capture flows at least up to the maximum design surface loading rate and to bypass high flows.
- Minimum media depth of 1.8 feet (may be reduced, but maintaining the same media volume, if required because of inadequate head to discharge point).
- Media and facility configuration supports a healthy tree or other vegetation.

Vault-Based High-Flowrate Media Filters

- Replaceable cartridge filters.
- Maximum design filter surface loading rate (to cartridge filters) of 1 gpm/ft²
- Storage volume detains runoff and allows settling of coarse solids prior to filtration.
- Flow through the cartridge filters is controlled by an orifice or other device so that the design surface loading rate is not exceeded.

Alternatively, applicants may specify treatment systems that have received a General Use Level Designation (GULD) for Basic Treatment from the Washington State Department of Ecology based on independently verified field testing following the Technical Assessment Protocol – Ecology (TAPE). Treatment systems must be sized to treat the water quality flow rate at the design operating rate for which they received TAPE GULD certification for Basic Treatment.

Media filters and high flow rate tree well filters currently holding this certification can be found at the following link:

<http://www.ecy.wa.gov/programs/wq/stormwater/newtech/technologies.html>

EXHIBIT "D" (SWCP)

EXHIBIT E

INSURANCE REQUIREMENTS FOR AMTRAK AND UPRR

INSURANCE REQUIREMENTS

NATIONAL RAILROAD PASSENGER CORPORATION (AMTRAK)

Revised as of December 5, 2019

DEFINITIONS

In these Insurance Requirements, "Railroad" or "Amtrak" shall mean National Railroad Passenger Corporation and, as appropriate, its subsidiary, Washington Terminal Company ("WTC"). "Contractor" shall mean the party identified as "Permittee" in the Temporary Permit to Enter Upon Property or the party with whom Amtrak has contracted in another agreement (e.g., Preliminary Engineering Agreement, Design and/or Construction Phase Agreement, Force Account Agreement, License Agreement), as well as its officers, employees, agents, servants, contractors, subcontractors, or any other person acting for or by permission of Contractor. "Operations" shall mean activities of or work performed by Contractor. "Agreement" shall mean the Temporary Permit to Enter Upon Property or other such agreement, as applicable.

INSURANCE

Contractor shall procure and maintain, at its sole cost, the types of insurance specified below:

1. **Workers' Compensation Insurance** complying with the requirements of the statutes of the jurisdiction(s) in which the Operations will be performed, covering all employees of Contractor. Employer's Liability coverage shall have the following minimum limits of coverage:

\$1,000,000	Each Accident
\$1,000,000	Disease Policy Limit
\$1,000,000	Disease Each Employee

In the event the Operations are to be performed on, over, or adjacent to navigable waterways, a U.S. Longshoremen and Harbor Workers' Compensation Act Endorsement and an Outer Continental Lands Act Endorsement are required.

2. **Commercial General Liability (CGL) Insurance** covering liability of Contractor with respect to all operations to be performed and all obligations assumed by Contractor under the terms of the Agreement. Products-completed operations, independent contractors and contractual liability coverages are to be included, with the contractual exclusion related to construction/demolition activity within fifty (50) feet of the railroad deleted and with no exclusions for Explosion/Collapse/ Underground (X-C-U). Coverage shall include bodily injury (including disease or death), personal injury and property damage (including loss of use) liability.

This policy shall have the following minimum limits of coverage:

\$5,000,000	Each Occurrence
\$5,000,000	Annual Policy Aggregate
\$5,000,000	Products and Completed Operations

In addition, the following shall apply:

- A. The policy shall name National Railroad Passenger Corporation (and, as appropriate, WTC) and all commuter agencies and railroads that operate over the property or tracks at issue as additional insureds with respect to the operations to be performed.
 - B. The policy shall include an ISO endorsement Form CG 24 17 10 01 or its equivalent providing contractual liability coverage for railroads listed as additional insureds.
 - C. Coverage for such additional insureds shall be primary and non-contributory with respect to any other insurance the additional insureds may carry.
 - D. Such coverage may be provided by a combination of a primary CGL policy and a following form excess or umbrella liability policy.
3. **Automobile Liability Insurance** covering the liability of Contractor arising out of the use of any vehicles which bear, or are required to bear, license plates according to the laws of the jurisdiction in which they are to be operated, and which are not covered under Contractor's CGL insurance. The policy shall have the following minimum limits of coverage:

\$1,000,000	Each Occurrence, Combined Single Limit
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In addition, the following shall apply:

- A. The policy shall name National Railroad Passenger Corporation (and, as appropriate, WTC) and all commuter agencies and railroads that operate over the property or tracks at issue as additional insureds with respect to the operations to be performed.
 - B. Coverage shall include bodily injury (including disease or death), personal injury and property damage (including loss of use) liability and cover damages resulted from loading and unloading activities.
 - C. In the event Contractor will be transporting and/or disposing of any hazardous material or waste off of the jobsite, a MCS-90 Endorsement is to be added to this policy and the limits of liability are to be increased to \$5 million each occurrence.
4. **Railroad Protective (RRP) Liability Insurance** covering the Operations performed by Contractor within fifty (50) feet vertically or horizontally of railroad tracks. The policy shall be written on a current ISO Occurrence Form (claims-made forms are unacceptable) in the name of National Railroad Passenger Corporation (and, as appropriate WTC) and all commuter agencies and railroads that operate over the property or tracks at issue). The policy shall have the following minimum limits of coverage:

\$2,000,000	Each Occurrence
\$6,000,000	Policy Aggregate

In addition, the following shall apply:

- A. The policy shall have coverage for losses arising out of injury to or death of all persons, and for physical loss or damage to or destruction of property, including the loss of use thereof.
- B. Policy Endorsement CG 28 31 - Pollution Exclusion Amendment is required to be endorsed onto the policy.
- C. "Physical Damage to Property" as defined in the policy is to be deleted and replaced by the following endorsement:

"It is agreed that 'Physical Damage to Property' means direct and accidental loss of or damage to all property owned by any named insured and all property in any named insured's care, custody and control."

5. **All Risk Property Insurance** covering damage to or loss of all personal property of Contractor used during Operations including, but not limited to, tools, equipment, construction trailers and their contents and temporary scaffolding at the project site, whether owned, leased, rented or borrowed for the full replacement cost value. Such insurance policies shall include a waiver of subrogation and any other rights of recovery in favor of Amtrak.

6. **Contractor's Pollution Liability Insurance** covering the liability of Contractor arising out of any sudden and/or non-sudden pollution or impairment of the environment, including clean-up costs and defense, which arise from the Operations of Contractor. The policy shall have the following minimum limits of coverage:

\$2,000,000	Each Occurrence
\$2,000,000	Annual Policy Aggregate

In addition, the following shall apply:

- A. The policy shall name National Railroad Passenger Corporation (and, as appropriate, WTC) and all commuter agencies and railroads that operate over the property or tracks at issue as additional insureds.
 - B. The coverage shall be maintained during the term of the Operations and for at least two (2) years following completion thereof.
7. **Pollution Legal Liability Insurance** is required if any hazardous material or waste is to be transported or disposed of off of the jobsite. Contractor or its transporter, as well as the disposal site operator, shall maintain this insurance. The policy shall have the following minimum limits of coverage:

\$2,000,000	Each Occurrence
\$2,000,000	Annual Policy Aggregate

In addition, the following shall apply:

- A. Contractor shall designate the disposal site and provide a certificate of insurance from the disposal facility to Amtrak.
 - B. The policy shall name National Railroad Passenger Corporation (and, as appropriate, WTC) and all commuter agencies and railroads that operate over the property or tracks at issue as additional insureds.
 - C. Any additional insurance coverages, permits, licenses and other forms of documentation required by the United States Department of Transportation, the Environmental Protection Agency and/or related state and local laws, rules and regulations shall be obtained by Contractor.
8. **Professional Liability Insurance** covering the liability of Contractor for any errors or omissions committed by Contractor providing professional design or engineering services in the performance of

the Operations, regardless of the type of damages. The policy shall have the following minimum levels of coverage:

\$2,000,000	Per Claim
\$2,000,000	Annual Policy Aggregate

In addition, the following shall apply:

- A. The coverage shall be maintained during the Operations and for at least three (3) years following completion thereof.
- B. The policy shall have a retroactive date that coincides with or precedes any design work on the project.
- C. If Contractor is not performing professional design or engineering services, Contractor may elect to satisfy this requirement through the addition of endorsement CG2279 “Incidental Professional Liability” to its CGL policy.

MISCELLANEOUS

1. General

- A. All insurance shall be procured from insurers authorized to do business in the jurisdiction(s) where the Operations are to be performed.
 - B. Contractor shall require all subcontractors to carry the insurance required herein or Contractor may, at its option, provide the coverage for any or all subcontractors, provided the evidence of insurance submitted by Contractor to Amtrak so stipulates.
 - C. The insurance shall provide for thirty (30) days prior written notice to Amtrak in the event coverage is substantially changed, canceled or non-renewed.
 - D. Unless noted otherwise herein, all insurance shall remain in force until all Operations are satisfactorily completed, all Contractor personnel and equipment have been removed from Railroad property, and any work has been formally accepted.
 - E. Contractor may provide for the insurance coverages with such deductible or retained amount as Amtrak may approve from time to time, except, however, that Contractor shall, at its sole cost, pay for all claims and damages which fall within such deductible or retained amount on the same basis as if there were full commercial insurance in force.
 - F. Contractor's failure to comply with the insurance requirements set forth in these Insurance Requirements shall constitute a violation of the Agreement.
2. **Waiver of Subrogation** As to all insurance policies required herein, Contractor waives all rights of recovery, and its insurers must waive all rights of subrogation of damages against Amtrak (and, as appropriate, WTC) and their agents, officers, directors, and employees. The waiver must be stated on the certificates of insurance.
3. **Punitive Damages** Unless prohibited by law, no liability insurance policies required herein shall contain an exclusion for punitive or exemplary damages.
4. **Claims-Made Insurance** If any liability insurance specified herein shall be provided on a claims-made basis then, in addition to coverage requirements above, the following shall apply:

- A. The retroactive date shall coincide with or precede Contractor's start of Operations (including subsequent policies purchased as renewals or replacements);
- B. The policy shall allow for the reporting of circumstances or incidents that might give rise to future claims;
- C. Contractor shall maintain similar insurance under the same terms and conditions that describe each type of policy listed above (e.g., CGL, Professional Liability, Pollution Legal Liability) for at least three (3) years following completion of Operations; and
- D. If insurance is terminated for any reason, Contractor shall purchase an extended reporting provision of at least six (6) years to report claims arising from Operations.

5. **Evidence of Insurance**

- A. Contractor shall submit to Amtrak the original RRP Liability Insurance Policy and certificates of insurance evidencing the other required insurance. In addition, Contractor agrees to provide certified copies of the insurance policies for the required insurance within thirty (30) days of Amtrak's written request.
- B. Contractor shall furnish evidence of insurance as specified herein at least fifteen (15) days prior to commencing Operations. The fifteen (15) day requirement may be waived by Amtrak in situations where such waiver will benefit Amtrak, but under no circumstances will Contractor begin Operations without providing satisfactory evidence of insurance as approved by Amtrak.
- C. Prior to the cancellation, renewal, or expiration of any insurance policy specified above, Contractor shall furnish evidence of insurance replacing the cancelled or expired policies.
- D. ALL INSURANCE DOCUMENTS SHALL INCLUDE A DESCRIPTION OF THE PROJECT AND THE LOCATION ALONG THE RAILROAD RIGHT-OF-WAY (typically given by milepost designation) IN ORDER TO FACILITATE PROCESSING.
- E. Evidence of insurance coverage shall be sent to: jointprojects@amtrak.com and permit@amtrak.com.

UPRR
CONTRACTOR INSURANCE REQUIREMENTS

UPRR NSURANCE REQUIREMENTS

Contractor is required to comply with UPRR Insurance Requirements as stipulated in the Unition Pacific Public Project Manual, Section 11.

Section 11.5

Insurance Requirement for Public Projects The licensee shall, at its own sole cost and expense, procure the following kinds of insurance and promptly pay, when due, all premiums for that insurance. The following insurance shall be kept in force during the life of the applicable agreement:

- Commercial General Liability Insurance
- Business Automobile Liability Insurance
- Worker’s Compensation Insurance
- Railroad Protective Liability Insurance (RPLI; during construction or maintenance only).

The limits of coverage under each of the required insurance policies will be based on the activity and risk involved with the specific project. Specific insurance requirements will be provided to you in the agreement covering your project when it is approved by the Railroad.

Section 11.5.1

Railroad Protective Liability Insurance Railroad Protective Liability Insurance (RPLI) is for projects under \$10 million that do not exceed 12 months. When working within Railroad ROW, your company will be required to obtain RPLI for the project. For RPLI application requests, you may be asked by your insurance carrier to provide train movement information. For security and safety reasons, UP employees no longer supply train information to parties outside the Railroad. The major insurance companies are aware of this. Public information is available on the FRA Office of Safety Analysis’ Crossing Inventory Database, if needed. A Railroad Protective Liability Program is available through the national broker, MARSH. Visit the MARSH website for an application and contact information. New Highway-Rail Grade Crossing Agreements require the following:

1. New individual and residential Private Crossings and Encroachments:
 - a. General Public Liability providing \$1 million for each occurrence and general aggregate limit of \$1 million
 - b. Automobile Public Liability providing \$500,000 for each occurrence
2. Commercial and industrial crossings and Encroachments and Contractors’ Private Crossings and Encroachments:
 - a. General Public Liability providing \$5 million for each occurrence and general aggregate limit of \$10 million
 - b. Automobile Public Liability providing \$2 million for each occurrence
 - c. Worker’s Compensation covering the statutory liability determined by state law
 - d. Railroad Protective Liability providing \$2 million for each occurrence and aggregate limit of \$6 million.

Examples of the insurance required for various types of projects are found on the UP Insurance Requirements website.

EXHIBIT F

**EASEMENT AGREEMENT (AMTRAK AT LUMBERYARD)
DATED AUGUST 18, 2009**

AND

**GOLETA MOU AGREEMENT WITH AMTRAK
DATED JULY 22, 2009.**

ORIGINAL

Agreement No. 2009-067
City of Goleta, California

MEMORANDUM OF UNDERSTANDING

BETWEEN THE CITY OF GOLETA
AND
NATIONAL RAILROAD PASSENGER CORPORATION

This Memorandum of Understanding (MOU) is made and entered into this 22nd day of July, 2009, by and between the CITY OF GOLETA, a municipal corporation organized under the laws of the State of California, with an address at 130 Cremona Drive, Suite B, Goleta, CA 93117 (herein referred to as "CITY") and the National Railroad Passenger Corporation, a corporation organized under the Rail Passenger Service Act (recodified at 49 U.S.C. §24101 et seq.) and the laws of the District of Columbia, with its principal office located at 60 Massachusetts Avenue, N.E., Washington D.C. 20002 (herein referred to as "AMTRAK").

CITY and AMTRAK agree as follows:

RECITALS

WHEREAS, AMTRAK entered into an agreement with the State of California Department of Transportation (herein referred to as "CALTRANS"), dated August 18, 2005, as amended, ("State Agreement") whereby CALTRANS granted AMTRAK funds to perform capital improvements for the property located at 25 S. La Patera Lane, Goleta, CA 93117 ("Goleta Station");

WHEREAS, AMTRAK agreed to the construction of a bus turning circle, described in Exhibit A attached to this agreement (the "Project") as part of the State Agreement;

WHEREAS, AMTRAK requested that the CITY provide for a funding shortfall of \$66,000 to complete the Project;

WHEREAS, CITY desires that AMTRAK complete the Project to improve the efficiency of transportation services at, and to enhance, Goleta Station; and

WHEREAS, CITY desires to grant funding of \$66,000 to AMTRAK to complete the Project.

NOW, THEREFORE, for and in consideration of good and valuable consideration, CITY and AMTRAK agree as follows:

EXHIBIT "F" (ACCESS AGREEMENT)

AGREEMENT

1. The Work.

AMTRAK will hire a contractor to construct the Project in accordance with the applicable plans and specifications as provided under Exhibit A of the State Agreement (the "Work").

2. CITY's Obligations.

- a. CITY will pay to AMTRAK the sum of \$66,000 for the completion of the Project ("City Funding") within 10 days of receipt of a written invoice from AMTRAK.

The invoice shall be submitted to:

Community Services Department
City of Goleta
130 Cremona Drive, Suite B
Goleta, CA 93117

- b. To the maximum extent permitted by law, CITY hereby agrees to defend, indemnify and hold harmless AMTRAK from and against any claims, losses, liabilities, fines, penalties, actions, damages, costs and expenses which AMTRAK may hereafter incur or be responsible for which arise out of CITY's unreasonable delay or failure to deliver the City Funding to AMTRAK in accordance with Section 2(a) above.
- c. Except as otherwise stated herein, CITY shall have no rights with respect to the AMTRAK's management, inspection or oversight of the Work.
- d. Neither CITY nor any officer or employee thereof is responsible for any damage or liability occurring by reason of anything done or omitted to be done by AMTRAK under or in connection with any work, authority or jurisdiction delegated to AMTRAK under this MOU. It is understood and agreed that pursuant to Government Code Section 895.4, AMTRAK shall fully defend, indemnify and save harmless CITY, all officers and employees from all claims, suits or actions of every name, kind and description brought for or on account of injury (as defined by Government Code Section 810.8) occurring by reason of anything done or omitted to be done by AMTRAK under or in connection with any work, authority or jurisdiction delegated to AMTRAK under this MOU.

3. AMTRAK's Obligations.

- a. AMTRAK shall utilize the CITY Funding for the completion of the Work.

EXHIBIT "F" (ACCESS AGREEMENT)

- b. AMTRAK shall assure that all work shall be performed pursuant to any and all applicable State prevailing wages requirements.
 - c. AMTRAK shall complete the Work in a timely manner, but no later than June 30, 2010.
 - d. AMTRAK acknowledges and agrees that CITY has no obligation to maintain any portion of the Project.
 - e. If CITY requests so in writing prior to the execution of any contract for the provision of the Work, AMTRAK agrees to include a requirement that any warranties provided thereunder (including contractor, manufacturer and supplier warranties) shall be for the benefit of CITY and AMTRAK.
4. Termination.
- a. This MOU shall terminate upon the completion of the Project. Either party may terminate this MOU upon 10 days' written notice in the event of a material breach by the other party.
 - b. If this MOU is earlier terminated by CITY due to a material breach by AMTRAK, AMTRAK shall return the entire City Funding to CITY.
 - c. If this MOU is earlier terminated by AMTRAK due to a material breach by CITY, AMTRAK shall return to CITY the City Funding, less all costs and expenses paid or incurred by AMTRAK that are directly attributable to said breach by CITY.
 - d. If this MOU is earlier terminated by AMTRAK for any other reason, AMTRAK shall return to CITY the full amount of City Funding, without any setoff of costs or expenses.
 - e. If the Project is not completed by the above-stated completion date, AMTRAK shall return to CITY the full amount of City Funding, without any setoff of costs or expenses.
5. General Provisions.
- a. In the event of a conflict between this MOU and the applicable provisions of Exhibit A of the State Agreement (a copy of which is attached hereto) regarding design and construction of the PROJECT, the latter controls.
 - b. Nothing in the provisions of this MOU is intended to create duties or obligations to or rights in third parties not party to this MOU or affect the legal liability of either party to the MOU by imposing any standard of care

EXHIBIT "F" (ACCESS AGREEMENT)

with respect to the construction or maintenance of roads different from the standard of care imposed by applicable law.

- c. Any notices required to be given hereunder shall be deemed to have been given if personally delivered or sent by registered or certified mail, postage prepaid, and addressed as follows:

TO CITY: Attention: Daniel Singer, City Manager
City of Goleta
130 Cremona Drive, Suite B
Goleta, CA 93117

TO AMTRAK: Attention: Bruce Looloian, AVP Real Estate Dev.
National Railroad Passenger Corp.
2955 Market Street, Box 25
Philadelphia, PA 19104

And

Attention: Project Director
Real Estate Development
National Railroad Passenger Corp.
530 Water Street, 5th Floor
Oakland, CA 94607

- d. This MOU constitutes the entire agreement between the parties. There are no other agreements, express or implied. All prior agreements and understandings between them with respect to the Work are subsumed within this MOU. No alteration or variation of the terms of this MOU shall be valid unless made in writing and signed by the parties hereto and no oral understanding or agreement shall be binding on any of the parties hereto.
- e. This MOU is governed by and construed in accordance with the laws of the State of California, without regard to its choice of law provisions.
- f. The parties hereto agree that all actions or proceedings arising in connection with this MOU shall be tried and litigated exclusively in the State courts located in the County of Santa Barbara, State of California and federal courts of the Central District of California. The aforementioned choice of venue is intended by the parties to be mandatory and not permissive in nature, thereby precluding the possibility of litigation between the parties with respect to or arising out of this Agreement in any jurisdiction other than that specified in this paragraph. Each party hereby waives any right it may have to assert the doctrine of forum non conveniens or similar doctrine or to object to venue with respect to any proceeding brought in accordance with this paragraph, and stipulates that said courts shall have in personam jurisdiction and venue

EXHIBIT "F" (ACCESS AGREEMENT)

over each of them for the purpose of litigating any dispute, controversy, or proceeding arising out of or related to this MOU. Each party hereby authorizes and accepts service of process sufficient for personal jurisdiction in any action against it as contemplated by this paragraph by registered or certified mail, return receipt requested, postage prepaid, to its address for the giving of notices as set forth in this MOU. Any final judgment rendered against a party in any action or proceeding shall be conclusive as to the subject of such final judgment and may be enforced in other jurisdictions in any manner provided by law.

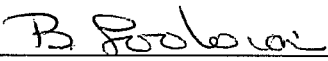
IN WITNESS WHEREOF, the parties hereto have executed this MOU as of the day and year first above written.

CITY OF GOLETA

NATIONAL RAILROAD PASSENGER CORPORATION

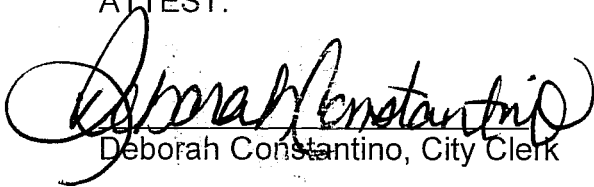


Daniel Singer, City Manager



Bruce Looloian
Assistant Vice President of
Real Estate Development

ATTEST:



Deborah Constantino, City Clerk

APPROVED AS TO FORM



Tim W. Giles, City Attorney

EXHIBIT "F" (ACCESS AGREEMENT)

EXHIBIT A
Goleta Amtrak Station Enhancements

PROJECT DESCRIPTION

This Project will redesign the turning circle at the station's entrance and provide for pedestrian improvements, enhanced paving, landscaping, and signage, enhance lighting, and other amenities.

SCOPE OF WORK

Perform 30% design and 100% environmental clearance for the construction of the Project described above including: bus turning circle to accommodate full-size buses and semi-trucks; new bus loading area/shelter; redesign of walkway to the rail platform; new restroom facilities; and improved signage, benches; lighting, landscaping, paving and sidewalk. Amtrak will also perform construction management oversight of its A&E contractor.

LOCATION

Goleta Amtrak Station in the City of Goleta, Santa Barbara County, California, at the end of La Patera Lane on the Pacific Surfliner Corridor

SCHEDULE AND EXPIRATION

This Project shall commence August 18, 2005 and shall be completed on or before August 18, 2007, unless extended by mutual agreement between the State and Amtrak.

FUNDING

Total State funding for this Project is \$90,000 for the above Scope of Work.

BUDGET

The detailed Project Budget will be developed by Amtrak and is included in the above Scope of Work. Amtrak will be reimbursed for all allowable costs incurred after the date of this Agreement for engineering and estimating (this does not include Project Management during construction) not to exceed 5% of the total funding amount, unless mutually agreed by the parties. The budget will be in sufficient detail to outline each major element of work as determined by Amtrak based on the above Scope of Work, yet not to exceed the funding amount shown above. Amtrak will submit the Budget to the State for approval and receive written approval of the Budget from the State prior to incurring any further costs on the Project.

The total estimated cost to provide the above services will not exceed \$90,000.00. The funding source is the California Transportation Commission (CTC) and is allocated in the following manner:

- PS&E and Construction Management - \$60,000.00
- Environmental Clearances - \$30,000.00



2009-0050728

Recorded
Official Records
County of
Santa Barbara
Joseph E. Holland

REC FEE 36.00

CONFORMED COPY 2.00

03:59PM 18-Aug-2009

MH
Page 1 of 10

PLEASE COMPLETE THIS INFORMATION.

RECORDING REQUESTED BY:

National Railroad Passenger Corporation

AND WHEN RECORDED MAIL TO:

Real Estate Development / 30th and Market

30th Street Station

Philadelphia, PA 19104

10
cc:lw

SPACE ABOVE FOR RECORDER'S USE ONLY

EASEMENT AGREEMENT

(Please fill in document title(s) on this line)

THIS PAGE ADDED TO PROVIDE ADEQUATE SPACE FOR RECORDING INFORMATION

(Additional recording fee applies)

SBR2005

EXHIBIT "F" (ACCESS AGREEMENT)

RECORDING REQUESTED BY:

National Railroad Passenger Corporation

AND WHEN RECORDED RETURN TO:

National Railroad Passenger Corporation
Real Estate Development
Address: 30th and Market
30th Street Station
Philadelphia, PA 19104

SPACE ABOVE LINE FOR RECORDER'S USE

EASEMENT AGREEMENT

THIS EASEMENT AGREEMENT (this "Agreement") is made and entered into this 31st day of March, 2009, by and between HOMER T. HAYWARD LUMBER CO., a California corporation, who holds title as HAYWARD LUMBER COMPANY, INC., a California corporation ("Grantor"), and NATIONAL RAILROAD PASSENGER CORPORATION, a District of Columbia corporation d/b/a Amtrak ("Grantee").

Recitals

A. Grantor is the owner of that certain real property in the County of Santa Barbara, State of California, commonly known as 20 S. La Patera Lane, Santa Barbara, California 93117 and designated as Assessor's Parcel No. 073-080-075 (the "Hayward Property").

B. Grantee desires to acquire an easement over approximately 5,119 square feet of the Hayward Property ("Easement Area") to construct improvements serving and to provide access to the existing Amtrak train station located on that certain real property adjacent to the Hayward

Property and designated as Assessor's Parcel No. 073-010-014 ("Goleta Station"). A description of the improvements to be constructed on the Easement Area (the "Easement Improvements") and the uses to be made thereof is set forth in Exhibit "A" attached hereto and incorporated herein by this reference. The location of the Easement Area is described on Exhibit "B" and is graphically depicted on Exhibit "C", which Exhibits are attached hereto and incorporated herein by this reference.

C. The parties desire to set forth herein their agreement relating to the granting of the Easement by Grantor to Grantee and Grantee's obligations in connection therewith.

NOW THEREFORE, for good and valuable consideration the parties hereto, intending to be legally bound hereby, agree as follows:

1. GRANT OF EASEMENT

Grantor hereby grants bargains and conveys to Grantee and Grantee's successors and assigns the right to enter on and upon the property described on Exhibits "B" and "C" for the purposes of constructing, maintaining, repairing, reconstructing and replacing the Easement Improvements and undertaking the uses described on Exhibit "A" ("Easement"). In exercising its rights hereunder, Grantee shall not permanently block or unreasonably interfere with Grantor's ingress into or egress from its property.

2. CONSIDERATION

Grantee hereby agrees to pay Grantor the sum of One Hundred Fifty-Eight Thousand Five Hundred Dollars (\$158,500), which shall constitute the entire consideration for the Easement granted hereunder ("Easement Fee"). Grantee shall deliver the Easement Fee in accordance with the following terms and conditions:

A. A deposit in the amount of Seventy-Five Thousand Dollars (\$75,000) upon Grantee's execution of this Agreement ("Deposit").

B. The balance of the Easement Fee by wire transfer of immediately available U.S. Federal funds to Grantor pursuant to written wire transfer, or other written payment, instructions which Grantor shall provide to Grantee within 90 days, or such later date as mutually agreed in writing by the parties. Grantee shall not commence construction of the Easement Improvements prior to payment of the balance of the Easement Fee to Grantor.

C. In the event that Grantee shall fail to pay the Easement Fee within the 90-day time period specified in subsection 2.B. above, this Agreement and all rights and obligations hereunder shall terminate and within 60 days after such termination Grantee shall quitclaim, release and convey the Easement Area to Grantor ("Easement Release"). Concurrently with the Easement Release, Grantor shall refund to Grantee the entire Deposit.

EXHIBIT "F" (ACCESS AGREEMENT)

3. OBLIGATIONS OF GRANTEE

- A. Grantee shall be responsible, at Grantee's sole cost and expense, for the construction, maintenance, repair, reconstruction and replacement of the Easement Improvements, which activities shall be undertaken by Grantee in strict accordance with all applicable laws, rules, regulations, permit requirements, standards and specifications.
- B. Grantee, at its expense, shall connect a water pipe to the existing water meter (which, as of the date of this Agreement, is located in a landscaped area in the Goleta Station and shown on Exhibit "C" with the designation "protect existing utilities in place") and extend such water pipe underground into the Hayward Property to a point which is 10 feet past the property line or to such other location as to which the parties shall reasonably agree and terminate said water pipe into a junction box to be supplied by Grantee. Notwithstanding the foregoing, in no event shall Grantee be responsible for any costs or expenses associated with Grantor's utility use including water usage.

4. INDEMNIFICATION

- A. Grantee agrees to indemnify, defend and hold harmless Grantor and its officers, directors, shareholders, employees and agents from and against any and all losses, costs, damages, liabilities and expenses (including all costs of defense and attorneys' fees) for injury or death of any person, or damage to or destruction of any property directly arising out of (i) the construction, maintenance, repair, reconstruction, replacement, or any of the foregoing, of the Easement Improvements, (ii) the use of the Easement, the Easement Improvements or both, by Grantee, its employees, contractors, agents, customers, passengers, invitees or any other person acting for or with Grantee's permission, or (ii) Grantee's breach of any of the provisions hereof.
- B. Grantor agrees to indemnify, defend and hold harmless Grantee and its officers, directors, employees, agents, servants, invitees, licensees, subsidiaries, affiliates and contractors and each of their successors and assigns from and against any and all losses, costs, damages, liabilities and expenses (including all costs of defense and attorneys' fees) for injury or death of any person, or damage to or destruction of any property arising out of or related to Grantor's ownership of the Easement Area, the condition of the Easement Area prior to the conveyance of the Easement to Grantee hereunder, or both, but excluding anything or any claim relating to Grantee's obligations set forth in Section 3 or Subsection 4.A. above.

5. INSURANCE

- A. Grantee, at its sole cost and expense, shall maintain at all times on all Easement Improvements, a policy of standard fire and extended coverage (all-risk) insurance to be in the amount of their full replacement value. The proceeds from any such policy shall be used by Grantee for the replacement, repair and/or restoration of the Easement Improvements.
- B. Grantee, at its sole cost and expense, shall also maintain at all times comprehensive general liability and property damage insurance in an amount approved by Grantor in Grantor's reasonable discretion, for bodily injury and property damage, insuring Grantor and Grantee against all liability arising out of and in connection with the use or occupancy of the Easement and the Easement Improvements by Grantee or by any other person or entity. Said insurance shall also insure performance by Grantee of the indemnification, defense and hold harmless

provisions in Section 4, above, but the limits of such insurance shall not limit the liability of Grantee hereunder.

C. Promptly following the execution of this Agreement, Grantee shall supply Grantor with a certificate evidencing the insurance coverage required hereunder. Said certificate shall name Grantor as an additional insured and shall expressly provide that the policy(ies) evidenced by the certificate may not be cancelled or altered without thirty (30) days' prior written notice to Grantor (ten (10) days in the event of nonpayment of premiums). Grantee shall provide Grantor with current certificates of insurance prior to the expiration of any policy required hereunder.

D. Grantee reserves the right to self-insure any and all of the insurance requirements listed in this Section 5 of this Agreement in the amount of Twenty Million Dollars (\$20,000,000) or the current level of self-insurance maintained by Grantee, whichever is higher. Grantee agrees at all times to act in good faith with regard to setting the then current dollar amount of its self-insured retention, so as to be able to meet its obligations in regard thereto.

6. WAIVER AND RELEASE

A. Grantee hereby irrevocably and unconditionally assumes any and all risks, and waives all claims against Grantor, arising solely out of the use of the Easement, the Easement Improvements by Grantee's, its employees, contractors, customers, passengers, invitees or any other person acting for or with Grantee's permission, whether such risks or claims are presently known or unknown.

B. Subject to the provisions of Sections 3 and 4.A. above, Grantor acknowledges and agrees that it is responsible for all risks associated with its ownership of the Easement Area and the condition of the Easement Area prior to the conveyance of the Easement to Grantee hereunder. Grantor hereby irrevocably and unconditionally releases Grantee from and waives all claims against Grantee arising out of or in any way connected to Grantor's ownership of the Easement Area, the condition of the Easement Area, or both prior to the conveyance of the Easement to Grantee hereunder.

7. ATTORNEYS' FEES

Should any litigation or arbitration be commenced between the parties to this Agreement concerning the enforcement or interpretation of any rights or obligations hereunder, the prevailing party shall be entitled to recover attorneys' fees, in addition to such other relief as may be granted.

8. SUCCESSORS IN INTEREST

This Agreement relates to an interest affecting the title to and possession of the Hayward Property and the Easement area. All the terms, covenants and conditions contained herein shall be binding upon and inure to the benefit of the successors in interest of the parties hereto, and shall run with the Hayward Property and the Easement area or any part thereof.

EXHIBIT "F" (ACCESS AGREEMENT)

IN WITNESS WHEREOF, the parties have executed this Easement Agreement and make it effective as of the date first set forth above.

“GRANTOR”
HAYWARD LUMBER COMPANY, INC.,
a California corporation

“GRANTEE”
NATIONAL RAILROAD
PASSENGER CORPORATION,
a District of Columbia corporation

By: *Steve Mangelsen*
STEVE MANGELSEN, Chief
Financial Officer

By: *B. Pooloian*
BRUCE LOOLOIAN, Assistant Vice
President, Real Estate Development

State of California)
) SS:
County of Monterey)

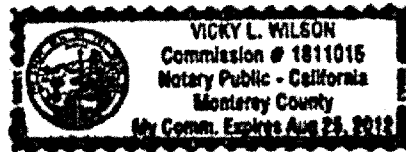
On 4-7-09 before me, *Vicky L. Wilson*, Notary Public
(insert name and title of the officer)

personally appeared STEVE MANGELSEN, who proved to me on the basis of satisfactory evidence to be the person(s) whose name(s) is/are subscribed to the written instrument and acknowledged to me that he/she/they executed the same in his/her/their, authorized capacity (ies), and that by his/her/their signature(s) on the instrument to person(s), or the entity upon behalf of which the person(s) acted, executed the instrument.

I certify under PENALTY OF PERJURY, under the laws of the State of California that the foregoing paragraph is true and correct.

WITNESS my hand and official seal.

Signature *Vicky L. Wilson* (Seal)



[SEE NEXT PAGE FOR ADDITIONAL JURAT]

EXHIBIT "F" (ACCESS AGREEMENT)

Commonwealth
State of Pennsylvania)
) SS:
County of Philadelphia)

On April 14, 2009 before me, Nancy J. Edwards, Notary Public
(insert name and title of the officer)

personally appeared BRUCE LOOLOIAN who proved to me on the basis of satisfactory evidence to be the person(s) whose name(s) is/are subscribed to the written instrument and acknowledged to me that he/she/they executed the same in his/her/their, authorized capacity (ies), and that by his/her/their signature(s) on the instrument to the person(s), or the entity upon behalf of which the person(s) acted, executed the instrument.

I certify under PENALTY OF PERJURY, under the laws of the State of Pennsylvania that the foregoing paragraph is true and correct.

WITNESS my hand and official seal.

Signature Nancy J. Edwards (Seal)

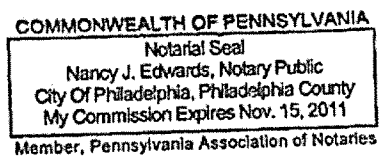


EXHIBIT "F" (ACCESS AGREEMENT)

EXHIBIT "A"

DESCRIPTION OF EASEMENT IMPROVEMENTS AND USES

Grantee will redesign the entrance to the Goleta train station to enhance the accessibility and create an enticing gateway for the station. Grantee's changes will include a redesign of the turning circle at the station's entrance and provide for pedestrian improvements, enhanced paving, landscaping and signage, enhanced lighting and other amenities.



EXHIBIT "F" (ACCESS AGREEMENT)

EXHIBIT "B"

DESCRIPTION OF EASEMENT

All that certain Lot or piece of ground situate in the City of Goleta, County of Santa Barbara, State of California, described according to a Plan made by Patterson and Associates Inc. dated 3/13/06 (Exhibit "C") to wit:

Beginning at a point on the easterly side of La Patera Lane (60' wide), said point being the northwesterly corner of a Lot known as #30 S. La Patera Lane (A.P.N. 073 - 080 -001) and the southwesterly corner of a Lot known as #20 S. La Patera Lane (A.P.N. 073-080-075); thence extending N 9 ° 46' 50" W. along the easterly side of said La Patera Lane, the distance of 110.27' to a point; thence extending N84°11'09" E. the distance of 66.92' to a point; thence extending S. 5 ° 48' 50" E. the distance of 48.50' to a point; thence extending S. 38 ° 08' 26" W. the distance of 85.43' to the first mentioned point and place of beginning.

Containing in area 5,119 square feet more or less.

EXHIBIT "B"

EXHIBIT "F" (ACCESS AGREEMENT)

EXHIBIT G

LIMITED PHASE II INVESTIGATION WORK PLAN

PREPARED BY ALL PHASE ENVIRONMENTAL, INC.

DATED DECEMBER 19, 2023

All Phase Environmental, Inc.



Limited Phase II Investigation Work Plan Revised

**Goleta Train Depot
27 South La Patera Lane
Goleta, California, 93117**



December 19, 2023

Prepared for:

**City of Goleta
City Hall - 130 Cremona Drive, Suite B
Goleta, California 93117**

Prepared by:

**All Phase Environmental, Inc.
8792 Lauder Circle, Suite 200
Huntington Beach, California 92646
(800) 567-7729
www.PhaseOneESA.com**

EXHIBIT "G" (Limited PH2 Investigation Work Plan)
APEI Project No. 14242.00

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APPENDIX B Geophysical Investigation Report

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1.0 Summary

At the request of the City of Goleta, All Phase Environmental, Inc. (APEI) have been asked to prepare a work plan for a limited Phase II investigation of the site located at 27 South La Patera Lane, Goleta, California 93117, hereinafter referred to as the “subject property.”

This work plan contains a summary of the history of the subject property, the goals of the investigation, the work procedures to be carried out, the reasons and locations for the proposed borings, and a summary of the Ground Penetrating Radar (GPR) work already completed in the area of the reportedly removed 7,000 gallon gasoline UST.

2.0 Subject Property Description

The subject property is a lot of approximately 2.48-acres, and the street address is 27 South Patera Lane, in the City of Goleta, in the County of Santa Barbara, California, 93117. The subject property is composed of one parcel with APN number 073-050-033. The subject property is located on the west and south side of South Patera Lane. South Patera Lane delimits the subject property to the east and to the north where it is being used as the Goleta Amtrack Train Depot. Industrial sites delimit the subject property to the south and west.

The subject property is developed with a one-story office and industrial warehouse structure. The building is approximately 30,000-square feet and was constructed in approximately 1967. There are office spaces along the south side of the building with a small mezzanine office and storage space in the southwest corner of the building. The remainder of the building is composed of two open warehouse areas. On the west end of the building is a grade level warehouse area. A loading dock is located on the east side of the warehouse and a ramp and receiving dock are situated in the northwest corner of the building. Outside the southwest corner of the building are a diesel generator and an 1,800-gallon diesel UST that remains operational. At the time of the investigation, the building was partially occupied by a tenant using it for intermittent classes, office space, and warehouse space.

Concrete paving covers the west end of the parcel and the land east of the east loading dock. An asphalt paved parking lot covers the remainder of the land south and east of the office area of the building. There are landscaped planters along the east border and strips of landscaped grounds bordering the east loading dock. The subject property can be accessed via a driveway from South La Patera to the east, and roll-up doors in the warehouse open to the Union Pacific Railroad to the north.

3.0 Summary of Historical Uses

Tenant History

The following is a summary of historical uses of the subject property obtained from a Phase I ESA previously performed by APEI in 2016:

- Orchards from prior to 1943 through 1947.
- Cleared of orchards between 1947 and 1967.
- Developed with the existing subject property building in 1967.
- Occupied by Sears from 1967 through 1988, most likely used as offices and warehouse space.
- Portions of the subject property were occupied by several delivery and transportation firms from at least 1980 through 1992. Durham Transportation was one of these tenants who stored small quantities of hazardous substances and petroleum products. Durham Transportation reportedly performed bus repairs on the subject property.
- Raytheon occupied the subject property from 1982 through August of 1990, and most likely used the building for offices and warehouse space.
- In 2018, the City of Goleta acquired the subject property for the purposes of constructing the Goleta Train Depot.
- The owner prior to acquisition by the City of Goleta in 2018 was Direct Relief International, which has occupied portions or all of the subject property since at least 1999.

Environmental History

The following is a summary of significant hazardous substances and petroleum product storage and uses on the subject property (APEI, 2016):

- Organochlorine pesticides may have been used when the subject property was occupied by orchards from prior to 1943 through 1947.
- Sears installed the former approximately 7,500-gallon diesel UST in 1967. Documents reviewed indicated that the associated piping and dispenser were located directly over the tank.
- Under permit and regulatory oversight, the tank, associated piping, and dispenser were removed from the subject property on April 12, 1990. Some visually stained soil was identified. The Santa Barbara County, Environmental Health Services (EHS) and Santa Barbara County Fire were present during the tank removal. The tank was reported to be in good condition, no groundwater was encountered but some discolored soils were noted at the midpoint of the tank. Soil samples were taken from the bottom and sidewall of the excavation and from stockpiled soils. Soil samples were analyzed for total petroleum hydrocarbons (TPH), benzene, toluene, ethylbenzene, and xylene (BTEX), and total lead. Total lead was reported to be at background levels. The sidewall results for fuel constituents were below laboratory detection levels. The bottom sample had detectable levels of TPH at 2.1 parts per million (mg/kg or ppm) and trace BTEX concentrations. All results were reported to be below cleanup levels. Samples of excavated soils contained up to 11 ppm gasoline and 110 ppm diesel. No further action was recommended. Supporting documents indicated the soil and UST had been taken offsite for disposal.
- Documents reviewed indicated that the 7,500 gallon UST may have been used for diesel and gasoline.
- Direct Relief International installed the existing diesel generator and associated 1,800 gallon diesel UST in 2008.
- The remaining diesel UST is a double walled fiberglass tank with an outer reinforced steel jacket and double walled piping equipped with an interstitial Veeder Root monitoring system.
- During a 2016 ESA performed on the subject property for due diligence purposes prior to purchase, two unlabeled 55-gallon drums of an unknown solid were observed in the northwest corner of the subject property. These have since been removed.
- A 55-gallon drum of unidentified contents remains next to the diesel generator. This drum was labeled as hazardous waste.
- A waste oil AST and a clarifier were observed on the north adjacent site on the west end of the subject property that remain there as of the publication of this work plan.

4.0 Geology

The subject property is located in the Goleta Valley, a low-lying, gently southwest sloping coastal plain. The Goleta Valley is bounded to the north by the Santa Ynez Mountains, to the south and west by the Pacific Ocean, and to the east by the Mesa Hills and relatively elevated alluvial terraces. The surrounding highlands are composed of steeply south sloped consolidated sedimentary rocks of Tertiary age. These Tertiary age materials are interpreted to be present at depths of approximately 500-feet below the ground surface (Olson, 1982). Folded consolidated bedrock is unconformably overlain by almost flat-lying, unconsolidated sediments, including greater than approximately 430 feet of the Plio-Pleistocene Santa Barbara Formation, and approximately 70-feet of Recent alluvial deposits. The subject property is underlain by these alluvial deposits.

According to the Web Soil Survey by the National Resources Conservation Service dated September 3, 2015, the primary soil type at the subject property is Milpitas-Positas fine sandy loams. The landform setting for this soil is described as terraces with a slope of 2 to 9 percent. This soil is moderately well drained and the depth to the water table is more than 80-inches.

5.0 Hydrogeology

Unconfined groundwater exists within the younger alluvium in the basin but the vast majority of the groundwater is present in a confined or semi-confined condition. Most wells within the basin derive groundwater from the Santa Barbara Formation (Upson, 1951). Subsurface data was reviewed from investigations on the west adjacent site, Bardex Corporation. In a report, dated January 16, 2015, by The Source Group, Inc. entitled "Second Half 2014 Groundwater Monitoring Report" groundwater was reported to be at a depth of approximately 14.89 to 36.62 feet below the top of the well casing. Because these wells are located down a slope of at least ten-feet, groundwater below the subject property is expected to be deeper. The groundwater flow direction has historically been reported as variable, ranging in direction from westerly to southerly.

A geotechnical report by ENGIO in 2020, determined that the underlying soils were generally impermeable.

6.0 Geophysical Investigation Findings

The purpose of the investigation was to locate detectable utilities in the vicinity of the advancement of 10 proposed borings. The work also included a search for potential subsurface structures associated with the former 6,000 to 7,500-gallon Underground Storage Tank (UST) and pump island formerly located adjacent to the southern property boundary. Lastly, the investigation was to investigate three (3) areas roughly 25 feet by 25 feet in size. The three areas were to be searched for traces of subsurface structures associated with possible sumps and/or drain systems inside the subject property building.

All 10 borings were cleared of identifiable utilities.

The three areas investigated inside the subject property building did not identify any subsurface structures. One floor drain near the southeast corner of the large warehouse was deemed to have not been an industrial wastewater drain but was instead, a sanitary drain formerly associated with the adjacent bathrooms.

The Ground Penetrating Radar (GPR) investigation identified two anomalies that could not be attributed to above ground cultural features and/or detected utilities. A search of the area depicted on regulatory record drawings showed undisturbed soil. It was deemed that these hand-drawn maps were not accurate. Searching further to the west, an area was identified where there had been significant disturbance to the soil below the asphalt. This was then determined to likely have been the location of the former UST. In addition to disturbed soil, two anomalies were identified.

Anomaly A was approximately 26-feet by 17-feet in size and at a depth of approximately 3 to 6 feet below the surface. Using GPR it was revealed that it was possibly reinforced concrete mesh beneath the asphalt in an area of disturbed soil. The presence of reinforced concrete mesh is only an estimate, it is possible that the anomaly is some other object. It is also possible that something else lies beneath the reinforced concrete mesh/object that was not detected which could be a UST.

Anomaly B was approximately 31-feet by 12-feet in size and at a depth of approximately 3 to 6 feet below the surface. Using GPR it was revealed that it was possibly reinforced concrete mesh beneath the asphalt with an additional uneven layered reflection deeper in the profiles in an area of disturbed soil. The presence of reinforced concrete mesh is only an estimate, it is possible that the anomaly is some other object. Readings interpreted from deeper analysis indicated that the area below the reinforced concrete mesh/object was deemed not typical of an excavation or a UST.

Because Spectrum could not 100% confirm that USTs were not present, they recommended further investigation in these areas to determine the sources. APEI agrees that these areas should be investigated by excavation at some time in the future. However, if no contamination is identified in borings B1, B2, or B3, then it is likely that the anomalies are not USTs, or at least have not led to significant subsurface impact. It would then be advised that this area be excavated during the redevelopment and grading of the subject property.

7.0 Boring Locations, Strategies, and Descriptions

Figure 1 in Appendix A contains a drawing illustrating the proposed boring locations and Appendix C contains photographs of the locations.

Boring Locations B1, B2, and B3

These three borings are intended to identify possible releases from the former 7,500 gallon diesel/gasoline UST. The locations were selected using the data from the GPR report. All three borings are situated around the identified anomalies since drilling into the anomalies would likely result in refusal. B1 will be advanced to a terminal depth of 36 feet below ground surface (bgs) or refusal and is intended to investigate possible releases from the former underground tank, associated piping, or dispensers not previously identified during the tank removal. Borings B2 and B3 will be advanced to a terminal depth of 10 feet below ground surface (bgs) or refusal and are intended to investigate for releases from the associated piping or dispensers not previously identified during the tank removal.

Boring Location B4

B4 is intended to identify possible undetected releases from the existing 1,800 gallon diesel UST. It will be advanced to a terminal depth of 36 feet bgs or refusal. The location was selected to be nearest to the tank and associated piping without being located in the tank excavation (which would be filled with pea gravel).

Boring Location B5

B5 is intended to identify possible undetected releases that may have migrated to this corner where there is a stormwater collection drain for the west side of the subject property. It is postulated that Durham Transportation performed bus repairs on the west side of the subject property and any spills in this area would migrate to this corner. In addition, two unlabeled 55 gallon drums of an unknown solid were previously observed in this corner. B5 will be advanced to a terminal depth of 5 feet bgs or refusal.

Boring Location B6

B6 is intended to identify possible undetected releases that may have migrated to this area from stored materials, improper disposal into solid waste dumpsters formerly located in this area, and from the north adjacent waste oil AST and clarifier. B6 will be advanced to a terminal depth of 5 feet bgs or refusal.

Boring Location B7

B7 is intended to identify possible undetected releases that may have migrated to this area from the east loading dock and from a drain/sump located in this corner. B7 will be advanced to a terminal depth of 5 feet bgs or refusal.

Boring Location B8

B8 is intended to identify possible undetected releases that may have migrated to this area from former work performed in the west end warehouse space. This location was selected because it was the lowest elevation in this area and there were no other conduits to the subsurface identified during the visual and GPR survey. It is not known what work may have been performed in this area of the warehouse but if vehicle repairs were being performed by Durham Transportation, it is likely that they would have used this area of the warehouse. B8 will be advanced to a terminal depth of 5 feet bgs or refusal.

Boring Locations B9 and B10

B9 and B10 are intended to identify possible undetected releases that may have occurred from former onsite operations in the main area of the subject property warehouse. The visual and GPR survey did not identify any subsurface anomalies worthy of testing. There were no areas in the warehouse where trenching or signs of prior uses, other than warehousing, were evident. Therefore, if there had been a release in the main warehouse, it would have likely been due to spillage from stored materials in the building. Boring B9 was located next to what looks like a boring from a prior investigation. Boring B10 was located next to a rack that had an eyewash station, typical of an area where hazardous materials would have been stored. B9 and B10 will be advanced to a terminal depth of 15 feet bgs or refusal.

8.0 Sampling Depths, Media, and Laboratory Analysis

B1

- Advanced to a terminal depth of 36 feet bgs or refusal.
- Soil samples will be taken at depths of 5', 10', 15', 20', 25', 36'. These will be analyzed for TPH-G.
- Soil vapor probes will be installed at depths of 5' and at the terminal depth or shallower if groundwater is encountered. Soil Vapor samples will be analyzed at 5' and terminal depth for VOCs.
- A groundwater grab sample will be collected if available at less than 36 feet bgs and analyzed for VOCs.

B2 and B3

- Advanced to a terminal depth of 10 feet bgs or refusal.
- Soil samples will be taken at depths of 5' and 10'. These will be analyzed for TPH-G.
- Soil vapor probes will be installed at depths of 5' and 10'. Soil Vapor samples will be analyzed at both depths for VOCs.

B4

- Advanced to a terminal depth of 36 feet bgs or refusal.
- Soil samples will be taken at depths of 5', 10', 15', 20', 25', 36'. These will be analyzed for TPH-D/MO.
- A groundwater grab sample will be collected if available at less than 36 feet bgs and analyzed for TPH-D/MO.

B5

- Advanced to a terminal depth of 5 feet bgs or refusal.
- Soil samples will be taken at 5' and analyzed for TPH-G, TPH-D/MO, organochlorine pesticides, and Title 22 Metals (CAM15).
- A soil vapor probe will be installed at 5' and analyzed for VOCs and TPH-G.

B6

- Advanced to a terminal depth of 5 feet bgs or refusal.
- Soil samples will be taken at 5' and analyzed for TPH-Gallon and TPH-D/MO.
- A soil vapor probe will be installed at 5' and analyzed for VOCs and TPH-G.

B7

- Advanced to a terminal depth of 5 feet bgs or refusal.
- Soil samples will be taken at 5' and analyzed for TPH-Gallon and TPH-D/MO.
- A soil vapor probe will be installed at 5' and analyzed for VOCs and TPH-G.

B8

- Advanced to a terminal depth of 5 feet bgs or refusal.
- Soil samples will be taken at 5' and analyzed for TPH-Gallon and TPH-D/MO.
- A soil vapor probe will be installed at 5' and analyzed for VOCs and TPH-G.

B9 and B10

- Advanced to a terminal depth of 15 feet bgs or refusal.
- Soil samples will be taken at depths of 5' and 15'. The 5' samples will be analyzed for TPH-G, TPH-D/MO, and Title 22 Metals (CAM15). Soil samples at 15' will be preserved for possible additional analysis pending the results from the 5' samples.
- Soil vapor probes will be installed at depths of 5' and 15'. Soil Vapor samples will be analyzed at both depths for VOCs, TPH-G, and methane. One duplicate soil vapor sample will be collected and analyzed for VOCs, TPH-G, and methane.

9.0 Soil Sampling Protocol

Soil borings will be advanced using a direct-push sampling rig. The direct-push system is driven by a hydraulic hammer and is equipped with a dual-tube core barrel. As the hollow dual-tube core barrel is driven downward, soil is pushed into a 4-foot long acetate sleeve that is located within the inner core barrel. The inner core barrel is lifted up and the acetate sleeve is removed, and another empty sleeve is inserted into the inner core barrel. The outer core barrel is temporarily left in place to provide bore-hole stability. This procedure is repeated until the desired depth is reached.

At select depths, soil samples are collected within the acetate sleeve and a six-inch long portion of the sleeve is isolated and cut from the 4-foot long sleeve. That sample is immediately capped and preserved with Teflon tape and end caps and chilled on ice in a cooler pending delivery to a State certified laboratory. When soil samples are slated for analysis of VOCs and TPHg, an encore device will be used to extract approximately 5-grams of soil from the 6-inch sample sleeve (EPA Method 5035).

During drilling, a photo-ionization detector will be used to screen all soil samples collected from the borings for VOCs and for worker health and safety concerns. The PID will be calibrated with hexane (100 ppmV) in the field in the morning prior to the commencement of any field activities. The identified lithology (Unified Soil Classification System) along with the PID readings will be recorded on a boring log.

10.0 Soil Vapor Probe Installation and Sampling Protocol

Several borings will receive soil vapor probes that are used to measure and specify the type of VOCs present in soil gas. During drilling, at the desired depth, a 2-inch long vapor probe fitted with ¼-inch ID tubing will be placed within the outer core barrel and the barrel will be lifted out of the bore hole. A 1-foot thick sand pack will be placed above and below the probe followed by 6-inches of dry bentonite and then hydrated bentonite to the near surface. If multiple probes are placed in the same borehole, the same installation procedure will be used, but the deepest probe will be distinguished from the shallow by slightly longer tubing and labeling. The probes will be allowed to equilibrate for a minimum of 4-hours prior to sampling, and the probes will be purged and sampled in general accordance with the DTSC vapor intrusion guidance specifications (DTSC's Supplemental Guidance, Screening and Evaluating Vapor Intrusion, February 2020).

Each probe head will be attached to the sampling train assembly of Teflon tubing, valves, and fittings and connected to a purge pump. The pump will be used to evacuate the sealed system using an applied maximum vacuum of 100 inches of water column (in. WC). The vacuum on each probe will be monitored for 90 seconds with the sampling train system sealed. After the shut-in test is validated, the sampling train will be leak tested. Liquid isopropyl alcohol will be applied to a cloth and placed around all connections in the sampling train to evaluate whether the system is sealed from ambient air leaks. A detection of 10 times the reporting limit of this compound may suggest that ambient air leakage has occurred.

Each probe will be purged prior to sampling, and the purpose of purging is to remove stagnant air from the vapor sampling train to ensure representative samples are obtained. The probes will be purged of three purge volumes of soil gas (a purge volume includes the volume of tubing plus the void space of the sand pack around the probe) using an adjustable vacuum pump. The purge rate will be set at 200 mL/minute.

After purging three volumes through the system, soil gas samples will be collected in glass syringes from each probe by a technician operating a mobile lab from A&R Laboratories. Each sample will be analyzed for TPHg (EPA Method 8015M, methane (EPA Method 8015M), and/or VOCs (EPA Method 8260B). A greater volume of air from the sample will be used for the analysis to achieve detection limits for each compound comparable to the EPA Method TO-15 test, which should meet residential standards.

11.0 Groundwater Grab Sampling Protocol

During drilling, if groundwater is encountered, the inner rod will be extracted and fitted with a 4-foot long stainless steel screen at the end. This screen will be driven down into the saturated section in an attempt to retrieve a water sample. A 3/8-inch ID Teflon tube will be placed through the core barrel to the total depth. A removable bailer with a check valve will be attached to the bottom of the tubing, and the tube will be manually pumped to collect water into the tube. Two 40-ml vials, preserved with HCL, will be used to collect the water, and each vial will be labeled, sealed with an end cap, and chilled in a cooler pending shipment to a State certified laboratory for analysis.

12.0 Soil Sampling Drill Rigs

The truck mounted direct push (Geoprobe) rig that is planned to be used to perform the work will not be able to obtain the samples inside the warehouse space of the subject property building. The proximity of the shelving installed in the warehouse is too close for this rig to reach the sample locations. A mobile Geoprobe unit will need to be brought to the subject property in order to advance these borings. There is an additional fee of approximately \$2,000.00 for labor and equipment to make this possible.

13.0 Cultural Resources Observation

APEI is prepared to have a Native American representative onsite to perform cultural resources observation during subsurface work. However, due to the following considerations, it is advised that this service be used during other subsurface disturbances that will be more impactful to the subject property:

- The total of all ten soil borings being advanced on the subject property will have a combined diameter of less than one square foot.
- When the subject property was developed, it is likely that the grading practice included the disturbance and recompaction of at least the top five feet of the entire subject property (deeper in areas below the building). The areas most likely to contain artifacts near the surface would have been extensively disturbed and damaged from past grading activities.
- The Professional Geologist will be inspecting the soil removed during sampling operations. If any artifacts are identified, work will stop and the Native American representative will be contacted for inspection.

14.0 References

Phase I Environmental Site Assessment, Industrial Property, 27 South Patera Lane, Goleta, California, 93117, All Phase Environmental, Inc., September 7, 2016.

Surface and Subsurface Geology of the Santa Barbara-Goleta Metropolitan Area, Santa Barbara County, California, Daniel J. Olson, October 1982.

Web Soil Survey, National Resources Conservation Service, September 3, 2015, <http://websoilsurvey.nrcs.usda.gov/Appendix>.

Second Half 2014 Groundwater Monitoring Report, The Source Group, Inc., January 16, 2015.

15.0 Environmental Professionals' Signatures

The undersigned certifies that the professional services have been conducted, our findings obtained, and our recommendations have been prepared in accordance with customary principles and practices in the field of environmental science and engineering. APEI has acted in good faith and has no relationship with sellers, buyers or agents of the subject property. There have been no conflicts of interest involved in the drawing of conclusions, which have been based solely on materials reviewed and visual inspections conducted by APEI.

Prepared by:

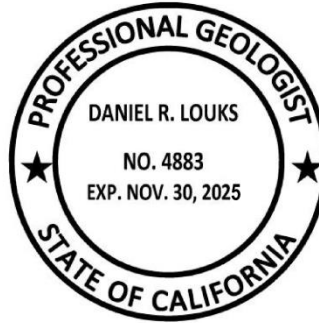


Douglas B. Kochanowski, CHMM, CAC
Environmental Professional, Senior Environmental Scientist, and Biologist

Reviewed by:



Daniel R. Louks, P.G.



16.0 Qualifications of Environmental Professionals

Doug Kochanowski

**Environmental Professional, Senior Environmental Scientist, and Biologist
CHMM (#9970), CAC (#99-2699)**

Professional Experience:

Mr. Kochanowski has been performing Phase I Environmental Site Assessments (ESAs) since 1988 and is considered an industry expert. The environmental consulting profession was in its infancy when he performed his first ESA. Over the past three decades, Mr. Kochanowski has performed ESAs on almost every type of real property in over ten different states and in Europe. This includes military bases, medical facilities, high-rise office buildings, learning institutions, factories, shopping malls and plazas, gasoline stations, industrial parks, manufacturing facilities, vacant land, agricultural land, housing tracks, multifamily developments, and government facilities. His wide array of experience has made him a key component for conducting complex ESAs and his expertise is sought after by a wide variety of clients and other consulting firms. His practical approach and comprehensive knowledge of the ASTM standards result in ESAs that are accurate, comprehensive, and address environmental issues with a common-sense approach.

Mr. Kochanowski's environmental portfolio also includes experience conducting a variety of additional services that include soil, groundwater, and soil vapor testing, modeling, landfill leachate testing, indoor air sampling, lead-based paint sampling, and conducting human health risk assessments. He has managed several large IDT contracts for the European District Corps of Engineers, working at over twenty bases in Germany and Spain. Projects included remediation design, soil and groundwater sampling, landfill leachate testing, asbestos surveys, air monitoring, and radon testing.

For as long as Mr. Kochanowski has been writing ESAs he has also been performing asbestos testing and consulting. He is a California Certified Asbestos Consultant and is NIOSH 582 Certified to analyze Polarized Light Microscopy (PLM) samples. Mr. Kochanowski performs asbestos surveys, develops removal specifications and drawings, writes Operations and Management (O&M) Plans, and conducts contractor observation and air monitoring during abatement projects. His asbestos experience includes schools, nuclear facilities, universities, airports, hospitals, military bases, shopping malls, high-rise office buildings, industrial complexes, port facilities, apartments and single-family homes. Mr. Kochanowski was the Manager and Facility Security Officer (FSO) for a high-profile asbestos survey, air monitoring and abatement project of the White House, Washington D.C. His AHERA survey experience includes inspecting over eight million square feet of building space for school districts in California, Kansas, New Mexico and Tennessee.

Mr. Kochanowski has teaching experience including conducting OSHA 1910.120 HAZWOPR, Confined Space Entry, and asbestos awareness classes.

He has served as Secretary on the Board of Directors and was a founding father for the SoCal ACHMM chapter. In the past, he has served on the technical committee for a Local Emergency Planning Commission (LEPC) and was elected Secretary on the Board of Directors for the Rhine-Main Post of the Society of American Military Engineers (SAME).

Education:

Bachelor of Science, Biology, San Diego State University, 1987.
Continuing Education; Strategies for Conducting Meaningful Microbial IAQ Investigations/American Indoor Air Quality Council

Registrations and Certifications:

CHMM, Master Level; Secretary of the SoCal ACHMM Chapter
California Certified Asbestos Consultant (#09-2699)
NIOSH 582 Accredited Sampling and Evaluation Airborne Asbestos
Certified, OSHA 40Hr Trained 1910.120/Site Supervisor
Certified TRGS 519 Under German Hazardous Materials Regulations
AHERA Certified Asbestos Inspector, Management Planner, Designer, and Abatement
Supervisor
Certified Radiation Worker
Confined Space Entry Certified

Daniel R. Louks
California Professional Geologist

Education

M.S. Candidate, Applied Geophysics, California State University, Northridge, Ca.
B.S. Geology, University of California, Los Angeles, Ca, 1983.

Professional Affiliations

California Professional Geologist
California Professional Civil Engineer

Professional Experience

Mr. Louks has worked as an Engineer and Hydrogeologist, responsible for the design, planning, budgeting, and operations of all environmental and hydrogeological related projects. He provides environmental engineering and consulting services with expertise. Project experience includes injection of oxidants and electron donor materials within the saturated zone for the chemical and biologic decomposition of halogenated solvents and petroleum compounds. Mr. Louks has experience with the operation of vapor and dual-phase extraction systems for the physical removal of volatile solvents and petroleum compounds.

Mr. Louks has worked as a Senior Geologist responsible for the design, implementation, budgeting, and operations of environmental and geological projects. He has participated in the development and management of financial operations associated with hydrogeological groups.

Mr. Louks has developed and managed hydrogeologic service groups. He was responsible for the design, implementation, budgeting, and operations of environmental related projects. Mr. Louks participated in the development and management of financial operations associated with a hydrogeological group. He has been responsible for the design, implementation, and operations of bioreclamation projects.

Publications

Maggio, A., Louks, D., 1989, Determining the Feasibility and Design Parameters for In-Situ Biodegradation of Gasoline in a Shallow Aquifer, The Proceedings of the Third National Outdoor Action Conference on Aquifer Restoration, Groundwater Monitoring and Geophysical methods: National Water Well Association, Dublin, OH, pp. 521-534.

17.0 List of Appendix Sections

- APPENDIX A Drawings
- APPENDIX B Geophysical Investigation Report
- APPENDIX C Photographs

APPENDIX A

Drawings

All Phase Environmental, Inc.

EXHIBIT "G" (Limited Phase Investigation Work Plan)

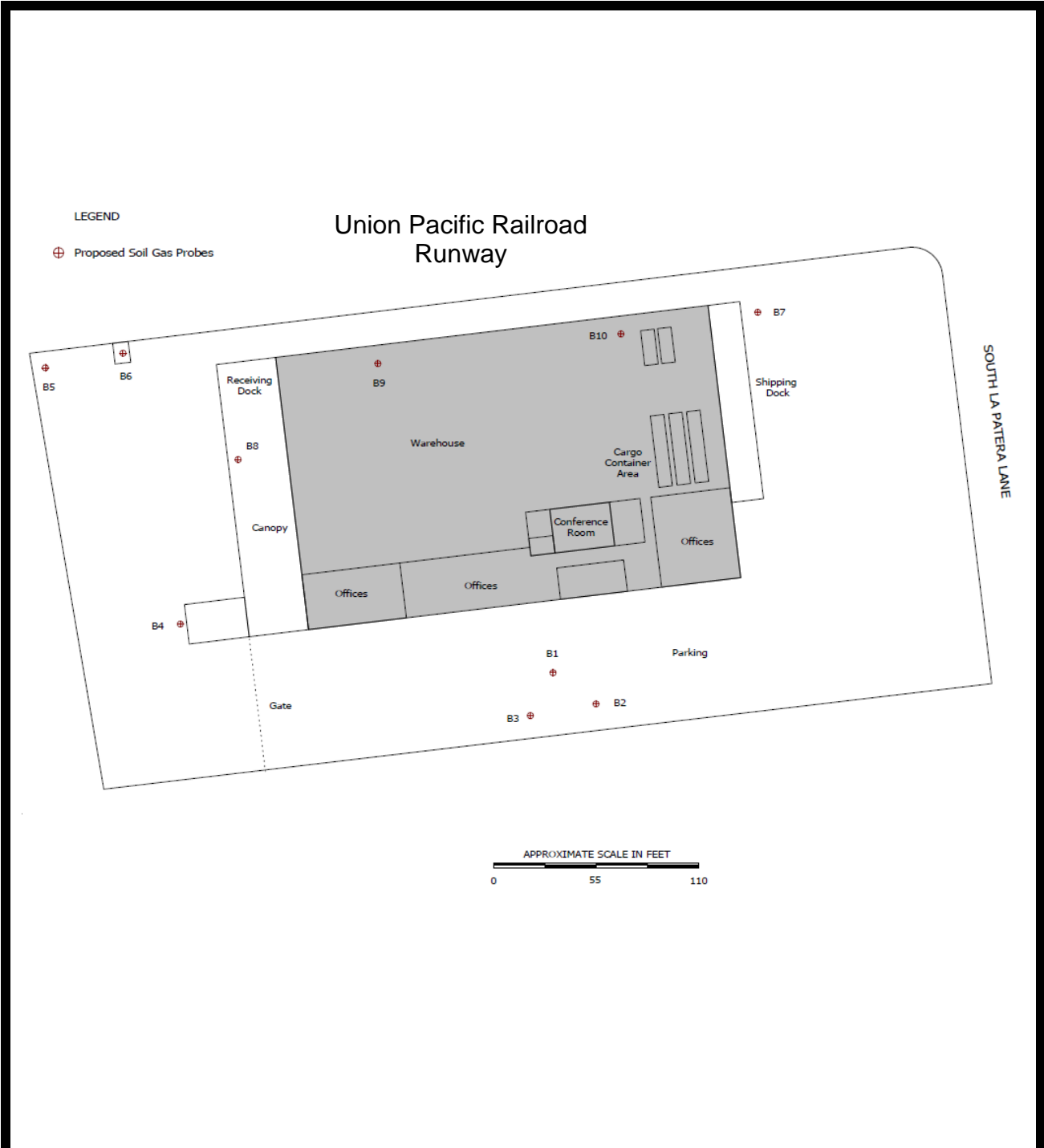


Figure 1: Proposed Boring Location Plan
Date: December 19, 2023
Scale: None
Project: Goleta Train Depot
Project Number: 14242.00

All Phase Environmental, Inc.






EXHIBIT "G" (Limited PH2 Investigation Work Plan)

APPENDIX B

Geophysical Investigation Report

APPENDIX D

Photographs



GPR investigation of floor drain in main warehouse.



GPR investigation of pipes in the floor in the southwest corner of the west warehouse space.



GPR investigation of pipes in the floor in the southeast corner of the west warehouse space.



Boring locations B1, B2, and B3.



Boring locations B4.



Boring locations B4.



Boring locations B5.



Boring locations B5.



Boring locations B6.



Boring locations B6.



Boring locations B7.



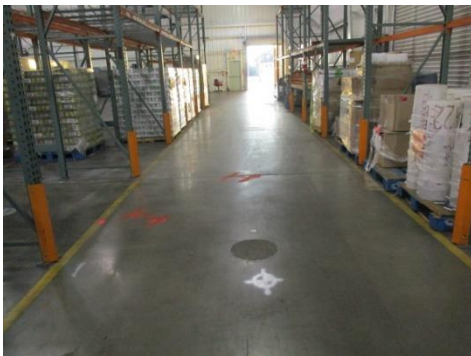
Boring locations B7.



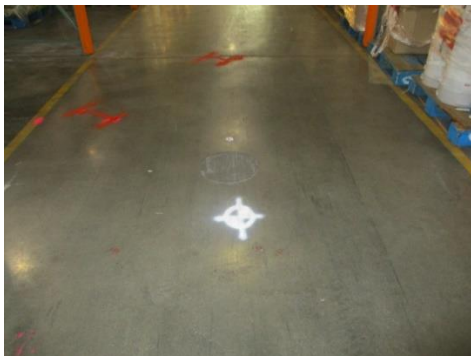
Boring locations B8.



Boring locations B8.



Boring locations B9.



Boring locations B9.



Boring locations B10.



Boring locations B10.

EXHIBIT H

LIMITED PHASE II INVESTIGATION REPORT

PREPARED BY ALL PHASE ENVIRONMENTAL, INC.

DATED DECEMBER 9, 2023

All Phase Environmental, Inc.



Limited Phase II Investigation

**Goleta Train Depot
27 South La Patera Lane
Goleta, California, 93117**



February 9, 2024

Prepared for:

**City of Goleta
City Hall - 130 Cremona Drive, Suite B
Goleta, California 93117**

Prepared by:

**All Phase Environmental, Inc.
8792 Lauder Circle, Suite 200
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(800) 567-7729**

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EXHIBIT "H" (LIMITED PH2 INVESTIGATION)

APEI Project No. 14242.00

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- APPENDIX C Boring Logs**
- APPENDIX D Soil Vapor Analytical Laboratory Report**
- APPENDIX E Soil Analytical Laboratory Report**
- APPENDIX F Photographs**
- APPENDIX G Soil Gas Sampling Data**

1.0 Summary

At the request of the City of Goleta, All Phase Environmental, Inc. (APEI) conducted a limited Phase II investigation of the site located at 27 South La Patera Lane, Goleta, California 93117, hereinafter referred to as the “subject property.”

APEI performed a Phase I ESA of the subject property in 2016. The City of Goleta later purchased the subject property with the intent to convert the warehouse/industrial site into a new train depot facility. The purpose of this investigation was to screen the soil and groundwater, if encountered, for possible chemical impacts from past uses in the most likely areas.

Between January 25 and 28, APEI advanced ten borings on the subject property to varying depths ranging from 5 to 30 feet below ground surface (bgs), installed soil vapor probes, and performed soil and vapor sampling. Soil and soil vapor samples were collected from various depths and selectively analyzed for TPH-G, VOCs, TPH-D/MO, organochlorine pesticides, Title 22 Metals (CAM15), and methane.

The results from this work indicated no detectable concentrations of petroleum hydrocarbons in soil, no concentrations of heavy metals in soil that exceed current residential or commercial screening levels, and no concentrations of VOC in soil gas that exceed current commercial screening levels. The results from laboratory analysis of methane indicated no detectable concentrations. Based on these results, no further sampling is recommended.

APEI also performed a geophysical survey of the subject property to clear borings and to confirm the removal of a former UST from the subject property. The geophysical survey could not completely rule out the existence of an existing UST. Although only low concentrations of Total Petroleum Hydrocarbons in the gasoline range (TPHg), benzene, and toluene were detected in this area (SG1-10), the presence of higher concentrations of petroleum compounds in the area of the former UST cannot be ruled out.

Due to the limited nature of the Phase II performed on the subject property and the presence of low levels of petroleum compounds identified in the soil vapor near the former UST area, and the long historical use of the subject property for commercial and industrial purposes, the development and implementation of a Soil Management Plan (SMP) is recommended as a measure to manage encountered impacted soils, if any.

2.0 Subject Property Description

The subject property is a parcel that occupies approximately 2.48-acres, and the street address is 27 South Patera Lane, in the City of Goleta, in the County of Santa Barbara, California, 93117. The subject property is composed of one parcel with APN number 073-050-033. The subject property is located on the west and south side of South Patera Lane. South Patera Lane delimits the subject property to the west, Union Pacific Railroad Runway delimits the subject property to the north, and office building and industrial site delimits the subject property to the south, and an industrial site delimits the subject property to the east.

The subject property is developed with a one-story office and industrial warehouse structure. The building is approximately 30,000-square feet and was constructed in approximately 1967. There are office spaces along the south side of the building with a small mezzanine office and storage space in the southwest corner of the building. The remainder of the building is composed of two open warehouse areas. On the west end of the building is a grade level warehouse area. A loading dock is located on the east side of the warehouse and a ramp and receiving dock are situated in the northwest corner of the building. Outside the southwest corner of the building are a diesel generator and an 1,800-gallon diesel UST that remains operational. At the time of the investigation, the building was partially occupied by a tenant using it for intermittent classes, office space, and warehouse space.

Concrete paving covers the west end of the parcel and the land east of the east loading dock. An asphalt paved parking lot covers the remainder of the land south and east of the office area of the building. There are landscaped planters along the east border and strips of landscaped grounds bordering the east loading dock. The subject property can be accessed via a driveway from South La Patera to the east, and roll-up doors in the warehouse open to the Union Pacific Railroad Runway to the north.

3.0 Summary of Historical Uses

Tenant History

The following is a summary of historical uses of the subject property obtained from a Phase I ESA previously performed by APEI in 2016:

- Orchards from prior to 1943 through 1947.
- Cleared of orchards between 1947 and 1967.
- Developed with the existing subject property building in 1967.
- Occupied by Sears from 1967 through 1988, most likely used as offices and warehouse space.
- Portions of the subject property were occupied by several delivery and transportation firms from at least 1980 through 1992. Durham Transportation was one of these tenants who stored small quantities of hazardous substances and petroleum products. Durham Transportation reportedly performed bus repairs on the subject property.
- Raytheon occupied the subject property from 1982 through August of 1990, and most likely used the building for offices and warehouse space.
- In 2018, the City of Goleta acquired the subject property for the purposes of constructing the Goleta Train Depot.
- The owner prior to acquisition by the City of Goleta in 2018 was Direct Relief International, which has occupied portions or all of the subject property since at least 1999.

Environmental History

The following is a summary of significant hazardous substances and petroleum product storage and uses on the subject property (APEI, 2016):

- Organochlorine pesticides may have been used when the subject property was occupied by orchards from prior to 1943 through 1947.
- Sears installed a former 7,500-gallon diesel UST in 1967. Documents reviewed indicated that the associated piping and dispenser were located directly over the tank.
- Under permit and regulatory oversight, the tank, associated piping, and dispenser were removed from the subject property on April 12, 1990. Some visually stained soil was identified. The Santa Barbara County, Environmental Health Services (EHS) and Santa Barbara County Fire were present during the tank removal. The tank was reported to be in good condition, no groundwater was encountered but some discolored soils were noted at the midpoint of the tank. Soil samples were taken from the bottom and sidewall of the excavation and from stockpiled soils. Soil samples were analyzed for total petroleum hydrocarbons (TPH), benzene, toluene, ethylbenzene, and xylene (BTEX), and total lead. Total lead was reported to be at background levels. The sidewall results for fuel constituents were below laboratory detection levels. The bottom sample had detectable levels of TPH at 2.1 parts per million (mg/kg or ppm) and trace BTEX concentrations. All results were reported to be below cleanup levels. Samples of excavated soils contained up to 11 ppm gasoline and 110 ppm diesel. No further action was recommended. Supporting documents indicated the soil and UST had been taken offsite for disposal.
- Documents reviewed indicated that the 7,500 gallon UST may have been used for diesel and gasoline.
- Direct Relief International installed the existing diesel generator and associated 1,800 gallon diesel UST in 2008.
- The remaining diesel UST is a double walled fiberglass tank with an outer reinforced steel jacket and double walled piping equipped with an interstitial Veeder Root monitoring system.
- During a 2016 ESA performed on the subject property for due diligence purposes prior to purchase, two unlabeled 55-gallon drums of an unknown solid were observed in the northwest corner of the subject property. These have since been removed.
- A 55-gallon drum of unidentified contents remains next to the diesel generator. This drum was labeled as hazardous waste.
- A waste oil AST and a clarifier were observed on the north adjacent site on the west end of the subject property that remain there as of the publication of this work plan.

4.0 Geology

The subject property is located in the Goleta Valley, a low-lying, gently southwest sloping coastal plain. The Goleta Valley is bounded to the north by the Santa Ynez Mountains, to the south and west by the Pacific Ocean, and to the east by the Mesa Hills and relatively elevated alluvial terraces. The surrounding highlands are composed of steeply south sloped consolidated sedimentary rocks of Tertiary age. These Tertiary age materials are interpreted to be present at depths of approximately 500-feet below the ground surface (Olson, 1982). Folded consolidated bedrock is unconformably overlain by almost flat-lying, unconsolidated sediments, including greater than approximately 430 feet of the Plio-Pleistocene Santa Barbara Formation, and approximately 70-feet of Recent alluvial deposits. The subject property is underlain by these alluvial deposits.

According to the Web Soil Survey by the National Resources Conservation Service dated September 3, 2015, the primary soil type at the subject property is Milpitas-Positas fine sandy loams. The landform setting for this soil is described as terraces with a slope of 2 to 9 percent. This soil is moderately well drained and the depth to the water table is more than 80-inches.

Based on the drilling logs the sediments beneath the site consist mostly of silty clay and sandy clay deposits to 15 feet below grade underlain by silty sand and sand deposits to 30 feet below grade where a dense and hard sand or silty clay layer was encountered and drilling was terminated due to refusal conditions. Groundwater was not encountered to 30 feet below grade, the maximum depth of exploration. The drilling logs are presented in Appendix C.

5.0 Hydrogeology

Unconfined groundwater exists within the younger alluvium in the basin but the vast majority of the groundwater is present in a confined or semi-confined condition. Most wells within the basin derive groundwater from the Santa Barbara Formation (Upson, 1951). Groundwater was not encountered in any of the borings with the deepest drilled to 30 feet bgs.

Based on information available on the GeoTracker website, the depth to groundwater at a site located about 250 feet west of the property was less than 10 feet below grade when last measured in 2004. (Bardex Corp Machine Shop, 6338 Lindmar Drive, Goleta CA, Global ID T10000008818).

6.0 Geophysical Investigation Findings

The purpose of the geophysical investigation was to locate detectable utilities in the vicinity of the advancement of the 10 borings. The work also included a search for potential subsurface structures associated with the former 6,000 to 7,500-gallon Underground Storage Tank (UST) and pump island formerly located adjacent to the southern property boundary. Lastly, the investigation was to investigate three (3) areas roughly 25 feet by 25 feet in size. The three areas were to be searched for traces of subsurface structures associated with possible sumps and/or drain systems inside the subject property building.

All 10 borings were cleared of identifiable utilities.

The three areas investigated inside the subject property building did not identify any subsurface structures. One floor drain near the southeast corner of the large warehouse was deemed to be a sanitary drain formerly associated with the adjacent bathrooms and not an industrial wastewater drain.

The Ground Penetrating Radar (GPR) investigation identified two anomalies that could not be attributed to above ground cultural features and/or detected utilities. A search of the area depicted on regulatory record drawings showed undisturbed soil. It was deemed that these hand-drawn maps were not accurate. Searching further to the west, an area was identified where there had been significant disturbance to the soil below the asphalt. This was then determined to likely have been the location of the former UST. In addition to disturbed soil, two anomalies were identified.

Anomaly A was approximately 26-feet by 17-feet in size and at a depth of approximately 3 to 6 feet below the surface. Using GPR it was revealed that it was possibly reinforced concrete mesh beneath the asphalt in an area of disturbed soil. The presence of reinforced concrete mesh is only an estimate, it is possible that the anomaly is some other object. It is also possible that something else lies beneath the reinforced concrete mesh/object that was not detected which could be a UST.

Anomaly B was approximately 31-feet by 12-feet in size and at a depth of approximately 3 to 6 feet below the surface. Using GPR it was revealed that it was possibly reinforced concrete mesh beneath the asphalt with an additional uneven layered reflection deeper in the profiles in an area of disturbed soil. The presence of reinforced concrete mesh is only an estimate, it is possible that the anomaly is some other object. Readings interpreted from deeper analysis indicated that the area below the reinforced concrete mesh/object was deemed not typical of an excavation or a UST.

The geophysical survey could not completely rule out the existence of an existing UST, so these areas were targeted for subsurface exploration. Only native sediments were encountered in these locations indicating no UST was present.

7.0 Boring Locations, Strategies, and Descriptions

Figure 1 in Appendix A contains a drawing illustrating the boring locations and Appendix F contains photographs of each boring location.

Boring Locations B1, B2, and B3

These three borings were intended to identify possible releases from the former 7,500 gallon diesel/gasoline UST. The locations were selected using the data from the GPR report. All three borings were situated around the identified anomalies since drilling into the anomalies would likely have resulted in refusal. The targeted depth of boring B1 was 36 feet bgs but due to refusal, the terminal depth was 30 feet below grade. This boring was intended to investigate possible releases from the former underground tank, associated piping, and dispensers not previously identified during the tank removal. Borings B2 and B3 were advanced to a terminal depth of 10 feet below ground surface (bgs) and were intended to investigate for releases from the associated piping or dispensers not previously identified during the tank removal.

Boring Location B4

B4 was intended to identify possible undetected releases from the existing 1,800 gallon diesel UST. The targeted depth at B4 was 36 feet bgs but due to refusal, the terminal depth was 30 feet below grade. The location was selected to be nearest to the tank and associated piping without being located in the tank excavation (which would be filled with pea gravel).

Boring Location B5

B5 is intended to identify possible undetected releases that may have migrated to this corner where there is a stormwater collection drain for the west side of the subject property. It is postulated that Durham Transportation performed bus repairs on the west side of the subject property and any spills in this area would migrate to this corner. In addition, two unlabeled 55 gallon drums of an unknown solid were previously observed in this corner. B5 was advanced to a terminal depth of 5 feet bgs.

Boring Location B6

B6 was intended to identify possible undetected releases that may have migrated to this area from stored materials, improper disposal into solid waste dumpsters formerly located in this area, and from the north adjacent waste oil AST and clarifier. B6 was advanced to a terminal depth of 5 feet bgs.

Boring Location B7

B7 was intended to identify possible undetected releases that may have migrated to this area from the east loading dock and from a drain/sump located in this corner. B7 was advanced to a terminal depth of 5 feet bgs.

Boring Location B8

B8 was intended to identify possible undetected releases that may have migrated to this area from former work performed in the west end warehouse space. This location was selected because it was the lowest elevation in this area and there were no other conduits to the subsurface identified during the visual and GPR survey. It is not known what work may have been performed in this area of the warehouse but if vehicle repairs were being performed by Durham Transportation, it is likely that they would have used this area of the warehouse. B8 was advanced to a terminal depth of 5 feet bgs.

Boring Locations B9 and B10

B9 and B10 were intended to identify possible undetected releases that may have occurred from former onsite operations in the main area of the subject property warehouse. The visual and GPR survey did not identify any subsurface anomalies worthy of testing. There were no areas in the warehouse where trenching or signs of prior uses, other than warehousing, were evident. Therefore, if there had been a release in the main warehouse, it would have likely been due to spillage from stored materials in the building. Boring B9 was located next to what looks like a boring from a prior investigation. Boring B10 was located next to a rack that had an eyewash station, typical of an area where hazardous materials would have been stored. Finally, these boring locations were located next to the north rollup doors where spills from materials being loaded onto the adjacent railway would most likely occur. B9 and B10 were advanced to a terminal depth of 15 feet bgs.

8.0 Sampling Depths, Media, and Laboratory Analysis

The following is a list of the sampling depths achieved, the media collected, and analysis performed in each of the ten (10) borings.

B1

- Advanced to a terminal depth of 30 feet bgs or refusal.
- Soil samples were collected at depths of 5', 10', 15', 20', 25', 30'. These were analyzed for TPH-G.
- Soil vapor probes were installed at 5' and at the terminal depth of 30'. Soil Vapor samples were analyzed for VOCs.
- Groundwater was not encountered and therefore could not be sampled.

B2 and B3

- Advanced to a terminal depth of 10 feet bgs.
- Soil samples were collected at depths of 5' and 10'. These were analyzed for TPH-G.
- Soil vapor probes were installed at depths of 5' and 10'. Soil Vapor samples were analyzed at both depths for VOCs.

B4

- Advanced to a terminal depth of 30 feet bgs or refusal.
- Soil samples were collected at depths of 5', 10', 15', 20', 25', 30'. These were analyzed for TPH-D/MO.
- Groundwater was not encountered and therefore could not be sampled.

B5

- Advanced to a terminal depth of 5 feet bgs.
- A soil sample was collected at 5' and analyzed for TPH-G, TPH-D/MO, organochlorine pesticides, and Title 22 Metals (CAM15).
- A soil vapor probe was installed at 5' and analyzed for VOCs and TPH-G.

B6

- Advanced to a terminal depth of 5 feet bgs.
- A soil sample was collected at 5' and analyzed for TPH-Gallon and TPH-D/MO.
- A soil vapor probe was installed at 5' and analyzed for VOCs and TPH-G.

B7

- Advanced to a terminal depth of 5 feet bgs.
- A soil sample was collected at 5' and analyzed for TPH-Gallon and TPH-D/MO.
- A soil vapor probe was installed at 5' and analyzed for VOCs and TPH-G.

B8

- Advanced to a terminal depth of 5 feet bgs.
- A soil sample was collected at 5' and analyzed for TPH-Gallon and TPH-D/MO.
- A soil vapor probe was installed at 5' and analyzed for VOCs and TPH-G.

B9 and B10

- Advanced to a terminal depth of 15 feet bgs.
- Soil samples were collected at depths of 5' and 15'. The 5' samples were analyzed for TPH-G, TPH-D/MO, and Title 22 Metals (CAM15). The soil samples at 15' were preserved for possible additional analysis pending the results from the 5' samples.
- Soil vapor probes were installed at depths of 5' and 15'. Soil vapor samples were analyzed at both depths for VOCs, TPH-G, and methane. One duplicate soil vapor sample was collected and analyzed for VOCs, TPH-G, and methane.

9.0 Soil Sampling Protocol

Soil borings were advanced using a direct-push sampling rig. The direct-push system is driven by a hydraulic hammer and was equipped with a dual-tube core barrel. As the hollow dual-tube core barrel was driven downward, soil was pushed into a 4-foot long acetate sleeve that was located within the inner core barrel. The inner core barrel was lifted up and the acetate sleeve was removed, and another empty sleeve was inserted into the inner core barrel. The outer core barrel was temporarily left in place to provide bore-hole stability. This procedure was repeated until the desired depth was reached.

At select depths, soil samples were collected within the acetate sleeve and a six-inch long portion of the sleeve was isolated and cut from the 4-foot long sleeve. That sample was immediately capped and preserved with Teflon tape and end caps and chilled on ice in a cooler pending delivery to a State certified laboratory.

During drilling, a photo-ionization detector was used to screen all soil samples collected from the borings for VOCs and for worker health and safety concerns. The PID was calibrated with hexane (100 ppmV) in the field in the morning prior to the commencement of any field activities. The identified lithology (Unified Soil Classification System) along with the PID readings were recorded on boring logs.

10.0 Soil Vapor Probe Installation and Sampling Protocol

All but boring B4 received soil vapor probes that were used to measure and specify the type of VOCs present in soil gas. During drilling, at the desired depth, a 2-inch long vapor probe fitted with ¼-inch ID tubing was placed within the outer core barrel and the barrel was lifted out of the bore hole. A 1-foot thick sand pack was placed above and below the probe followed by 6-inches of dry bentonite and then hydrated bentonite to the near surface. Where multiple probes were placed in the same borehole, the same installation procedure was used, but the deepest probe was distinguished from the shallow by slightly longer tubing and labeling. The probes were allowed to equilibrate for a minimum of 4-hours prior to sampling, and the probes were purged and sampled in general accordance with the DTSC vapor intrusion guidance specifications (DTSC's Supplemental Guidance, Screening and Evaluating Vapor Intrusion, February 2020).

Each probe head was attached to the sampling train assembly of Teflon tubing, valves, and fittings and connected to a purge pump. The pump was used to evacuate the sealed system using an applied maximum vacuum of 100 inches of water column (in. WC). The vacuum on each probe was monitored for 90 seconds with the sampling train system sealed. After the shut-in test was validated, the sampling train was leak tested. Liquid isopropyl alcohol was applied to a cloth and placed around all connections in the sampling train to evaluate whether the system was sealed from ambient air leaks. A detection of 10 times the reporting limit of this compound was not measured suggesting that ambient air leakage had not occurred.

Each probe was purged prior to sampling, and the purpose of purging was to remove stagnant air from the vapor sampling train to ensure representative samples are obtained. The probes were purged of three purge volumes of soil gas (a purge volume includes the volume of tubing plus the void space of the sand pack around the probe) using an adjustable vacuum pump. The purge rate was set at 200 mL/minute.

After purging three volumes through the system, soil gas samples were collected in glass syringes from each probe by a technician operating a mobile lab from A&R Laboratories. Each sample was analyzed for TPHg (EPA Method 8015M, methane (EPA Method 8015M), and/or VOCs (EPA Method 8260B). A greater volume of air from the sample was used for the analysis to achieve detection limits for each compound comparable to the EPA Method TO-15 test, which should meet residential standards.

11.0 Cultural Resources Observation

During soil sample collection, the Professional Geologist inspected the soil removed during drilling operations. There were no bones, artifacts, or evidence of any manmade materials identified in the soil removed from the subject property.

12.0 Groundwater Results

Groundwater was not encountered in any of the borings with the deepest drilled to 30 feet bgs.

13.0 Soil Vapor Sample Results

The results from soil vapor sampling indicated none of the samples had significant concentrations of TPHg with two samples having a maximum of just 3.3 ug/L (in sample SG1-10). The results from VOC analysis indicated two isolated detections of benzene with 0.010 ug/L detected in samples SG1-10 and SG9-15. This concentration is below the commercial screening level of 0.014 ug/L. Two samples also had detectable concentrations of trichloroethene (TCE) with 0.010 ug/L detected in both SG6-5 and SG10-5. These concentrations are well below the commercial screening level of 0.100 ug/L. Other much less sensitive VOC including toluene and trimethylbenzene were detected in some samples, none approaching commercial screening levels. In addition, the results from methane sampling indicated no detectable concentrations in either sample. These results are summarized in Table 2. The laboratory report from soil vapor sampling is included in Appendix D.

14.0 Soil Sample Results

The results from soil sampling indicated none of the samples had detectable concentrations of petroleum hydrocarbons. The three soil samples (B5-4, B9-5, and B10-5) analyzed for heavy metals indicated none had concentrations approaching residential or commercial screening levels. No OCP was detected in sample B5-4. These results are summarized in Tables 1 and 1A. The laboratory report from soil sampling is included in Appendix E.

15.0 Methane Sample Results

During purging of the soil gas, some samples had notable concentrations of methane. Based on these results, two samples were preserved for methane analysis by the laboratory by EPA Method 8015. These results are summarized in Table 2. The laboratory report from soil sampling is included in Appendix G.

16.0 Findings, Conclusions, and Recommendations

The site has a long history of commercial use, and it formerly maintained USTs. Based on the site history, a subsurface investigation was recommended. In January 2024 APE conducted a site assessment that included installation of 10 soil borings in targeted area across the site. Each boring was completed as a soil gas sampling probe; six of them with two sampling tips installed at discrete depths ranging from 5 to 30 feet below grade. The investigation included laboratory analysis of 20 soil samples and 16 soil gas samples for a variety of suspect contaminants including petroleum hydrocarbons, VOC, heavy metals, and OCP. In addition, field monitoring indicated the presence of methane in significant concentrations, so two soil gas samples were laboratory tested for methane.

The results from this work indicated no detectable concentrations of petroleum hydrocarbons in soil, no concentrations of heavy metals in soil that exceed current residential or commercial screening levels, and no concentrations of VOC in soil gas that exceed current commercial screening levels. The results from laboratory analysis of methane indicated no detectable concentrations. Based on these results, no further sampling is recommended.

Due to the limited nature of the Phase II performed on the subject property and the presence of low levels of petroleum compounds identified in the soil vapor near the former UST area, and the long historical use of the subject property for commercial and industrial purposes, the development and implementation of a Soil Management Plan (SMP) is recommended as a measure to manage encountered impacted soils, if any.

17.0 References

Phase I Environmental Site Assessment, Industrial Property, 27 South Patera Lane, Goleta, California, 93117, All Phase Environmental, Inc., September 7, 2016.

Surface and Subsurface Geology of the Santa Barbara-Goleta Metropolitan Area, Santa Barbara County, California, Daniel J. Olson, October 1982.

Web Soil Survey, National Resources Conservation Service, September 3, 2015, <http://websoilsurvey.nrcs.usda.gov/Appendix>.

18.0 Environmental Professionals' Signatures

The undersigned certifies that the professional services have been conducted, our findings obtained, and our recommendations have been prepared in accordance with customary principles and practices in the field of environmental science and engineering. APEI has acted in good faith and has no relationship with sellers, buyers or agents of the subject property. There have been no conflicts of interest involved in the drawing of conclusions, which have been based solely on materials reviewed and visual inspections conducted by APEI.

Prepared by:

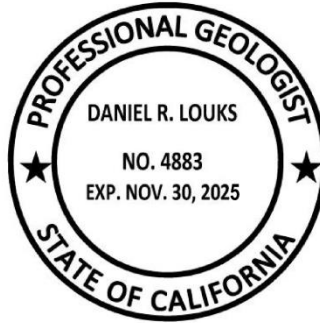


Douglas B. Kochanowski, CHMM, CAC
Environmental Professional, Senior Environmental Scientist, and Biologist

Reviewed by:



Daniel R. Louks, P.G.



19.0 Qualifications of Environmental Professionals

Doug Kochanowski

**Environmental Professional, Senior Environmental Scientist, and Biologist
CHMM (#9970), CAC (#99-2699)**

Professional Experience:

Mr. Kochanowski has been performing Phase I Environmental Site Assessments (ESAs) since 1988 and is considered an industry expert. The environmental consulting profession was in its infancy when he performed his first ESA. Over the past three decades, Mr. Kochanowski has performed ESAs on almost every type of real property in over ten different states and in Europe. This includes military bases, medical facilities, high-rise office buildings, learning institutions, factories, shopping malls and plazas, gasoline stations, industrial parks, manufacturing facilities, vacant land, agricultural land, housing tracks, multifamily developments, and government facilities. His wide array of experience has made him a key component for conducting complex ESAs and his expertise is sought after by a wide variety of clients and other consulting firms. His practical approach and comprehensive knowledge of the ASTM standards result in ESAs that are accurate, comprehensive, and address environmental issues with a common-sense approach.

Mr. Kochanowski's environmental portfolio also includes experience conducting a variety of additional services that include soil, groundwater, and soil vapor testing, modeling, landfill leachate testing, indoor air sampling, lead-based paint sampling, and conducting human health risk assessments. He has managed several large IDT contracts for the European District Corps of Engineers, working at over twenty bases in Germany and Spain. Projects included remediation design, soil and groundwater sampling, landfill leachate testing, asbestos surveys, air monitoring, and radon testing.

For as long as Mr. Kochanowski has been writing ESAs he has also been performing asbestos testing and consulting. He is a California Certified Asbestos Consultant and is NIOSH 582 Certified to analyze Polarized Light Microscopy (PLM) samples. Mr. Kochanowski performs asbestos surveys, develops removal specifications and drawings, writes Operations and Management (O&M) Plans, and conducts contractor observation and air monitoring during abatement projects. His asbestos experience includes schools, nuclear facilities, universities, airports, hospitals, military bases, shopping malls, high-rise office buildings, industrial complexes, port facilities, apartments and single-family homes. Mr. Kochanowski was the Manager and Facility Security Officer (FSO) for a high-profile asbestos survey, air monitoring and abatement project of the White House, Washington D.C. His AHERA survey experience includes inspecting over eight million square feet of building space for school districts in California, Kansas, New Mexico and Tennessee.

Mr. Kochanowski has teaching experience including conducting OSHA 1910.120 HAZWOPR, Confined Space Entry, and asbestos awareness classes.

He has served as Secretary on the Board of Directors and was a founding father for the SoCal ACHMM chapter. In the past, he has served on the technical committee for a Local Emergency Planning Commission (LEPC) and was elected Secretary on the Board of Directors for the Rhine-Main Post of the Society of American Military Engineers (SAME).

Education:

Bachelor of Science, Biology, San Diego State University, 1987.
Continuing Education; Strategies for Conducting Meaningful Microbial IAQ Investigations/American Indoor Air Quality Council

Registrations and Certifications:

CHMM, Master Level; Secretary of the SoCal ACHMM Chapter
California Certified Asbestos Consultant (#09-2699)
NIOSH 582 Accredited Sampling and Evaluation Airborne Asbestos
Certified, OSHA 40Hr Trained 1910.120/Site Supervisor
Certified TRGS 519 Under German Hazardous Materials Regulations
AHERA Certified Asbestos Inspector, Management Planner, Designer, and Abatement Supervisor
Certified Radiation Worker
Confined Space Entry Certified

Daniel R. Louks
California Professional Geologist

Education

M.S. Candidate, Applied Geophysics, California State University, Northridge, Ca.
B.S. Geology, University of California, Los Angeles, Ca, 1983.

Professional Affiliations

California Professional Geologist
California Professional Civil Engineer

Professional Experience

Mr. Louks has worked as an Engineer and Hydrogeologist, responsible for the design, planning, budgeting, and operations of all environmental and hydrogeological related projects. He provides environmental engineering and consulting services with expertise. Project experience includes injection of oxidants and electron donor materials within the saturated zone for the chemical and biologic decomposition of halogenated solvents and petroleum compounds. Mr. Louks has experience with the operation of vapor and dual-phase extraction systems for the physical removal of volatile solvents and petroleum compounds.

Mr. Louks has worked as a Senior Geologist responsible for the design, implementation, budgeting, and operations of environmental and geological projects. He has participated in the development and management of financial operations associated with hydrogeological groups.

Mr. Louks has developed and managed hydrogeologic service groups. He was responsible for the design, implementation, budgeting, and operations of environmental related projects. Mr. Louks participated in the development and management of financial operations associated with a hydrogeological group. He has been responsible for the design, implementation, and operations of bioreclamation projects.

Publications

Maggio, A., Louks, D., 1989, Determining the Feasibility and Design Parameters for In-Situ Biodegradation of Gasoline in a Shallow Aquifer, The Proceedings of the Third National Outdoor Action Conference on Aquifer Restoration, Groundwater Monitoring and Geophysical methods: National Water Well Association, Dublin, OH, pp. 521-534.

20.0 Tables

TABLE 1
 Summary of Soil Sampling Results (mg/Kg)

Sample ID	Heavy Metals Above Commercial Screening Levels	OCP	TPHg C4-C12	TPHd C13-C22	TPH-Oil C23-C40
Sampled January 25, 2024					
B1-5	--	--	ND<0.50	ND<10	ND<20
B1-10	--	--	ND<0.50	ND<10	ND20
B1-15	--	--	ND<0.50	ND<10	ND20
B1-20	--	--	ND<0.50	ND<10	ND20
B1-30	--	--	ND<0.50	ND<10	ND<20
B2-5	--	--	ND<0.50	ND<10	ND<20
B2-10	--	--	ND<0.50	ND<10	ND<20
B3-5	--	--	ND<0.50	ND<10	ND<20
B3-10	--	--	ND<0.50	ND<10	ND<20
B4-5	--	--	ND<0.50	ND<10	ND<20
B4-10	--	--	ND<0.50	ND<10	ND20
B4-15	--	--	ND<0.50	ND<10	ND20
B4-20	--	--	ND<0.50	ND<10	ND20
B4-30	--	--	ND<0.50	ND<10	ND<20
B5-4	None	ND	ND<0.50	ND<10	ND<20
B6-4	--	--	ND<0.50	ND<10	ND<20
B7-4	--	--	ND<0.50	ND<10	ND<20
B8-4	--	--	ND<0.50	ND<10	ND<20
B9-5	None	--	ND<0.50	ND<10	ND<20
B10-5	None	--	ND<0.50	ND<10	ND<20
Residential RSL	--	--	82	82	82
Commercial RSL	--	--	420	420	420

Notes: ND - Not Detected. Carbon Chain Hydrocarbon analysis includes Total Petroleum Hydrocarbons (TPH) expressed as gasoline (g, diesel (d) and Oil. EPA Regional Screening Levels (RSLs) are human health risk based screening levels used by EPA and DTSC to determine Health Risk in residential and industrial settings. Please refer to lab report for complete results.

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Goleta Train Depot Limited Phase II Investigation
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TABLE 1A
Summary of Heavy Metal Results (mg/Kg)

Sample ID	Arsenic	Barium	Cadmium	Chromium	Cobalt	Copper	Lead	Nickel	Vanadium	Zinc
Sampled January 25, 2024										
B4-5	3.52	65.4	1.22	28.4	9.00	33.2	4.07	29.4	27.6	41.9
B9-5	2.66	153	1.06	23.4	8.02	29.3	5.07	27.4	24.0	34.7
B10-5	4.05	83.2	1.05	22.3	3.92	28.5	5.37	16.7	29.0	31.8
Residential RSL	0.11*	15,000	7.1*	36,000*	23	3,100	80*	820*	390*	23,000
Commercial RSL	0.36*	220,000	79*	170,000*	350	47,000	500*	11,000*	5,800*	350,000
DTSC Bkgrnd	12	--	--	--	--	--	--	--	--	--

*Notes: Sample also had detectable concentrations of antimony (1.10 mg/Kg); Residential RSL=31 mg/Kg; Commercial RSL= 470 mg/Kg, beryllium (1.24 mg/Kg); Residential RSL= 16 mg/Kg; Commercial RSL= 230 mg/Kg and molybdenum (0.699 mg/Kg); Residential RSL= 390 mg/Kg; Commercial RSL= 5,800 mg/Kg. ND-Not Detected. EPA Regional Screening Levels (RSLs) are human health risk based screening levels used by EPA and DTSC to determine Health Risk in residential and industrial settings. *-Values modified for California by DTSC HERO Note 3. DTSC Background Concentration is based on statistical study of sites throughout southern California. This concentration may be used as a screening level for anthropogenic and naturally occurring levels of arsenic in soil in southern California. Please refer to lab report for complete results.*

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TABLE 2
Summary of Soil Gas Sampling Results (ug/L)

Sample ID	Benzene	Toluene	Ethylbenzene	Xylenes	TCE	PCE	Other VOC	TPHg	Methane (ppmV)
Sampled January 28, 2024									
SG1-10	0.010	0.010	ND<0.0065	ND<0.013	ND<0.0065	ND<0.0065	ND	3.3	--
SG1-30	ND<0.0031	ND<0.0065	ND<0.0065	ND<0.013	ND<0.0065	ND<0.0065	ND	ND<0.65	--
SG2-5	ND<0.0031	ND<0.0065	ND<0.0065	ND<0.013	ND<0.0065	ND<0.0065	IPA=1.4	ND<0.65	<15
SG2-10	ND<0.0031	ND<0.0065	ND<0.0065	ND<0.013	ND<0.0065	ND<0.0065	ND	ND<0.65	--
SG3-5	ND<0.0031	ND<0.0065	ND<0.0065	ND<0.013	ND<0.0065	ND<0.0065	ND	ND<0.65	--
SG3-10	ND<0.0031	ND<0.0065	ND<0.0065	ND<0.013	ND<0.0065	ND<0.0065	ND	ND<0.65	--
SG4-10	ND<0.0031	ND<0.0065	ND<0.0065	ND<0.013	ND<0.0065	ND<0.0065	Var.	ND<0.65	<15
SG4-30	ND<0.0031	ND<0.0065	ND<0.0065	ND<0.013	ND<0.0065	ND<0.0065	ND	ND<0.65	--
SG5-5	ND<0.0031	ND<0.0065	ND<0.0065	ND<0.013	ND<0.0065	ND<0.0065	ND	ND<0.65	--
SG6-5	ND<0.0031	ND<0.0065	ND<0.0065	ND<0.013	0.010	ND<0.0065	ND	ND<0.65	--
SG7-5	ND<0.0031	ND<0.0065	ND<0.0065	ND<0.013	ND<0.0065	ND<0.0065	ND	ND<0.65	--
SG8-5	ND<0.0031	ND<0.0065	ND<0.0065	ND<0.013	ND<0.0065	ND<0.0065	ND	ND<0.65	--
SG9-5	ND<0.0031	ND<0.0065	ND<0.0065	ND<0.013	ND<0.0065	ND<0.0065	Chlr=0.010	ND<0.65	--
SG9-15	0.010	0.010	ND<0.0065	ND<0.013	ND<0.0065	ND<0.0065	Var.	1.8	--
SG10-5	ND<0.0031	ND<0.0065	ND<0.0065	ND<0.013	0.010	ND<0.0065	Chlr=0.020	ND<0.65	--
SG10-15	ND<0.0031	ND<0.0065	ND<0.0065	ND<0.013	ND<0.0065	ND<0.0065	TCTFE	ND<0.65	--
Residential RSL AF=0.03	0.003*	10.3*	0.037	3.33	0.016	0.015*	--	--	--
Commercial RSL AF=0.03	0.014*	43.3*	0.163	14.67	0.10	0.067*	--	--	--

Notes: ND - Not Detected. Other VOC detected in some samples included Isopropanol (IPA), Acetone, Isopropyl toluene, trimethylbenzene, chloroform, and trichloro trifluoroethane (TCTFE), none above commercial screening levels. EPA Regional Screening Levels (RSLs) are human health risk based screening levels used by EPA and DTSC to determine Health Risk in residential and commercial settings. *-Values modified for California by DTSC HERO Note 3. Screening levels for soil gas calculated using indoor air values and attenuation factors provided by EPA and DTSC (0.03). Please refer to lab report for complete results.

21.0 List of Appendix Sections

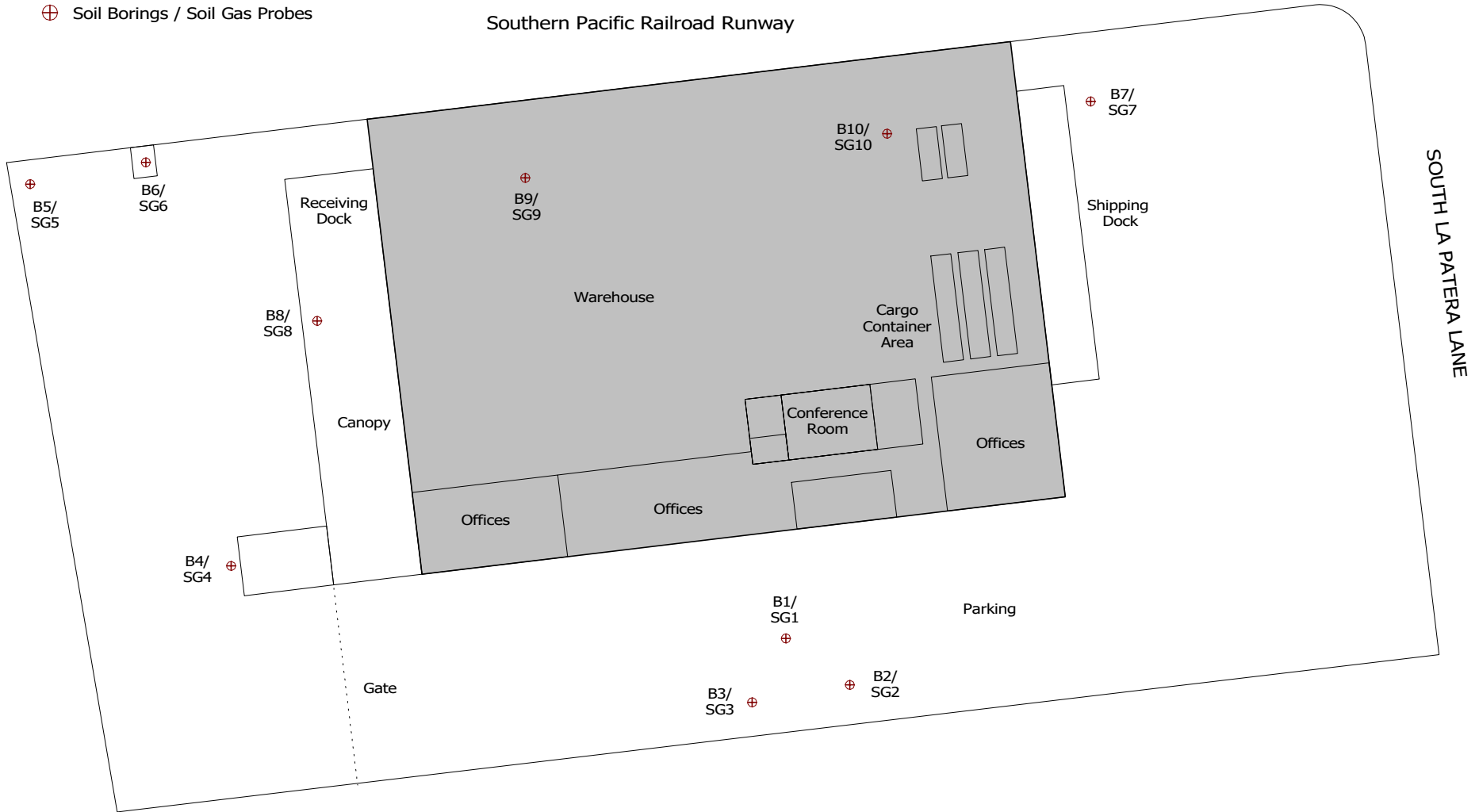
- APPENDIX A Drawings
- APPENDIX B Geophysical Investigation Report
- APPENDIX C Boring Logs
- APPENDIX D Soil Vapor Analytical Laboratory Report
- APPENDIX E Soil Analytical Laboratory Report
- APPENDIX F Photographs
- APPENDIX G Soil Gas Sampling Data

APPENDIX A

Drawings

LEGEND

⊕ Soil Borings / Soil Gas Probes



All Phase Environmental, Inc.



APPROXIMATE SCALE IN FEET

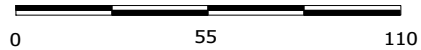


FIGURE 1
GENERAL SITE PLAN
GOLETA TRAIN DEPOT
27 South La Patera Lane
Goleta, California

APPENDIX B

Geophysical Investigation Report

Report of Geophysical Investigation

City of Goleta
Goleta Train Depot
27 South La Patera Lane
Goleta, California Project
#8256



8216 Lankershim Blvd., #12
North Hollywood, California 91605
1-877-565-3595

EXHIBIT "H" (LIMITED PH2 INVESTIGATION)

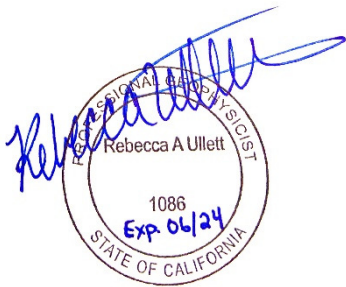
Geophysical Investigation

Goleta Train Depot
27 South La Patera Lane
Goleta, California

Prepared For: City of Goleta Via
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December 13, 2023



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LIST OF FIGURES

FIGURE	TITLE
1	Geophysical Interpretation Map
2	Contour Map of EM-61 Differential Data



1.0 INTRODUCTION

On November 28th, 2023, Spectrum Geophysics conducted a geophysical investigation on the property of the former Ratheon Site 27 Facility and future Goleta Train Depot located on 27 South La Patera Lane in Goleta, California (hereinafter referred to as the Property).

The purpose of the investigation was to locate detectable steel underground storage tanks (USTs) and to investigate 10 proposed boring locations for detectable utilities. The area of investigation for the USTs and 3 of 10 proposed boring locations was approximately 95 x 40 feet in size and asphalt covered.

Site interferences included a utility pole, parking blocks, a metal fence and a sheared metal pipe.

2.0 EQUIPMENT

The equipment used during this investigation consisted of a Geonics EM-61 high-sensitivity metal detector (EM-61), a Sensors & Software “Noggin Smart Cart” ground penetrating radar (GPR) unit coupled to a 500-MHz antenna, a Fisher TW-6 M-Scope shallow-focus metal detector (M-Scope) and a RadioDetection RD4000 electromagnetic utility locator (RD4000). A Trimble Pro 6H GPS unit and a digital field computer were used during EM-61 data acquisition.

3.0 METHODS AND FIELD PROCEDURES

3.1 EM-61 High Sensitivity Metal Detector

The EM-61 high-sensitivity metal detector was used in an effort to delineate areas where metallic objects (such as underground storage tanks and metallic piping) may be buried. The EM-61 transmitter generates short pulses of a primary magnetic field that induces electromagnetic currents in nearby metallic objects. Between pulses, the two receiver coils measure the decay of these electromagnetic currents in millivolts (mV). The measured values are proportional to the metal content (ferrous and non-ferrous) of the nearby objects.

Prior to data acquisition the EM-61 battery level was checked and found to be at a proper level for data acquisition. After the EM-61 had a few minutes to warm up, the unit was nulled in a location with more than four meters of separation between the coils and any known metallic objects. A cable-shake test was performed to assure the cables were in good working condition and the connectors were fastened properly. Finally, a static test was performed in which the instrument



*EM-61 data acquisition
(archive photo)*

response to soil and a metal bolt was monitored for amplitude and consistency of the readings. The EM-61 used in this survey was found to be working as expected.

During this investigation, EM-61 readings were collected along roughly parallel survey lines spaced between 4 and 5 feet apart within the area of the investigation. These measurements were recorded at a rate of 5 readings per second and stored in the Archer digital field computer. GPS positions were streamed into the field computer at one second intervals, and the EM-61 measurements were interpolated between GPS positions. This resulted in a 1-foot station spacing on average. Survey lines were displayed on the field computer in real time for navigation. If the submeter accuracy was lost during data acquisition an alarm from the field computer was sounded and data acquisition was paused until accuracy was regained. These data were processed in the field and used to generate contour maps to assist in identifying anomalies that may be caused by large buried metallic objects like USTs. Linear EM-61 anomalies were relocated with the utility locating equipment in an attempt to determine their source.

Top or bottom coil EM-61 data can be useful for identifying near-surface metallic objects; although, the top coil generally has a larger response than the bottom coil to deeply buried objects. Top coil data are also useful for identifying buried utilities and other shallow linear features. The differential data (bottom coil data subtracted from the top coil data) was used during this survey to distinguish deeper targets (such as metallic USTs) from shallow ones such as a vault lid or scrap metal. Utilization of the differential data allows for the suppression of near surface targets that might mask the response from deeper targets of interest.

3.2 Ground Penetrating Radar

EM-61 anomalies that could not be attributed to aboveground cultural features or detected underground utilities were further investigated using GPR methods. The overgrown nature of the site made GPR data collection difficult in many locations. GPR data were collected over suspect areas and interpreted in the field for anomalies whose signatures might indicate the presence of utilities or other features of interest.



Data collection using the Noggin GPR (archive photo)

During GPR surveys, a high frequency (500 MHz) radio signal is transmitted into the ground via the antenna. As radio waves propagate into the ground, these signals are reflected off of structures with differing electrical properties. These reflected signals are then captured by the receiver and are presented as vertical profiles on the GPR unit. The profiles were then interpreted for the presence of buried utilities and other features of interest.

The areal extents and/or surface traces of detected features were marked on the ground with spray paint.

3.3 Electromagnetic Utility Location

During this investigation, active electromagnetic (EM) utility-locating methods were used to relocate linear EM-61 anomalies and to delineate the surface trace of detectable underground utilities.

Active locating was initiated by transmitting an alternating current at a known frequency (8 kHz for this site) on a street lighting line exposed at the surface. A receiver, tuned to 8 kHz, was then used to locate the signal maxima (or surface trace) of the applied signal. The street lighting did not pass through the area of investigation and was not mapped.

The Fisher M-Scope metal detector was used to relocate shallow buried metallic features identified in the EM-61 data. The M-Scope has a transmitter and a receiver at the ends of a short boom. The transmitter emits a radio-frequency source signal that induces a secondary magnetic field in metallic material in its immediate vicinity. The receiver measures the signal strength of this secondary magnetic field and emits an audible response, the volume and pitch of which increase in the presence of metallic material. The sensitivity of the M-Scope allows the operator to locate the lateral boundaries of a metallic object.

Detected utilities were marked on the ground with surveyor's paint.

3.4 Investigation of Proposed Borings

The following procedures were used for each proposed boring location at the Site:

- The area surrounding each boring location was visually inspected for evidence of subsurface utilities or other buried features.
- Each identified utility was investigated using active electromagnetic utility-locating instruments and its surface trace was demarcated on the ground using color-coded spray paint.
- Each boring location was investigated with a passive electromagnetic receiver tuned to 50/60 cycle electrical current to detect possible electrical lines (with voltages up to 30,000 volts) in the vicinity. The surface trace of any detected electrical lines was demarcated on the ground using red spray paint. In addition, each boring location was investigated using audio, radio, and 1KHz frequencies to identify utilities re-radiating these ambient signals.
- Each boring was investigated using an electromagnetic transmitter placed over the boring location while the operator walked an equidistance with the receiver around the location to detect increases in signal strength that would suggest possible subsurface utilities. Each suspect signal increase was further investigated to discern a signal propagating utility.
- Each boring location was investigated using a shallow focus terrain conductivity meter (M-Scope) to identify possible buried and abandoned conduits as well as piping that had no surface expression



Utility location using the RD4000

- A signal was directed onto any identified electrical and telephone lines and their surface trace was determined by identifying the signal maxima.
- Accessible vaults in the vicinity of each boring location were opened and investigated for detectable utilities originating from the vault. If the vault was adjacent to the proposed boring, the subsurface extent of the vault was delineated and marked on the ground surface.
- Each boring location was investigated using ground penetrating radar (GPR). Using this method, one or more GPR profiles are established across the subject boring location, where a GPR unit (typically the Noggin Smart Cart) is used in an effort to identify possible subsurface obstructions in the immediate vicinity of the boring. During operation, a high-frequency radio signal is transmitted into the ground via the antenna. As radio waves propagate into the ground, these signals are reflected off structures with differing electrical properties. These reflected signals are then captured by the receiver and are presented as vertical profiles on the GPR unit.

4.0 RESULTS

A geophysical interpretation map is presented in Figure 1, and a contour map of the EM-61 differential data is presented in Figure 2.

4.1 EM-61

The color scale in the contour map of the EM-61 differential data displays the magnitudes of the measured EM-61 values where blue and green colors represent negative readings (indicative of surface metal), light green to yellow colors represent background readings and orange to pink colors represent increasing values above background. Due to the sensitivity of the EM-61, anomalies are usually exaggerated compared to the actual dimensions of the source metal. It is common for a sheared fence post to produce a 7-foot by 7-foot EM-61 anomaly while a 500-gallon UST buried 4 feet below ground surface can produce an EM-61 anomaly with dimensions of 15 feet by 15 feet. The findings of the survey are discussed below.

Two anomalies were detected in the EM-61 differential data (Figure 2) that could not be attributed to above ground cultural features and/or detected utilities.

Anomaly A was observed as a high amplitude anomaly in both the EM-61 top coil and differential data, identified in Figure 1 as a red dashed box. This anomaly is 26 feet x 17 feet in size and is located along Eastings 6005914 to 6005942 and between Northing 1986540 to 1986521. Two conduits were detected using EM-utility location methods within the bounds of the anomaly however, they could not be determined as the sole sources. Follow up using GPR revealed possible reinforced concrete mesh beneath the asphalt. The existence of this reinforcement and soil conditions precludes determining the presence of a UST. Spectrum recommends further investigation in this area to determine the source(s).

Anomaly B was observed as a high amplitude anomaly in both the EM-61 top coil and differential data, identified in Figure 1 as a red dashed box. This anomaly is approximately 31 feet x 12 feet in size and is located along Eastings 6005912 to 6005943 and between Northing 1986522 to 1986507. A conduit was detected using EM-utility location methods within the bounds of the anomaly however, it could not be determined as the sole source of the anomaly. Follow up using GPR revealed possible reinforced concrete beneath the asphalt and an additional uneven layered reflection deeper in the profiles. No source for this signature was determined and it was atypical for an excavation or a UST. Spectrum recommends additional investigation in this area.

5.0 LIMITATIONS

The detection of subsurface objects and utilities is dependent upon acquiring reliable data with geophysical instruments above ground. These data may be interpreted as representative of subsurface objects. The electromagnetic waves or fields being measured, however, may be attenuated and/or distorted by a number of factors including soil moisture, corrosion, and proximity to other surface and subsurface structures. A discussion of the limitations of each method follows.

5.1 EM-61

The EM-61 is capable of detecting a 55-gallon drum up to a depth of 3 meters under favorable conditions. We recommended a minimum 10-foot buffer between the survey area and any metallic or metal bearing surface cultural features such as the metal fence, utility pole, parking blocks, and the sheared metal pipe which could severely compromise the quality of the data. As a result, Spectrum cannot guarantee that metallic USTs are not present near or beneath these features.







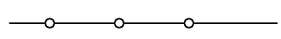




5.2 GPR

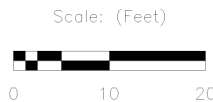
The performance capability of GPR is dependent on the electrical conductivity of the soil at the site. If the soil conductivity is high, attenuation of the radar signal in the soil can severely restrict the maximum penetration depth of the radar signal. Under favorable conditions depth of penetration can be greater than 10 feet; however, average depths of GPR penetration in Southern California tend to range between 2-5 feet. Soils high in clay content and moisture will have higher signal attenuation. GPR surveys should be performed in the dry season if at all possible, especially at sites located in Southern California.

5.3 Positioning


The features identified in Figure 1 were located using GPS for positioning (sub-meter accuracy). In addition, because the site map and the EM-61 data contour maps were created using GPS for positioning, the anomalies identified may also contain some positioning error. As a result, all features depicted in Figure 1 may be in error with regards to their true GPS position by as much as 3 feet.



-  Area of Investigation
-  Metallic Anomaly
-  Electric
-  Telecommunication
-  Sewer
-  Conduit
-  Trend Not Determined
-  Fence
-  Proposed Boring Location
-  Parking Block
-  Utility Pole

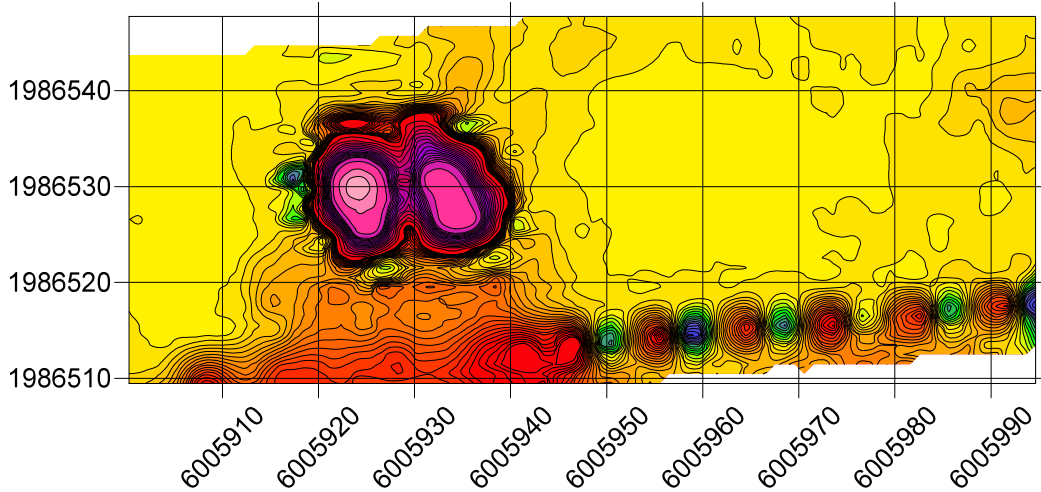


***Note: Not all below ground utilities or features may be represented on this map

 <p>spectrum geophysics REVEALING THE SUBSURFACE</p>	<p>MAP</p> <h2 style="margin: 0;">Geophysical Interpretation Map</h2>	<p>FIGURE NO.</p> <h1 style="margin: 0;">1</h1>
	<p>PROJECT</p> <p>Former Raytheon Site 27 27 South La Patera Lane Goleta, California</p>	<p>PROJECT NO.</p> <p>8256</p>
<p>8216 LANKERSHIM BLVD #12 NORTH HOLLYWOOD, CA 91605 Phone: (818) 886-4500 www.spectrum-geophysics.com</p>	<p>PREPARED FOR</p> <p>All Phase Environmental Huntington Beach, California</p>	<p>SCALE</p> <p>1 inch = 20 feet</p>
<p>FIGURE BY</p> <p>RJW</p>		<p>REVIEWED BY</p> <p>BAU</p>
<p>DATE</p> <p>12/12/2023</p>		<p>FIGURE NO.</p> <p>8256</p>

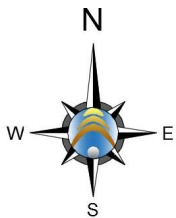
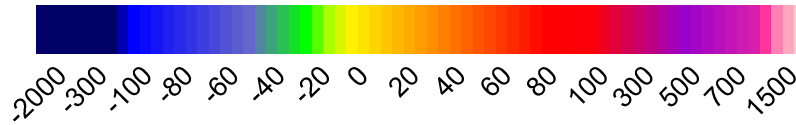
"LIMITED" (LIMITED INVESTIGATION)

California State Plane, NAD 83, U.S. Survey Feet North



California State Plane, NAD 83, U.S. Survey Feet East

Color contour in millivolts



Scale in feet




	MAP	Contour Map of EM-61 Differential Data		FIGURE NO.	2
	PROJECT	Former Raytheon Site 27 27 South La Patera Lane Goleta, California		PROJECT NO.	
8216 LANKERSHIM BLVD., #12 NORTH HOLLYWOOD, CA 91605 (818) 886-4500 www.spectrum-geophysics.com	PREPARED FOR	All Phase Environmental Huntington Beach, California		FIGURE BY	RJW
	SCALE	1 inch = 20 feet		REVIEWED BY	BAU
				DATE	12/12/2023

EXHIBIT 11 (LIMITED TIME INVESTIGATION)

APPENDIX C

Boring Logs



DRILL/LITHOLOGIC LOG

BORING/WELL NUMBER B1

PROJECT Commercial Property **OWNER**

LOCATION 27 South La Patera Lane, Goleta, CA **PROJECT NUMBER**

DATE DRILLED January 25, 2024 **TOTAL DEPTH OF HOLE** 30 Feet

SURFACE ELEVATION **DEPTH TO WATER**

SCREEN: DIA. **LENGTH** **SLOT SIZE**

CASING: DIA. **LENGTH** **TYPE**

DRILLING COMPANY MR Drilling **DRILL METHOD** GeoProbe-Limited Access

DRILLER Mario **LOG BY** Dan Louks

DEPTH (FEET)	WELL CONST		PID (PPM)	SAMPLES		SOIL CLASS (USCS)	DESCRIPTION/SOIL CLASSIFICATION (COLOR, TEXTURE, STRUCTURES)
	PIPE	FILL		NUMBER	BLOW		
2						ML	Sandy SILT; dark brown, low plasticity, very fine sand, no odor.
5			<1	B1-5		CL	Silty CLAY; brown, low plasticity, slightly moist, no odor.
10			<1	B1-10		CL	Sandy CLAY; brown, low plasticity, very fine sand, dry, no odor.
15			<1	B1-15		SC	Clayey SAND; brown, very fine grained, damp, no odor.
20			<1	B1-20		SP	SAND; light brown, very fine grained, well sorted, slightly moist, no odor.
25			<1	B1-25		SW	SAND; light brown, very fine to medium grained, poorly sorted, dry, no odor.
30			<1	B1-30		CL	Silty CLAY; gray-brown, low plasticity, dense, damp. No odor. Refusal at 30 feet, dense sediment. Install Probe SG1 with sample tips installed at 10 and 30 feet below grade. Install filter pack. Seal with bentonite and neat cement.

EXHIBIT "H" (LIMITED PH2 INVESTIGATION)



DRILL/LITHOLOGIC LOG

BORING/WELL NUMBER B2
PROJECT Commercial Property **OWNER** _____
LOCATION 27 South La Patera Lane, Goleta, CA **PROJECT NUMBER** _____
DATE DRILLED January 25, 2024 **TOTAL DEPTH OF HOLE** 10 Feet
SURFACE ELEVATION _____ **DEPTH TO WATER** _____
SCREEN: DIA. _____ **LENGTH** _____ **SLOT SIZE** _____
CASING: DIA. _____ **LENGTH** _____ **TYPE** _____
DRILLING COMPANY MR Drilling **DRILL METHOD** GeoProbe-Limited Access
DRILLER Mario **LOG BY** Dan Louks

DEPTH (FEET)	WELL CONST		PID (PPM)	SAMPLES		SOIL CLASS (USCS)	DESCRIPTION/SOIL CLASSIFICATION (COLOR, TEXTURE, STRUCTURES)
	PIPE	FILL		NUMBER	BLOW		
5			<1	B2-5		CL	Silty CLAY; brown, medium plasticity, no odor.
10			<1	B2-10		CL	Sandy CLAY; brown, very fine sand, low plasticity, slightly moist, no odor.
							Install Probe SG2 with sample tips installed at 5 and 10 feet below grade. Install filter pack. Seal with bentonite and neat cement.

EXHIBIT "H" (LIMITED PH2 INVESTIGATION)



DRILL/LITHOLOGIC LOG

BORING/WELL NUMBER B3
PROJECT Commercial Property **OWNER** _____
LOCATION 27 South La Patera Lane, Goleta, CA **PROJECT NUMBER** _____
DATE DRILLED January 25, 2024 **TOTAL DEPTH OF HOLE** 10 Feet
SURFACE ELEVATION _____ **DEPTH TO WATER** _____
SCREEN: DIA. _____ **LENGTH** _____ **SLOT SIZE** _____
CASING: DIA. _____ **LENGTH** _____ **TYPE** _____
DRILLING COMPANY MR Drilling **DRILL METHOD** GeoProbe-Limited Access
DRILLER Mario **LOG BY** Dan Louks

DEPTH (FEET)	WELL CONST		PID (PPM)	SAMPLES		SOIL CLASS (USCS)	DESCRIPTION/SOIL CLASSIFICATION (COLOR, TEXTURE, STRUCTURES)
	PIPE	FILL		NUMBER	BLOW		
5			<1	B3-5		CL	Silty CLAY; brown, medium plasticity, no odor.
10			<1	B3-10		CL	Sandy CLAY; brown, very fine sand, low plasticity, slightly moist, no odor. Install Probe SG3 with sample tips installed at 5 and 10 feet below grade. Install filter pack. Seal with bentonite and neat cement.

EXHIBIT "H" (LIMITED PH2 INVESTIGATION)



DRILL/LITHOLOGIC LOG

BORING/WELL NUMBER B4

PROJECT Commercial Property OWNER _____

LOCATION 27 South La Patera Lane, Goleta, CA PROJECT NUMBER _____

DATE DRILLED January 25, 2024 TOTAL DEPTH OF HOLE 30 Feet

SURFACE ELEVATION _____ DEPTH TO WATER _____

SCREEN: DIA. _____ LENGTH _____ SLOT SIZE _____

CASING: DIA. _____ LENGTH _____ TYPE _____

DRILLING COMPANY MR Drilling DRILL METHOD GeoProbe-Limited Access

DRILLER Mario LOG BY Dan Louks

DEPTH (FEET)	WELL CONST		PID (PPM)	SAMPLES		SOIL CLASS (USCS)	DESCRIPTION/SOIL CLASSIFICATION (COLOR, TEXTURE, STRUCTURES)
	PIPE	FILL		NUMBER	BLOW		
5			<1	B4-5		CL	Sandy CLAY; brown, low plasticity, very fine sand, slightly moist, no odor.
10			<1	B4-10		CL	Sandy CLAY; brown, low plasticity, very fine sand, slightly moist, no odor.
15			<1	B4-15		CL	Silty CLAY; brown, medium plasticity, slightly moist, no odor.
20			<1	B4-20		SM	Silty SAND; light brown, very fine sand, dense, hard, dry, no odor.
25			<1	B4-25		SM	Silty SAND; light brown, very fine sand, dense, hard, dry, no odor.
30			<1	B4-30		CL	Silty CLAY; gray-brown, low plasticity, dense, damp. No odor. Refusal at 30 feet, dense sediment. Install Probe SG4 with sample tips installed at 10 and 30 feet below grade. Install filter pack. Seal with bentonite and neat cement.

DRILL/LITHOLOGIC LOG

BORING/WELL NUMBER B5
PROJECT Commercial Property **OWNER** _____
LOCATION 27 South La Patera Lane, Goleta, CA **PROJECT NUMBER** _____
DATE DRILLED January 25, 2024 **TOTAL DEPTH OF HOLE** 5 Feet
SURFACE ELEVATION _____ **DEPTH TO WATER** _____
SCREEN: DIA. _____ **LENGTH** _____ **SLOT SIZE** _____
CASING: DIA. _____ **LENGTH** _____ **TYPE** _____
DRILLING COMPANY MR Drilling **DRILL METHOD** GeoProbe-Limited Access
DRILLER Mario **LOG BY** Dan Louks

DEPTH (FEET)	WELL CONST		PID (PPM)	SAMPLES		SOIL CLASS (USCS)	DESCRIPTION/SOIL CLASSIFICATION (COLOR, TEXTURE, STRUCTURES)
	PIPE	FILL		NUMBER	BLOW		
4			<1	B5-4		CL	Silty CLAY; brown, medium plasticity, damp, no odor.
5						CL	Silty CLAY; brown, medium plasticity, damp, no odor.
Install Probe SG5 with sample tip installed at 5 feet below grade. Install filter pack. Seal with bentonite and neat cement.							



DRILL/LITHOLOGIC LOG

BORING/WELL NUMBER	<u>B6</u>	OWNER	_____
PROJECT	<u>Commercial Property</u>	PROJECT NUMBER	_____
LOCATION	<u>27 South La Patera Lane, Goleta, CA</u>	TOTAL DEPTH OF HOLE	<u>5 Feet</u>
DATE DRILLED	<u>January 25, 2024</u>	DEPTH TO WATER	_____
SURFACE ELEVATION	_____	SCREEN: DIA.	_____
		LENGTH	_____
		SLOT SIZE	_____
CASING: DIA.	_____	LENGTH	_____
		TYPE	_____
DRILLING COMPANY	<u>MR Drilling</u>	DRILL METHOD	<u>GeoProbe-Limited Access</u>
DRILLER	<u>Mario</u>	LOG BY	<u>Dan Louks</u>

DEPTH (FEET)	WELL CONST		PID (PPM)	SAMPLES		SOIL CLASS (USCS)	DESCRIPTION/SOIL CLASSIFICATION (COLOR, TEXTURE, STRUCTURES)
	PIPE	FILL		NUMBER	BLOW		
4			<1	B6-4		CL	Silty CLAY; brown, medium plasticity, no odor.
5						CL	Silty CLAY; brown, medium plasticity, no odor.
Install Probe SG6 with sample tip installed at 5 feet below grade. Install filter pack. Seal with bentonite and neat cement.							



DRILL/LITHOLOGIC LOG

BORING/WELL NUMBER B7

PROJECT Commercial Property **OWNER**

LOCATION 27 South La Patera Lane, Goleta, CA **PROJECT NUMBER**

DATE DRILLED January 25, 2024 **TOTAL DEPTH OF HOLE** 5 Feet

SURFACE ELEVATION **DEPTH TO WATER**

SCREEN: DIA. **LENGTH** **SLOT SIZE**

CASING: DIA. **LENGTH** **TYPE**

DRILLING COMPANY MR Drilling **DRILL METHOD** GeoProbe-Limited Access

DRILLER Mario **LOG BY** Dan Louks

DEPTH (FEET)	WELL CONST		PID (PPM)	SAMPLES		SOIL CLASS (USCS)	DESCRIPTION/SOIL CLASSIFICATION (COLOR, TEXTURE, STRUCTURES)
	PIPE	FILL		NUMBER	BLOW		
4			<1	B7-4		CL	Silty CLAY; brown, medium plasticity, no odor.
5						CL	Silty CLAY; brown, medium plasticity, no odor.
<p>Install Probe SG7 with sample tip installed at 5 feet below grade. Install filter pack. Seal with bentonite and neat cement.</p>							



DRILL/LITHOLOGIC LOG

BORING/WELL NUMBER B8

PROJECT Commercial Property

OWNER _____

LOCATION 27 South La Patera Lane, Goleta, CA

PROJECT NUMBER _____

DATE DRILLED January 25, 2024

TOTAL DEPTH OF HOLE 5 Feet

SURFACE ELEVATION _____

DEPTH TO WATER _____

SCREEN: DIA. _____ **LENGTH** _____ **SLOT SIZE** _____

CASING: DIA. _____ **LENGTH** _____ **TYPE** _____

DRILLING COMPANY MR Drilling

DRILL METHOD GeoProbe-Limited Access

DRILLER Mario

LOG BY Dan Louks

DEPTH (FEET)	WELL CONST		PID (PPM)	SAMPLES		SOIL CLASS (USCS)	DESCRIPTION/SOIL CLASSIFICATION (COLOR, TEXTURE, STRUCTURES)
	PIPE	FILL		NUMBER	BLOW		
4			<1	B8-4		CL	Silty CLAY; brown, medium plasticity, no odor.
5						CL	Silty CLAY; brown, medium plasticity, no odor.
<p>Install Probe SG8 with sample tip installed at 5 feet below grade. Install filter pack. Seal with bentonite and neat cement.</p>							

APPENDIX D

Soil Vapor Analytical Laboratory Report



A & R Laboratories, Inc.

1650 S. GROVE AVE., SUITE C

ONTARIO, CA 91761

909-781-6335

www.arlaboratories.com

office@arlaboratories.com

CHEMISTRY · MICROBIOLOGY · FOOD SAFETY · MOBILE LABORATORIES
FOOD · COSMETICS · WATER · SOIL · SOIL VAPOR · WASTES

CASE NARRATIVE

Authorized Signature Name / Title (print)

Ken Zheng, President

Signature / Date

Ken Zheng, President
02/04/2024 20:37:30

Laboratory Job No. (Certificate of Analysis No.)

2401-00264

Project Name / No.

27 S. La Patera Lane, Goleta, CA 93117

Dates Sampled (from/to)

01/28/24 To 01/28/24

Dates Received (from/to)

01/28/24 To 01/28/24

Dates Reported (from/to)

02/04/24 To 2/4/2024

Chains of Custody Received

Yes

Comments:

Subcontracting

Organic Analyses

No analyses sub-contracted

Sample Condition(s)

All samples intact

Positive Results (Organic Compounds)

Sample	Analyte	Result	Qual	Units	RL	Sample	Analyte	Result	Qual	Units	RL
SG2-5	Isopropanol (IPA)	1.4		µg/L	0.13	SG1-10	Benzene	0.010	J	µg/L	0.013
SG1-10	C4-C12	3.3		µg/L	1.3	SG1-10	Toluene	0.010	J	µg/L	0.013
SG4-10	Acetone	1.0		µg/L	0.13	SG4-10	Isopropanol (IPA)	1.3		µg/L	0.13
SG6-5	Trichloroethene	0.010	J	µg/L	0.013	SG9-5	Chloroform	0.010		µg/L	0.0052
SG9-15	1,2,4-Trimethylbenzene	0.010	J	µg/L	0.013	SG9-15	4-Isopropyltoluene	0.020		µg/L	0.013
SG9-15	Benzene	0.010	J	µg/L	0.013	SG9-15	C4-C12	1.8		µg/L	1.3
SG9-15	Chloroform	0.010		µg/L	0.0052	SG9-15	Toluene	0.010	J	µg/L	0.013
SG9-15	Trichlorotrifluoroethane	0.040		µg/L	0.013	SG10-5	Chloroform	0.020		µg/L	0.0052
SG10-5	Trichloroethene	0.010	J	µg/L	0.013	SG10-15	Trichlorotrifluoroethane	0.010	J	µg/L	0.013
SG10-15 DUP	Trichlorotrifluoroethane	0.010	J	µg/L	0.013						

EXHIBIT "H" (LIMITED PH2 INVESTIGATION)

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USDA-EPA-NIOSH Testing Food Sanitation Consulting Chemical and Microbiological Analyses and Research



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CERTIFICATE OF ANALYSIS

2401-00264

ALL PHASE ENVIRONMENTAL, INC.
DAN LOUKS
8792 LAUDER CIRCLE, STE. 200
HUNTINGTON BEACH, CA 92646

Date Reported 02/04/24
Date Received 01/28/24
Invoice No. 470
Cust # A022
Permit Number
Customer P.O.

Project: 27 S. La Patera Lane, Goleta, CA 93117

Analysis	Result	Qual	Units	Method	DF	MDL	RL	Date	Time	Tech
Sample: 001 SG2-5								Date & Time Sampled: 01/28/24	@	6:50
Sample Matrix: Air										
Purge Volume Sampled: 3										
[TPH Gasoline by GCMS]										
C4-C12	<0.6500		µg/L	EPA 8260B	0.1	0.6500	1.3	01/28/24	7:00	KZ
[VOCs by GCMS]										
Acetone	<0.0650		µg/L	EPA 8260B	0.1	0.0650	0.13	01/28/24	7:00	KZ
t-Amyl Methyl Ether (TAME)	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	7:00	KZ
Benzene	<0.0031		µg/L	EPA 8260B	0.1	0.0031	0.013	01/28/24	7:00	KZ
Bromobenzene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	7:00	KZ
Bromochloromethane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	7:00	KZ
Bromodichloromethane	<0.0052		µg/L	EPA 8260B	0.1	0.0052	0.010	01/28/24	7:00	KZ
Bromoform	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	7:00	KZ
Bromomethane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	7:00	KZ
t-Butanol (TBA)	<0.0650		µg/L	EPA 8260B	0.1	0.0650	0.13	01/28/24	7:00	KZ
2-Butanone (MEK)	<0.0650		µg/L	EPA 8260B	0.1	0.0650	0.13	01/28/24	7:00	KZ
n-Butylbenzene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	7:00	KZ
sec-Butylbenzene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	7:00	KZ
tert-Butylbenzene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	7:00	KZ
Carbon Disulfide	<0.0650		µg/L	EPA 8260B	0.1	0.0650	0.13	01/28/24	7:00	KZ
Carbon Tetrachloride	<0.0033		µg/L	EPA 8260B	0.1	0.0033	0.0065	01/28/24	7:00	KZ
Chlorobenzene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	7:00	KZ
Chloroethane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	7:00	KZ
Chloroform	<0.0026		µg/L	EPA 8260B	0.1	0.0026	0.0052	01/28/24	7:00	KZ
Chloromethane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	7:00	KZ
2-Chlorotoluene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	7:00	KZ
4-Chlorotoluene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	7:00	KZ
Dibromochloromethane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	7:00	KZ
1,2-Dibromoethane (EDB)	<0.0016		µg/L	EPA 8260B	0.1	0.0016	0.013	01/28/24	7:00	KZ
1,2-Dibromo-3-Chloropropane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	7:00	KZ
Dibromomethane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	7:00	KZ
1,2-Dichlorobenzene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	7:00	KZ
1,3-Dichlorobenzene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	7:00	KZ
1,4-Dichlorobenzene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	7:00	KZ

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ALL PHASE ENVIRONMENTAL, INC.

DAN LOUKS

8792 LAUDER CIRCLE, STE. 200

HUNTINGTON BEACH, CA 92646

Date Reported 02/04/24

Date Received 01/28/24

Invoice No. 470

Cust # A022

Permit Number

Customer P.O.

Project: 27 S. La Patera Lane, Goleta, CA 93117

Analysis	Result	Qual	Units	Method	DF	MDL	RL	Date	Time	Tech
Sample: 001 SG2-5								Date & Time Sampled: 01/28/24	@ 6:50	
Sample Matrix: Air										
Purge Volume Sampled: 3										
.....continued										
Dichlorodifluoromethane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	7:00	KZ
1,1-Dichloroethane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	7:00	KZ
1,2-Dichloroethane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	7:00	KZ
1,1-Dichloroethene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	7:00	KZ
cis-1,2-Dichloroethene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	7:00	KZ
trans-1,2-Dichloroethene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	7:00	KZ
1,2-Dichloropropane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	7:00	KZ
1,3-Dichloropropane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	7:00	KZ
2,2-Dichloropropane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	7:00	KZ
1,1-Dichloropropene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	7:00	KZ
cis-1,3-Dichloropropene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	7:00	KZ
trans-1,3-Dichloropropene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	7:00	KZ
Diisopropyl Ether (DiPE)	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	7:00	KZ
Ethylbenzene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	7:00	KZ
Ethyl-t-Butyl Ether (EtBE)	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	7:00	KZ
Hexachlorobutadiene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	7:00	KZ
2-Hexanone	<0.0650		µg/L	EPA 8260B	0.1	0.0650	0.13	01/28/24	7:00	KZ
Isopropylbenzene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	7:00	KZ
4-Isopropyltoluene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	7:00	KZ
Methylene Chloride	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.01	01/28/24	7:00	KZ
4-Methyl-2-Pentanone (MIBK)	<0.0650		µg/L	EPA 8260B	0.1	0.0650	0.13	01/28/24	7:00	KZ
Methyl-t-butyl Ether (MtBE)	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	7:00	KZ
Naphthalene	<0.0033		µg/L	EPA 8260B	0.1	0.0033	0.0065	01/28/24	7:00	KZ
n-Propylbenzene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	7:00	KZ
Styrene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	7:00	KZ
1,1,1,2-Tetrachloroethane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	7:00	KZ
1,1,2,2-Tetrachloroethane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	7:00	KZ
Tetrachloroethene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	7:00	KZ
Toluene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	7:00	KZ
1,2,3-Trichlorobenzene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	7:00	KZ

EXHIBIT "H" (LIMITED PH2 INVESTIGATION)

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CERTIFICATE OF ANALYSIS

2401-00264

ALL PHASE ENVIRONMENTAL, INC.
DAN LOUKS
8792 LAUDER CIRCLE, STE. 200
HUNTINGTON BEACH, CA 92646

Date Reported 02/04/24
Date Received 01/28/24
Invoice No. 470
Cust # A022
Permit Number
Customer P.O.

Project: 27 S. La Patera Lane, Goleta, CA 93117

Analysis	Result	Qual	Units	Method	DF	MDL	RL	Date	Time	Tech
Sample: 001 SG2-5 Date & Time Sampled: 01/28/24 @ 6:50 Sample Matrix: Air Purge Volume Sampled: 3continued										
1,2,4-Trichlorobenzene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	7:00	KZ
1,1,1-Trichloroethane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	7:00	KZ
1,1,2-Trichloroethane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	7:00	KZ
Trichloroethene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	7:00	KZ
1,2,3-Trichloropropane	<0.0026		µg/L	EPA 8260B	0.1	0.0026	0.013	01/28/24	7:00	KZ
Trichlorofluoromethane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	7:00	KZ
Trichlorotrifluoroethane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	7:00	KZ
1,2,4-Trimethylbenzene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	7:00	KZ
1,3,5-Trimethylbenzene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	7:00	KZ
Vinyl Chloride	<0.0003		µg/L	EPA 8260B	0.1	0.0003	0.0065	01/28/24	7:00	KZ
m,p-Xylenes	<0.0130		µg/L	EPA 8260B	0.1	0.0130	0.026	01/28/24	7:00	KZ
o-Xylene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	7:00	KZ
[VOC Vapor Sampling Tracer]										
Isopropanol (IPA)	1.4		µg/L	EPA 8260B	0.1	0.0650	0.13	01/28/24	7:00	KZ
[VOC Surrogates]										
Dibromofluoromethane	87		%REC	EPA 8260B			70-130	01/28/24	7:00	KZ
Toluene-D8	118		%REC	EPA 8260B			70-130	01/28/24	7:00	KZ
Bromofluorobenzene	97		%REC	EPA 8260B			70-130	01/28/24	7:00	KZ
Sample: 002 SG2-10 Date & Time Sampled: 01/28/24 @ 6:59 Sample Matrix: Air Purge Volume Sampled: 3										
[TPH Gasoline by GCMS]										
C4-C12	<0.6500		µg/L	EPA 8260B	0.1	0.6500	1.3	01/28/24	7:23	KZ
[VOCs by GCMS]										
Acetone	<0.0650		µg/L	EPA 8260B	0.1	0.0650	0.13	01/28/24	7:23	KZ
t-Amyl Methyl Ether (TAME)	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	7:23	KZ
Benzene	<0.0031		µg/L	EPA 8260B	0.1	0.0031	0.013	01/28/24	7:23	KZ
Bromobenzene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	7:23	KZ
Bromochloromethane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	7:23	KZ

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ALL PHASE ENVIRONMENTAL, INC.

DAN LOUKS

8792 LAUDER CIRCLE, STE. 200

HUNTINGTON BEACH, CA 92646

Date Reported 02/04/24

Date Received 01/28/24

Invoice No. 470

Cust # A022

Permit Number

Customer P.O.

Project: 27 S. La Patera Lane, Goleta, CA 93117

Analysis	Result	Qual	Units	Method	DF	MDL	RL	Date	Time	Tech
Sample: 002 SG2-10								Date & Time Sampled:	01/28/24	@ 6:59
Sample Matrix: Air										
Purge Volume Sampled: 3										
.....continued										
Bromodichloromethane	<0.0052		µg/L	EPA 8260B	0.1	0.0052	0.010	01/28/24	7:23	KZ
Bromoform	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	7:23	KZ
Bromomethane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	7:23	KZ
t-Butanol (TBA)	<0.0650		µg/L	EPA 8260B	0.1	0.0650	0.13	01/28/24	7:23	KZ
2-Butanone (MEK)	<0.0650		µg/L	EPA 8260B	0.1	0.0650	0.13	01/28/24	7:23	KZ
n-Butylbenzene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	7:23	KZ
sec-Butylbenzene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	7:23	KZ
tert-Butylbenzene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	7:23	KZ
Carbon Disulfide	<0.0650		µg/L	EPA 8260B	0.1	0.0650	0.13	01/28/24	7:23	KZ
Carbon Tetrachloride	<0.0033		µg/L	EPA 8260B	0.1	0.0033	0.0065	01/28/24	7:23	KZ
Chlorobenzene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	7:23	KZ
Chloroethane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	7:23	KZ
Chloroform	<0.0026		µg/L	EPA 8260B	0.1	0.0026	0.0052	01/28/24	7:23	KZ
Chloromethane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	7:23	KZ
2-Chlorotoluene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	7:23	KZ
4-Chlorotoluene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	7:23	KZ
Dibromochloromethane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	7:23	KZ
1,2-Dibromoethane (EDB)	<0.0016		µg/L	EPA 8260B	0.1	0.0016	0.013	01/28/24	7:23	KZ
1,2-Dibromo-3-Chloropropane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	7:23	KZ
Dibromomethane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	7:23	KZ
1,2-Dichlorobenzene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	7:23	KZ
1,3-Dichlorobenzene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	7:23	KZ
1,4-Dichlorobenzene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	7:23	KZ
Dichlorodifluoromethane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	7:23	KZ
1,1-Dichloroethane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	7:23	KZ
1,2-Dichloroethane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	7:23	KZ
1,1-Dichloroethene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	7:23	KZ
cis-1,2-Dichloroethene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	7:23	KZ
trans-1,2-Dichloroethene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	7:23	KZ
1,2-Dichloropropane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	7:23	KZ

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Customer P.O.

Project: 27 S. La Patera Lane, Goleta, CA 93117

Analysis	Result	Qual	Units	Method	DF	MDL	RL	Date	Time	Tech
Sample: 002 SG2-10								Date & Time Sampled:	01/28/24	@ 6:59
Sample Matrix: Air										
Purge Volume Sampled: 3										
.....continued										
1,3-Dichloropropane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	7:23	KZ
2,2-Dichloropropane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	7:23	KZ
1,1-Dichloropropene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	7:23	KZ
cis-1,3-Dichloropropene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	7:23	KZ
trans-1,3-Dichloropropene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	7:23	KZ
Diisopropyl Ether (DiPE)	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	7:23	KZ
Ethylbenzene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	7:23	KZ
Ethyl-t-Butyl Ether (EtBE)	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	7:23	KZ
Hexachlorobutadiene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	7:23	KZ
2-Hexanone	<0.0650		µg/L	EPA 8260B	0.1	0.0650	0.13	01/28/24	7:23	KZ
Isopropylbenzene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	7:23	KZ
4-Isopropyltoluene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	7:23	KZ
Methylene Chloride	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.01	01/28/24	7:23	KZ
4-Methyl-2-Pentanone (MIBK)	<0.0650		µg/L	EPA 8260B	0.1	0.0650	0.13	01/28/24	7:23	KZ
Methyl-t-butyl Ether (MtBE)	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	7:23	KZ
Naphthalene	<0.0033		µg/L	EPA 8260B	0.1	0.0033	0.0065	01/28/24	7:23	KZ
n-Propylbenzene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	7:23	KZ
Styrene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	7:23	KZ
1,1,1,2-Tetrachloroethane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	7:23	KZ
1,1,2,2-Tetrachloroethane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	7:23	KZ
Tetrachloroethene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	7:23	KZ
Toluene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	7:23	KZ
1,2,3-Trichlorobenzene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	7:23	KZ
1,2,4-Trichlorobenzene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	7:23	KZ
1,1,1-Trichloroethane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	7:23	KZ
1,1,2-Trichloroethane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	7:23	KZ
Trichloroethene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	7:23	KZ
1,2,3-Trichloropropane	<0.0026		µg/L	EPA 8260B	0.1	0.0026	0.013	01/28/24	7:23	KZ
Trichlorofluoromethane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	7:23	KZ
Trichlorotrifluoroethane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	7:23	KZ

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CERTIFICATE OF ANALYSIS

2401-00264

ALL PHASE ENVIRONMENTAL, INC.
DAN LOUKS
8792 LAUDER CIRCLE, STE. 200
HUNTINGTON BEACH, CA 92646

Date Reported 02/04/24

Date Received 01/28/24

Invoice No. 470

Cust # A022

Permit Number

Customer P.O.

Project: 27 S. La Patera Lane, Goleta, CA 93117

Analysis	Result	Qual	Units	Method	DF	MDL	RL	Date	Time	Tech
Sample: 002 SG2-10						Date & Time Sampled:		01/28/24	@	6:59
Sample Matrix: Air										
Purge Volume Sampled: 3										
.....continued										
1,2,4-Trimethylbenzene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	7:23	KZ
1,3,5-Trimethylbenzene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	7:23	KZ
Vinyl Chloride	<0.0003		µg/L	EPA 8260B	0.1	0.0003	0.0065	01/28/24	7:23	KZ
m,p-Xylenes	<0.0130		µg/L	EPA 8260B	0.1	0.0130	0.026	01/28/24	7:23	KZ
o-Xylene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	7:23	KZ
[VOC Vapor Sampling Tracer]										
Isopropanol (IPA)	<0.0650		µg/L	EPA 8260B	0.1	0.0650	0.13	01/28/24	7:23	KZ
[VOC Surrogates]										
Dibromofluoromethane	107		%REC	EPA 8260B			70-130	01/28/24	7:23	KZ
Toluene-D8	124		%REC	EPA 8260B			70-130	01/28/24	7:23	KZ
Bromofluorobenzene	105		%REC	EPA 8260B			70-130	01/28/24	7:23	KZ
Sample: 003 SG1-30						Date & Time Sampled:		01/28/24	@	7:35
Sample Matrix: Air										
Purge Volume Sampled: 3										
[TPH Gasoline by GCMS]										
C4-C12	<0.6500		µg/L	EPA 8260B	0.1	0.6500	1.3	01/28/24	7:48	KZ
[VOCs by GCMS]										
Acetone	<0.0650		µg/L	EPA 8260B	0.1	0.0650	0.13	01/28/24	7:48	KZ
t-Amyl Methyl Ether (TAME)	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	7:48	KZ
Benzene	<0.0031		µg/L	EPA 8260B	0.1	0.0031	0.013	01/28/24	7:48	KZ
Bromobenzene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	7:48	KZ
Bromochloromethane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	7:48	KZ
Bromodichloromethane	<0.0052		µg/L	EPA 8260B	0.1	0.0052	0.010	01/28/24	7:48	KZ
Bromoform	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	7:48	KZ
Bromomethane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	7:48	KZ
t-Butanol (TBA)	<0.0650		µg/L	EPA 8260B	0.1	0.0650	0.13	01/28/24	7:48	KZ
2-Butanone (MEK)	<0.0650		µg/L	EPA 8260B	0.1	0.0650	0.13	01/28/24	7:48	KZ
n-Butylbenzene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	7:48	KZ
sec-Butylbenzene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	7:48	KZ

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ALL PHASE ENVIRONMENTAL, INC.

DAN LOUKS

8792 LAUDER CIRCLE, STE. 200

HUNTINGTON BEACH, CA 92646

Date Reported 02/04/24

Date Received 01/28/24

Invoice No. 470

Cust # A022

Permit Number

Customer P.O.

Project: 27 S. La Patera Lane, Goleta, CA 93117

Analysis	Result	Qual	Units	Method	DF	MDL	RL	Date	Time	Tech
Sample: 003 SG1-30								Date & Time Sampled: 01/28/24 @ 7:35		
Sample Matrix: Air										
Purge Volume Sampled: 3										
.....continued										
tert-Butylbenzene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	7:48	KZ
Carbon Disulfide	<0.0650		µg/L	EPA 8260B	0.1	0.0650	0.13	01/28/24	7:48	KZ
Carbon Tetrachloride	<0.0033		µg/L	EPA 8260B	0.1	0.0033	0.0065	01/28/24	7:48	KZ
Chlorobenzene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	7:48	KZ
Chloroethane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	7:48	KZ
Chloroform	<0.0026		µg/L	EPA 8260B	0.1	0.0026	0.0052	01/28/24	7:48	KZ
Chloromethane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	7:48	KZ
2-Chlorotoluene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	7:48	KZ
4-Chlorotoluene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	7:48	KZ
Dibromochloromethane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	7:48	KZ
1,2-Dibromoethane (EDB)	<0.0016		µg/L	EPA 8260B	0.1	0.0016	0.013	01/28/24	7:48	KZ
1,2-Dibromo-3-Chloropropane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	7:48	KZ
Dibromomethane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	7:48	KZ
1,2-Dichlorobenzene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	7:48	KZ
1,3-Dichlorobenzene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	7:48	KZ
1,4-Dichlorobenzene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	7:48	KZ
Dichlorodifluoromethane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	7:48	KZ
1,1-Dichloroethane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	7:48	KZ
1,2-Dichloroethane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	7:48	KZ
1,1-Dichloroethene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	7:48	KZ
cis-1,2-Dichloroethene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	7:48	KZ
trans-1,2-Dichloroethene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	7:48	KZ
1,2-Dichloropropane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	7:48	KZ
1,3-Dichloropropane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	7:48	KZ
2,2-Dichloropropane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	7:48	KZ
1,1-Dichloropropene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	7:48	KZ
cis-1,3-Dichloropropene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	7:48	KZ
trans-1,3-Dichloropropene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	7:48	KZ
Diisopropyl Ether (DIPE)	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	7:48	KZ
Ethylbenzene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	7:48	KZ

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CERTIFICATE OF ANALYSIS

2401-00264

ALL PHASE ENVIRONMENTAL, INC.

DAN LOUKS

8792 LAUDER CIRCLE, STE. 200

HUNTINGTON BEACH, CA 92646

Date Reported 02/04/24

Date Received 01/28/24

Invoice No. 470

Cust # A022

Permit Number

Customer P.O.

Project: 27 S. La Patera Lane, Goleta, CA 93117

Analysis	Result	Qual	Units	Method	DF	MDL	RL	Date	Time	Tech
Sample: 003 SG1-30								Date & Time Sampled: 01/28/24 @ 7:35		
Sample Matrix: Air										
Purge Volume Sampled: 3										
.....continued										
Ethyl-t-Butyl Ether (EtBE)	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	7:48	KZ
Hexachlorobutadiene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	7:48	KZ
2-Hexanone	<0.0650		µg/L	EPA 8260B	0.1	0.0650	0.13	01/28/24	7:48	KZ
Isopropylbenzene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	7:48	KZ
4-Isopropyltoluene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	7:48	KZ
Methylene Chloride	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.01	01/28/24	7:48	KZ
4-Methyl-2-Pentanone (MIBK)	<0.0650		µg/L	EPA 8260B	0.1	0.0650	0.13	01/28/24	7:48	KZ
Methyl-t-butyl Ether (MtBE)	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	7:48	KZ
Naphthalene	<0.0033		µg/L	EPA 8260B	0.1	0.0033	0.0065	01/28/24	7:48	KZ
n-Propylbenzene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	7:48	KZ
Styrene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	7:48	KZ
1,1,1,2-Tetrachloroethane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	7:48	KZ
1,1,2,2-Tetrachloroethane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	7:48	KZ
Tetrachloroethene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	7:48	KZ
Toluene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	7:48	KZ
1,2,3-Trichlorobenzene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	7:48	KZ
1,2,4-Trichlorobenzene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	7:48	KZ
1,1,1-Trichloroethane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	7:48	KZ
1,1,2-Trichloroethane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	7:48	KZ
Trichloroethene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	7:48	KZ
1,2,3-Trichloropropane	<0.0026		µg/L	EPA 8260B	0.1	0.0026	0.013	01/28/24	7:48	KZ
Trichlorofluoromethane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	7:48	KZ
Trichlorotrifluoroethane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	7:48	KZ
1,2,4-Trimethylbenzene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	7:48	KZ
1,3,5-Trimethylbenzene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	7:48	KZ
Vinyl Chloride	<0.0003		µg/L	EPA 8260B	0.1	0.0003	0.0065	01/28/24	7:48	KZ
m,p-Xylenes	<0.0130		µg/L	EPA 8260B	0.1	0.0130	0.026	01/28/24	7:48	KZ
o-Xylene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	7:48	KZ
[VOC Vapor Sampling Tracer]										
Isopropanol (IPA)	<0.0650		µg/L	EPA 8260B	0.1	0.0650	0.13	01/28/24	7:48	KZ

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ALL PHASE ENVIRONMENTAL, INC.
DAN LOUKS
8792 LAUDER CIRCLE, STE. 200
HUNTINGTON BEACH, CA 92646

Date Reported 02/04/24
Date Received 01/28/24
Invoice No. 470
Cust # A022
Permit Number
Customer P.O.

Project: 27 S. La Patera Lane, Goleta, CA 93117

Analysis	Result	Qual	Units	Method	DF	MDL	RL	Date	Time	Tech
Sample: 003 SG1-30 Date & Time Sampled: 01/28/24 @ 7:35 Sample Matrix: Air Purge Volume Sampled: 3continued										
[VOC Surrogates]										
Dibromofluoromethane	102		%REC	EPA 8260B			70-130	01/28/24	7:48	KZ
Toluene-D8	122		%REC	EPA 8260B			70-130	01/28/24	7:48	KZ
Bromofluorobenzene	121		%REC	EPA 8260B			70-130	01/28/24	7:48	KZ
Sample: 004 SG1-10 Date & Time Sampled: 01/28/24 @ 8:00 Sample Matrix: Air Purge Volume Sampled: 3										
[TPH Gasoline by GCMS]										
C4-C12	3.3		µg/L	EPA 8260B	0.1	0.6500	1.3	01/28/24	8:11	KZ
[VOCs by GCMS]										
Acetone	<0.0650		µg/L	EPA 8260B	0.1	0.0650	0.13	01/28/24	8:11	KZ
t-Amyl Methyl Ether (TAME)	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	8:11	KZ
Benzene	0.010	J	µg/L	EPA 8260B	0.1	0.0031	0.013	01/28/24	8:11	KZ
Bromobenzene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	8:11	KZ
Bromochloromethane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	8:11	KZ
Bromodichloromethane	<0.0052		µg/L	EPA 8260B	0.1	0.0052	0.010	01/28/24	8:11	KZ
Bromoform	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	8:11	KZ
Bromomethane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	8:11	KZ
t-Butanol (TBA)	<0.0650		µg/L	EPA 8260B	0.1	0.0650	0.13	01/28/24	8:11	KZ
2-Butanone (MEK)	<0.0650		µg/L	EPA 8260B	0.1	0.0650	0.13	01/28/24	8:11	KZ
n-Butylbenzene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	8:11	KZ
sec-Butylbenzene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	8:11	KZ
tert-Butylbenzene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	8:11	KZ
Carbon Disulfide	<0.0650		µg/L	EPA 8260B	0.1	0.0650	0.13	01/28/24	8:11	KZ
Carbon Tetrachloride	<0.0033		µg/L	EPA 8260B	0.1	0.0033	0.0065	01/28/24	8:11	KZ
Chlorobenzene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	8:11	KZ
Chloroethane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	8:11	KZ
Chloroform	<0.0026		µg/L	EPA 8260B	0.1	0.0026	0.0052	01/28/24	8:11	KZ
Chloromethane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	8:11	KZ

EXHIBIT "H" (LIMITED PH2 INVESTIGATION)

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CERTIFICATE OF ANALYSIS

2401-00264

ALL PHASE ENVIRONMENTAL, INC.

DAN LOUKS

8792 LAUDER CIRCLE, STE. 200

HUNTINGTON BEACH, CA 92646

Date Reported 02/04/24

Date Received 01/28/24

Invoice No. 470

Cust # A022

Permit Number

Customer P.O.

Project: 27 S. La Patera Lane, Goleta, CA 93117

Analysis	Result	Qual	Units	Method	DF	MDL	RL	Date	Time	Tech
Sample: 004 SG1-10								Date & Time Sampled: 01/28/24	@ 8:00	
Sample Matrix: Air										
Purge Volume Sampled: 3										
.....continued										
2-Chlorotoluene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	8:11	KZ
4-Chlorotoluene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	8:11	KZ
Dibromochloromethane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	8:11	KZ
1,2-Dibromoethane (EDB)	<0.0016		µg/L	EPA 8260B	0.1	0.0016	0.013	01/28/24	8:11	KZ
1,2-Dibromo-3-Chloropropane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	8:11	KZ
Dibromomethane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	8:11	KZ
1,2-Dichlorobenzene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	8:11	KZ
1,3-Dichlorobenzene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	8:11	KZ
1,4-Dichlorobenzene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	8:11	KZ
Dichlorodifluoromethane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	8:11	KZ
1,1-Dichloroethane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	8:11	KZ
1,2-Dichloroethane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	8:11	KZ
1,1-Dichloroethene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	8:11	KZ
cis-1,2-Dichloroethene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	8:11	KZ
trans-1,2-Dichloroethene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	8:11	KZ
1,2-Dichloropropane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	8:11	KZ
1,3-Dichloropropane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	8:11	KZ
2,2-Dichloropropane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	8:11	KZ
1,1-Dichloropropene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	8:11	KZ
cis-1,3-Dichloropropene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	8:11	KZ
trans-1,3-Dichloropropene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	8:11	KZ
Diisopropyl Ether (DiPE)	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	8:11	KZ
Ethylbenzene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	8:11	KZ
Ethyl-t-Butyl Ether (EtBE)	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	8:11	KZ
Hexachlorobutadiene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	8:11	KZ
2-Hexanone	<0.0650		µg/L	EPA 8260B	0.1	0.0650	0.13	01/28/24	8:11	KZ
Isopropylbenzene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	8:11	KZ
4-Isopropyltoluene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	8:11	KZ
Methylene Chloride	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.01	01/28/24	8:11	KZ
4-Methyl-2-Pentanone (MIBK)	<0.0650		µg/L	EPA 8260B	0.1	0.0650	0.13	01/28/24	8:11	KZ

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HUNTINGTON BEACH, CA 92646

Date Reported 02/04/24

Date Received 01/28/24

Invoice No. 470

Cust # A022

Permit Number

Customer P.O.

Project: 27 S. La Patera Lane, Goleta, CA 93117

Analysis	Result	Qual	Units	Method	DF	MDL	RL	Date	Time	Tech
Sample: 004 SG1-10							Date & Time Sampled:	01/28/24	@	8:00
Sample Matrix: Air										
Purge Volume Sampled: 3										
.....continued										
Methyl-t-butyl Ether (MtBE)	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	8:11	KZ
Naphthalene	<0.0033		µg/L	EPA 8260B	0.1	0.0033	0.0065	01/28/24	8:11	KZ
n-Propylbenzene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	8:11	KZ
Styrene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	8:11	KZ
1,1,1,2-Tetrachloroethane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	8:11	KZ
1,1,1,2,2-Tetrachloroethane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	8:11	KZ
Tetrachloroethane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	8:11	KZ
Toluene	0.010	J	µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	8:11	KZ
1,2,3-Trichlorobenzene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	8:11	KZ
1,2,4-Trichlorobenzene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	8:11	KZ
1,1,1-Trichloroethane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	8:11	KZ
1,1,2-Trichloroethane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	8:11	KZ
Trichloroethene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	8:11	KZ
1,2,3-Trichloropropane	<0.0026		µg/L	EPA 8260B	0.1	0.0026	0.013	01/28/24	8:11	KZ
Trichlorofluoromethane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	8:11	KZ
Trichlorotrifluoroethane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	8:11	KZ
1,2,4-Trimethylbenzene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	8:11	KZ
1,3,5-Trimethylbenzene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	8:11	KZ
Vinyl Chloride	<0.0003		µg/L	EPA 8260B	0.1	0.0003	0.0065	01/28/24	8:11	KZ
m,p-Xylenes	<0.0130		µg/L	EPA 8260B	0.1	0.0130	0.026	01/28/24	8:11	KZ
o-Xylene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	8:11	KZ
[VOC Vapor Sampling Tracer]										
Isopropanol (IPA)	<0.0650		µg/L	EPA 8260B	0.1	0.0650	0.13	01/28/24	8:11	KZ
[VOC Surrogates]										
Dibromofluoromethane	102		%REC	EPA 8260B			70-130	01/28/24	8:11	KZ
Toluene-D8	118		%REC	EPA 8260B			70-130	01/28/24	8:11	KZ
Bromofluorobenzene	116		%REC	EPA 8260B			70-130	01/28/24	8:11	KZ

Sample: 005 **SG3-5**

Sample Matrix: **Air**

Date & Time Sampled: 01/28/24 @ 8:35

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CERTIFICATE OF ANALYSIS

2401-00264

ALL PHASE ENVIRONMENTAL, INC.
DAN LOUKS
8792 LAUDER CIRCLE, STE. 200
HUNTINGTON BEACH, CA 92646

Date Reported 02/04/24
Date Received 01/28/24
Invoice No. 470
Cust # A022
Permit Number
Customer P.O.

Project: 27 S. La Patera Lane, Goleta, CA 93117

Analysis	Result	Qual	Units	Method	DF	MDL	RL	Date	Time	Tech
Sample: 005 SG3-5								Date & Time Sampled: 01/28/24	@ 8:35	
Sample Matrix: Air										
Purge Volume Sampled: 3										
[TPH Gasoline by GCMS]										
C4-C12	<0.6500		µg/L	EPA 8260B	0.1	0.6500	1.3	01/28/24	8:48	KZ
[VOCs by GCMS]										
Acetone	<0.0650		µg/L	EPA 8260B	0.1	0.0650	0.13	01/28/24	8:48	KZ
t-Amyl Methyl Ether (TAME)	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	8:48	KZ
Benzene	<0.0031		µg/L	EPA 8260B	0.1	0.0031	0.013	01/28/24	8:48	KZ
Bromobenzene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	8:48	KZ
Bromochloromethane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	8:48	KZ
Bromodichloromethane	<0.0052		µg/L	EPA 8260B	0.1	0.0052	0.010	01/28/24	8:48	KZ
Bromoform	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	8:48	KZ
Bromomethane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	8:48	KZ
t-Butanol (TBA)	<0.0650		µg/L	EPA 8260B	0.1	0.0650	0.13	01/28/24	8:48	KZ
2-Butanone (MEK)	<0.0650		µg/L	EPA 8260B	0.1	0.0650	0.13	01/28/24	8:48	KZ
n-Butylbenzene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	8:48	KZ
sec-Butylbenzene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	8:48	KZ
tert-Butylbenzene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	8:48	KZ
Carbon Disulfide	<0.0650		µg/L	EPA 8260B	0.1	0.0650	0.13	01/28/24	8:48	KZ
Carbon Tetrachloride	<0.0033		µg/L	EPA 8260B	0.1	0.0033	0.0065	01/28/24	8:48	KZ
Chlorobenzene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	8:48	KZ
Chloroethane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	8:48	KZ
Chloroform	<0.0026		µg/L	EPA 8260B	0.1	0.0026	0.0052	01/28/24	8:48	KZ
Chloromethane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	8:48	KZ
2-Chlorotoluene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	8:48	KZ
4-Chlorotoluene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	8:48	KZ
Dibromochloromethane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	8:48	KZ
1,2-Dibromoethane (EDB)	<0.0016		µg/L	EPA 8260B	0.1	0.0016	0.013	01/28/24	8:48	KZ
1,2-Dibromo-3-Chloropropane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	8:48	KZ
Dibromomethane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	8:48	KZ
1,2-Dichlorobenzene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	8:48	KZ
1,3-Dichlorobenzene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	8:48	KZ
1,4-Dichlorobenzene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	8:48	KZ

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Invoice No. 470
Cust # A022
Permit Number
Customer P.O.

Project: 27 S. La Patera Lane, Goleta, CA 93117

Analysis	Result	Qual	Units	Method	DF	MDL	RL	Date	Time	Tech
Sample: 005 SG3-5								Date & Time Sampled: 01/28/24	@	8:35
Sample Matrix: Air										
Purge Volume Sampled: 3										
.....continued										
Dichlorodifluoromethane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	8:48	KZ
1,1-Dichloroethane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	8:48	KZ
1,2-Dichloroethane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	8:48	KZ
1,1-Dichloroethene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	8:48	KZ
cis-1,2-Dichloroethene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	8:48	KZ
trans-1,2-Dichloroethene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	8:48	KZ
1,2-Dichloropropane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	8:48	KZ
1,3-Dichloropropane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	8:48	KZ
2,2-Dichloropropane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	8:48	KZ
1,1-Dichloropropene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	8:48	KZ
cis-1,3-Dichloropropene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	8:48	KZ
trans-1,3-Dichloropropene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	8:48	KZ
Diisopropyl Ether (DiPE)	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	8:48	KZ
Ethylbenzene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	8:48	KZ
Ethyl-t-Butyl Ether (EtBE)	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	8:48	KZ
Hexachlorobutadiene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	8:48	KZ
2-Hexanone	<0.0650		µg/L	EPA 8260B	0.1	0.0650	0.13	01/28/24	8:48	KZ
Isopropylbenzene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	8:48	KZ
4-Isopropyltoluene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	8:48	KZ
Methylene Chloride	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.01	01/28/24	8:48	KZ
4-Methyl-2-Pentanone (MIBK)	<0.0650		µg/L	EPA 8260B	0.1	0.0650	0.13	01/28/24	8:48	KZ
Methyl-t-butyl Ether (MtBE)	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	8:48	KZ
Naphthalene	<0.0033		µg/L	EPA 8260B	0.1	0.0033	0.0065	01/28/24	8:48	KZ
n-Propylbenzene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	8:48	KZ
Styrene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	8:48	KZ
1,1,1,2-Tetrachloroethane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	8:48	KZ
1,1,2,2-Tetrachloroethane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	8:48	KZ
Tetrachloroethene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	8:48	KZ
Toluene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	8:48	KZ
1,2,3-Trichlorobenzene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	8:48	KZ

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CERTIFICATE OF ANALYSIS

2401-00264

ALL PHASE ENVIRONMENTAL, INC.

DAN LOUKS

8792 LAUDER CIRCLE, STE. 200

HUNTINGTON BEACH, CA 92646

Date Reported 02/04/24

Date Received 01/28/24

Invoice No. 470

Cust # A022

Permit Number

Customer P.O.

Project: 27 S. La Patera Lane, Goleta, CA 93117

Analysis	Result	Qual	Units	Method	DF	MDL	RL	Date	Time	Tech
Sample: 005 SG3-5						Date & Time Sampled:		01/28/24	@	8:35
Sample Matrix: Air										
Purge Volume Sampled: 3										
.....continued										
1,2,4-Trichlorobenzene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	8:48	KZ
1,1,1-Trichloroethane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	8:48	KZ
1,1,2-Trichloroethane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	8:48	KZ
Trichloroethene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	8:48	KZ
1,2,3-Trichloropropane	<0.0026		µg/L	EPA 8260B	0.1	0.0026	0.013	01/28/24	8:48	KZ
Trichlorofluoromethane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	8:48	KZ
Trichlorotrifluoroethane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	8:48	KZ
1,2,4-Trimethylbenzene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	8:48	KZ
1,3,5-Trimethylbenzene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	8:48	KZ
Vinyl Chloride	<0.0003		µg/L	EPA 8260B	0.1	0.0003	0.0065	01/28/24	8:48	KZ
m,p-Xylenes	<0.0130		µg/L	EPA 8260B	0.1	0.0130	0.026	01/28/24	8:48	KZ
o-Xylene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	8:48	KZ
[VOC Vapor Sampling Tracer]										
Isopropanol (IPA)	<0.0650		µg/L	EPA 8260B	0.1	0.0650	0.13	01/28/24	8:48	KZ
[VOC Surrogates]										
Dibromofluoromethane	95		%REC	EPA 8260B			70-130	01/28/24	8:48	KZ
Toluene-D8	117		%REC	EPA 8260B			70-130	01/28/24	8:48	KZ
Bromofluorobenzene	108		%REC	EPA 8260B			70-130	01/28/24	8:48	KZ
Sample: 006 SG3-10						Date & Time Sampled:		01/28/24	@	9:00
Sample Matrix: Air										
Purge Volume Sampled: 3										
[TPH Gasoline by GCMS]										
C4-C12	<0.6500		µg/L	EPA 8260B	0.1	0.6500	1.3	01/28/24	9:10	KZ
[VOCs by GCMS]										
Acetone	<0.0650		µg/L	EPA 8260B	0.1	0.0650	0.13	01/28/24	9:10	KZ
t-Amyl Methyl Ether (TAME)	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	9:10	KZ
Benzene	<0.0031		µg/L	EPA 8260B	0.1	0.0031	0.013	01/28/24	9:10	KZ
Bromobenzene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	9:10	KZ
Bromochloromethane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	9:10	KZ

EXHIBIT "H" (LIMITED PH2 INVESTIGATION)

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USDA-EPA-NIOSH Testing Food Sanitation Consulting Chemical and Microbiological Analyses and Research



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CERTIFICATE OF ANALYSIS

2401-00264

ALL PHASE ENVIRONMENTAL, INC.
DAN LOUKS
8792 LAUDER CIRCLE, STE. 200
HUNTINGTON BEACH, CA 92646

Date Reported 02/04/24

Date Received 01/28/24

Invoice No. 470

Cust # A022

Permit Number

Customer P.O.

Project: 27 S. La Patera Lane, Goleta, CA 93117

Analysis	Result	Qual	Units	Method	DF	MDL	RL	Date	Time	Tech
Sample: 006 SG3-10								Date & Time Sampled: 01/28/24	@	9:00
Sample Matrix: Air										
Purge Volume Sampled: 3										
.....continued										
Bromodichloromethane	<0.0052		µg/L	EPA 8260B	0.1	0.0052	0.010	01/28/24	9:10	KZ
Bromoform	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	9:10	KZ
Bromomethane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	9:10	KZ
t-Butanol (TBA)	<0.0650		µg/L	EPA 8260B	0.1	0.0650	0.13	01/28/24	9:10	KZ
2-Butanone (MEK)	<0.0650		µg/L	EPA 8260B	0.1	0.0650	0.13	01/28/24	9:10	KZ
n-Butylbenzene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	9:10	KZ
sec-Butylbenzene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	9:10	KZ
tert-Butylbenzene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	9:10	KZ
Carbon Disulfide	<0.0650		µg/L	EPA 8260B	0.1	0.0650	0.13	01/28/24	9:10	KZ
Carbon Tetrachloride	<0.0033		µg/L	EPA 8260B	0.1	0.0033	0.0065	01/28/24	9:10	KZ
Chlorobenzene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	9:10	KZ
Chloroethane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	9:10	KZ
Chloroform	<0.0026		µg/L	EPA 8260B	0.1	0.0026	0.0052	01/28/24	9:10	KZ
Chloromethane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	9:10	KZ
2-Chlorotoluene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	9:10	KZ
4-Chlorotoluene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	9:10	KZ
Dibromochloromethane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	9:10	KZ
1,2-Dibromoethane (EDB)	<0.0016		µg/L	EPA 8260B	0.1	0.0016	0.013	01/28/24	9:10	KZ
1,2-Dibromo-3-Chloropropane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	9:10	KZ
Dibromomethane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	9:10	KZ
1,2-Dichlorobenzene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	9:10	KZ
1,3-Dichlorobenzene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	9:10	KZ
1,4-Dichlorobenzene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	9:10	KZ
Dichlorodifluoromethane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	9:10	KZ
1,1-Dichloroethane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	9:10	KZ
1,2-Dichloroethane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	9:10	KZ
1,1-Dichloroethene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	9:10	KZ
cis-1,2-Dichloroethene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	9:10	KZ
trans-1,2-Dichloroethene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	9:10	KZ
1,2-Dichloropropane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	9:10	KZ

EXHIBIT "H" (LIMITED PH2 INVESTIGATION)

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CERTIFICATE OF ANALYSIS

2401-00264

ALL PHASE ENVIRONMENTAL, INC.
DAN LOUKS
8792 LAUDER CIRCLE, STE. 200
HUNTINGTON BEACH, CA 92646

Date Reported 02/04/24
Date Received 01/28/24
Invoice No. 470
Cust # A022
Permit Number
Customer P.O.

Project: 27 S. La Patera Lane, Goleta, CA 93117

Analysis	Result	Qual	Units	Method	DF	MDL	RL	Date	Time	Tech
Sample: 006 SG3-10								Date & Time Sampled: 01/28/24	@ 9:00	
Sample Matrix: Air										
Purge Volume Sampled: 3										
.....continued										
1,3-Dichloropropane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	9:10	KZ
2,2-Dichloropropane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	9:10	KZ
1,1-Dichloropropene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	9:10	KZ
cis-1,3-Dichloropropene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	9:10	KZ
trans-1,3-Dichloropropene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	9:10	KZ
Diisopropyl Ether (DiPE)	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	9:10	KZ
Ethylbenzene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	9:10	KZ
Ethyl-t-Butyl Ether (EtBE)	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	9:10	KZ
Hexachlorobutadiene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	9:10	KZ
2-Hexanone	<0.0650		µg/L	EPA 8260B	0.1	0.0650	0.13	01/28/24	9:10	KZ
Isopropylbenzene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	9:10	KZ
4-Isopropyltoluene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	9:10	KZ
Methylene Chloride	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.01	01/28/24	9:10	KZ
4-Methyl-2-Pentanone (MIBK)	<0.0650		µg/L	EPA 8260B	0.1	0.0650	0.13	01/28/24	9:10	KZ
Methyl-t-butyl Ether (MtBE)	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	9:10	KZ
Naphthalene	<0.0033		µg/L	EPA 8260B	0.1	0.0033	0.0065	01/28/24	9:10	KZ
n-Propylbenzene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	9:10	KZ
Styrene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	9:10	KZ
1,1,1,2-Tetrachloroethane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	9:10	KZ
1,1,2,2-Tetrachloroethane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	9:10	KZ
Tetrachloroethene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	9:10	KZ
Toluene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	9:10	KZ
1,2,3-Trichlorobenzene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	9:10	KZ
1,2,4-Trichlorobenzene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	9:10	KZ
1,1,1-Trichloroethane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	9:10	KZ
1,1,2-Trichloroethane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	9:10	KZ
Trichloroethene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	9:10	KZ
1,2,3-Trichloropropane	<0.0026		µg/L	EPA 8260B	0.1	0.0026	0.013	01/28/24	9:10	KZ
Trichlorofluoromethane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	9:10	KZ
Trichlorotrifluoroethane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	9:10	KZ

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Invoice No. 470

Cust # A022

Permit Number

Customer P.O.

Project: 27 S. La Patera Lane, Goleta, CA 93117

Analysis	Result	Qual	Units	Method	DF	MDL	RL	Date	Time	Tech
Sample: 006 SG3-10					Date & Time Sampled:		01/28/24	@	9:00	
Sample Matrix: Air										
Purge Volume Sampled: 3										
.....continued										
1,2,4-Trimethylbenzene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	9:10	KZ
1,3,5-Trimethylbenzene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	9:10	KZ
Vinyl Chloride	<0.0003		µg/L	EPA 8260B	0.1	0.0003	0.0065	01/28/24	9:10	KZ
m,p-Xylenes	<0.0130		µg/L	EPA 8260B	0.1	0.0130	0.026	01/28/24	9:10	KZ
o-Xylene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	9:10	KZ
[VOC Vapor Sampling Tracer]										
Isopropanol (IPA)	<0.0650		µg/L	EPA 8260B	0.1	0.0650	0.13	01/28/24	9:10	KZ
[VOC Surrogates]										
Dibromofluoromethane		96	%REC	EPA 8260B			70-130	01/28/24	9:10	KZ
Toluene-D8		119	%REC	EPA 8260B			70-130	01/28/24	9:10	KZ
Bromofluorobenzene		111	%REC	EPA 8260B			70-130	01/28/24	9:10	KZ
Sample: 007 SG4-10					Date & Time Sampled:		01/28/24	@	9:35	
Sample Matrix: Air										
Purge Volume Sampled: 3										
[TPH Gasoline by GCMS]										
C4-C12	<0.6500		µg/L	EPA 8260B	0.1	0.6500	1.3	01/28/24	9:48	KZ
[VOCs by GCMS]										
Acetone		1.0	µg/L	EPA 8260B	0.1	0.0650	0.13	01/28/24	9:48	KZ
t-Amyl Methyl Ether (TAME)	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	9:48	KZ
Benzene	<0.0031		µg/L	EPA 8260B	0.1	0.0031	0.013	01/28/24	9:48	KZ
Bromobenzene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	9:48	KZ
Bromochloromethane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	9:48	KZ
Bromodichloromethane	<0.0052		µg/L	EPA 8260B	0.1	0.0052	0.010	01/28/24	9:48	KZ
Bromoform	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	9:48	KZ
Bromomethane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	9:48	KZ
t-Butanol (TBA)	<0.0650		µg/L	EPA 8260B	0.1	0.0650	0.13	01/28/24	9:48	KZ
2-Butanone (MEK)	<0.0650		µg/L	EPA 8260B	0.1	0.0650	0.13	01/28/24	9:48	KZ
n-Butylbenzene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	9:48	KZ
sec-Butylbenzene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	9:48	KZ

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Invoice No. 470

Cust # A022

Permit Number

Customer P.O.

Project: 27 S. La Patera Lane, Goleta, CA 93117

Analysis	Result	Qual	Units	Method	DF	MDL	RL	Date	Time	Tech
Sample: 007 SG4-10								Date & Time Sampled: 01/28/24	@ 9:35	
Sample Matrix: Air										
Purge Volume Sampled: 3										
.....continued										
tert-Butylbenzene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	9:48	KZ
Carbon Disulfide	<0.0650		µg/L	EPA 8260B	0.1	0.0650	0.13	01/28/24	9:48	KZ
Carbon Tetrachloride	<0.0033		µg/L	EPA 8260B	0.1	0.0033	0.0065	01/28/24	9:48	KZ
Chlorobenzene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	9:48	KZ
Chloroethane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	9:48	KZ
Chloroform	<0.0026		µg/L	EPA 8260B	0.1	0.0026	0.0052	01/28/24	9:48	KZ
Chloromethane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	9:48	KZ
2-Chlorotoluene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	9:48	KZ
4-Chlorotoluene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	9:48	KZ
Dibromochloromethane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	9:48	KZ
1,2-Dibromoethane (EDB)	<0.0016		µg/L	EPA 8260B	0.1	0.0016	0.013	01/28/24	9:48	KZ
1,2-Dibromo-3-Chloropropane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	9:48	KZ
Dibromomethane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	9:48	KZ
1,2-Dichlorobenzene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	9:48	KZ
1,3-Dichlorobenzene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	9:48	KZ
1,4-Dichlorobenzene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	9:48	KZ
Dichlorodifluoromethane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	9:48	KZ
1,1-Dichloroethane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	9:48	KZ
1,2-Dichloroethane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	9:48	KZ
1,1-Dichloroethene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	9:48	KZ
cis-1,2-Dichloroethene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	9:48	KZ
trans-1,2-Dichloroethene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	9:48	KZ
1,2-Dichloropropane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	9:48	KZ
1,3-Dichloropropane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	9:48	KZ
2,2-Dichloropropane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	9:48	KZ
1,1-Dichloropropene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	9:48	KZ
cis-1,3-Dichloropropene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	9:48	KZ
trans-1,3-Dichloropropene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	9:48	KZ
Diisopropyl Ether (DIPE)	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	9:48	KZ
Ethylbenzene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	9:48	KZ

EXHIBIT "H" (LIMITED PH2 INVESTIGATION)

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CERTIFICATE OF ANALYSIS

2401-00264

ALL PHASE ENVIRONMENTAL, INC.

DAN LOUKS

8792 LAUDER CIRCLE, STE. 200

HUNTINGTON BEACH, CA 92646

Date Reported 02/04/24

Date Received 01/28/24

Invoice No. 470

Cust # A022

Permit Number

Customer P.O.

Project: 27 S. La Patera Lane, Goleta, CA 93117

Analysis	Result	Qual	Units	Method	DF	MDL	RL	Date	Time	Tech
Sample: 007 SG4-10								Date & Time Sampled: 01/28/24	@ 9:35	
Sample Matrix: Air										
Purge Volume Sampled: 3										
.....continued										
Ethyl-t-Butyl Ether (EtBE)	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	9:48	KZ
Hexachlorobutadiene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	9:48	KZ
2-Hexanone	<0.0650		µg/L	EPA 8260B	0.1	0.0650	0.13	01/28/24	9:48	KZ
Isopropylbenzene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	9:48	KZ
4-Isopropyltoluene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	9:48	KZ
Methylene Chloride	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.01	01/28/24	9:48	KZ
4-Methyl-2-Pentanone (MIBK)	<0.0650		µg/L	EPA 8260B	0.1	0.0650	0.13	01/28/24	9:48	KZ
Methyl-t-butyl Ether (MtBE)	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	9:48	KZ
Naphthalene	<0.0033		µg/L	EPA 8260B	0.1	0.0033	0.0065	01/28/24	9:48	KZ
n-Propylbenzene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	9:48	KZ
Styrene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	9:48	KZ
1,1,1,2-Tetrachloroethane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	9:48	KZ
1,1,2,2-Tetrachloroethane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	9:48	KZ
Tetrachloroethene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	9:48	KZ
Toluene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	9:48	KZ
1,2,3-Trichlorobenzene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	9:48	KZ
1,2,4-Trichlorobenzene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	9:48	KZ
1,1,1-Trichloroethane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	9:48	KZ
1,1,2-Trichloroethane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	9:48	KZ
Trichloroethene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	9:48	KZ
1,2,3-Trichloropropane	<0.0026		µg/L	EPA 8260B	0.1	0.0026	0.013	01/28/24	9:48	KZ
Trichlorofluoromethane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	9:48	KZ
Trichlorotrifluoroethane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	9:48	KZ
1,2,4-Trimethylbenzene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	9:48	KZ
1,3,5-Trimethylbenzene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	9:48	KZ
Vinyl Chloride	<0.0003		µg/L	EPA 8260B	0.1	0.0003	0.0065	01/28/24	9:48	KZ
m,p-Xylenes	<0.0130		µg/L	EPA 8260B	0.1	0.0130	0.026	01/28/24	9:48	KZ
o-Xylene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	9:48	KZ
[VOC Vapor Sampling Tracer]										
Isopropanol (IPA)	1.3		µg/L	EPA 8260B	0.1	0.0650	0.13	01/28/24	9:48	KZ

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CERTIFICATE OF ANALYSIS

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DAN LOUKS
8792 LAUDER CIRCLE, STE. 200
HUNTINGTON BEACH, CA 92646

Date Reported 02/04/24

Date Received 01/28/24

Invoice No. 470

Cust # A022

Permit Number

Customer P.O.

Project: 27 S. La Patera Lane, Goleta, CA 93117

Analysis	Result	Qual	Units	Method	DF	MDL	RL	Date	Time	Tech
Sample: 007 SG4-10 Date & Time Sampled: 01/28/24 @ 9:35 Sample Matrix: Air Purge Volume Sampled: 3continued										
[VOC Surrogates]										
Dibromofluoromethane	102		%REC	EPA 8260B			70-130	01/28/24	9:48	KZ
Toluene-D8	118		%REC	EPA 8260B			70-130	01/28/24	9:48	KZ
Bromofluorobenzene	119		%REC	EPA 8260B			70-130	01/28/24	9:48	KZ
Sample: 008 SG4-30 Date & Time Sampled: 01/28/24 @ 10:00 Sample Matrix: Air Purge Volume Sampled: 3										
[TPH Gasoline by GCMS]										
C4-C12	<0.6500		µg/L	EPA 8260B	0.1	0.6500	1.3	01/28/24	10:11	KZ
[VOCs by GCMS]										
Acetone	<0.0650		µg/L	EPA 8260B	0.1	0.0650	0.13	01/28/24	10:11	KZ
t-Amyl Methyl Ether (TAME)	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	10:11	KZ
Benzene	<0.0031		µg/L	EPA 8260B	0.1	0.0031	0.013	01/28/24	10:11	KZ
Bromobenzene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	10:11	KZ
Bromochloromethane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	10:11	KZ
Bromodichloromethane	<0.0052		µg/L	EPA 8260B	0.1	0.0052	0.010	01/28/24	10:11	KZ
Bromoform	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	10:11	KZ
Bromomethane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	10:11	KZ
t-Butanol (TBA)	<0.0650		µg/L	EPA 8260B	0.1	0.0650	0.13	01/28/24	10:11	KZ
2-Butanone (MEK)	<0.0650		µg/L	EPA 8260B	0.1	0.0650	0.13	01/28/24	10:11	KZ
n-Butylbenzene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	10:11	KZ
sec-Butylbenzene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	10:11	KZ
tert-Butylbenzene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	10:11	KZ
Carbon Disulfide	<0.0650		µg/L	EPA 8260B	0.1	0.0650	0.13	01/28/24	10:11	KZ
Carbon Tetrachloride	<0.0033		µg/L	EPA 8260B	0.1	0.0033	0.0065	01/28/24	10:11	KZ
Chlorobenzene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	10:11	KZ
Chloroethane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	10:11	KZ
Chloroform	<0.0026		µg/L	EPA 8260B	0.1	0.0026	0.0052	01/28/24	10:11	KZ
Chloromethane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	10:11	KZ

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CERTIFICATE OF ANALYSIS

2401-00264

ALL PHASE ENVIRONMENTAL, INC.

DAN LOUKS

8792 LAUDER CIRCLE, STE. 200

HUNTINGTON BEACH, CA 92646

Date Reported 02/04/24

Date Received 01/28/24

Invoice No. 470

Cust # A022

Permit Number

Customer P.O.

Project: 27 S. La Patera Lane, Goleta, CA 93117

Analysis	Result	Qual	Units	Method	DF	MDL	RL	Date	Time	Tech
Sample: 008 SG4-30								Date & Time Sampled: 01/28/24	@ 10:00	
Sample Matrix: Air										
Purge Volume Sampled: 3										
.....continued										
2-Chlorotoluene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	10:11	KZ
4-Chlorotoluene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	10:11	KZ
Dibromochloromethane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	10:11	KZ
1,2-Dibromoethane (EDB)	<0.0016		µg/L	EPA 8260B	0.1	0.0016	0.013	01/28/24	10:11	KZ
1,2-Dibromo-3-Chloropropane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	10:11	KZ
Dibromomethane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	10:11	KZ
1,2-Dichlorobenzene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	10:11	KZ
1,3-Dichlorobenzene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	10:11	KZ
1,4-Dichlorobenzene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	10:11	KZ
Dichlorodifluoromethane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	10:11	KZ
1,1-Dichloroethane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	10:11	KZ
1,2-Dichloroethane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	10:11	KZ
1,1-Dichloroethene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	10:11	KZ
cis-1,2-Dichloroethene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	10:11	KZ
trans-1,2-Dichloroethene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	10:11	KZ
1,2-Dichloropropane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	10:11	KZ
1,3-Dichloropropane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	10:11	KZ
2,2-Dichloropropane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	10:11	KZ
1,1-Dichloropropene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	10:11	KZ
cis-1,3-Dichloropropene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	10:11	KZ
trans-1,3-Dichloropropene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	10:11	KZ
Diisopropyl Ether (DiPE)	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	10:11	KZ
Ethylbenzene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	10:11	KZ
Ethyl-t-Butyl Ether (EtBE)	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	10:11	KZ
Hexachlorobutadiene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	10:11	KZ
2-Hexanone	<0.0650		µg/L	EPA 8260B	0.1	0.0650	0.13	01/28/24	10:11	KZ
Isopropylbenzene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	10:11	KZ
4-Isopropyltoluene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	10:11	KZ
Methylene Chloride	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.01	01/28/24	10:11	KZ
4-Methyl-2-Pentanone (MIBK)	<0.0650		µg/L	EPA 8260B	0.1	0.0650	0.13	01/28/24	10:11	KZ

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Date Received 01/28/24

Invoice No. 470

Cust # A022

Permit Number

Customer P.O.

Project: 27 S. La Patera Lane, Goleta, CA 93117

Analysis	Result	Qual	Units	Method	DF	MDL	RL	Date	Time	Tech
Sample: 008 SG4-30							Date & Time Sampled:	01/28/24	@	10:00
Sample Matrix: Air										
Purge Volume Sampled: 3										
.....continued										
Methyl-t-butyl Ether (MtBE)	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	10:11	KZ
Naphthalene	<0.0033		µg/L	EPA 8260B	0.1	0.0033	0.0065	01/28/24	10:11	KZ
n-Propylbenzene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	10:11	KZ
Styrene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	10:11	KZ
1,1,1,2-Tetrachloroethane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	10:11	KZ
1,1,1,2,2-Tetrachloroethane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	10:11	KZ
Tetrachloroethane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	10:11	KZ
Toluene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	10:11	KZ
1,2,3-Trichlorobenzene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	10:11	KZ
1,2,4-Trichlorobenzene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	10:11	KZ
1,1,1-Trichloroethane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	10:11	KZ
1,1,2-Trichloroethane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	10:11	KZ
Trichloroethene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	10:11	KZ
1,2,3-Trichloropropane	<0.0026		µg/L	EPA 8260B	0.1	0.0026	0.013	01/28/24	10:11	KZ
Trichlorofluoromethane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	10:11	KZ
Trichlorotrifluoroethane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	10:11	KZ
1,2,4-Trimethylbenzene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	10:11	KZ
1,3,5-Trimethylbenzene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	10:11	KZ
Vinyl Chloride	<0.0003		µg/L	EPA 8260B	0.1	0.0003	0.0065	01/28/24	10:11	KZ
m,p-Xylenes	<0.0130		µg/L	EPA 8260B	0.1	0.0130	0.026	01/28/24	10:11	KZ
o-Xylene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	10:11	KZ
[VOC Vapor Sampling Tracer]										
Isopropanol (IPA)	<0.0650		µg/L	EPA 8260B	0.1	0.0650	0.13	01/28/24	10:11	KZ
[VOC Surrogates]										
Dibromofluoromethane	92		%REC	EPA 8260B			70-130	01/28/24	10:11	KZ
Toluene-D8	116		%REC	EPA 8260B			70-130	01/28/24	10:11	KZ
Bromofluorobenzene	110		%REC	EPA 8260B			70-130	01/28/24	10:11	KZ

Sample: 009 **SG5-5**Sample Matrix: **Air**

Date & Time Sampled: 01/28/24 @ 10:25

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Cust # A022
Permit Number
Customer P.O.

Project: 27 S. La Patera Lane, Goleta, CA 93117

Analysis	Result	Qual	Units	Method	DF	MDL	RL	Date	Time	Tech
Sample: 009 SG5-5								Date & Time Sampled: 01/28/24	@ 10:25	
Sample Matrix: Air										
Purge Volume Sampled: 3										
[TPH Gasoline by GCMS]										
C4-C12	<0.6500		µg/L	EPA 8260B	0.1	0.6500	1.3	01/28/24	10:36	KZ
[VOCs by GCMS]										
Acetone	<0.0650		µg/L	EPA 8260B	0.1	0.0650	0.13	01/28/24	10:36	KZ
t-Amyl Methyl Ether (TAME)	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	10:36	KZ
Benzene	<0.0031		µg/L	EPA 8260B	0.1	0.0031	0.013	01/28/24	10:36	KZ
Bromobenzene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	10:36	KZ
Bromochloromethane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	10:36	KZ
Bromodichloromethane	<0.0052		µg/L	EPA 8260B	0.1	0.0052	0.010	01/28/24	10:36	KZ
Bromoform	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	10:36	KZ
Bromomethane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	10:36	KZ
t-Butanol (TBA)	<0.0650		µg/L	EPA 8260B	0.1	0.0650	0.13	01/28/24	10:36	KZ
2-Butanone (MEK)	<0.0650		µg/L	EPA 8260B	0.1	0.0650	0.13	01/28/24	10:36	KZ
n-Butylbenzene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	10:36	KZ
sec-Butylbenzene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	10:36	KZ
tert-Butylbenzene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	10:36	KZ
Carbon Disulfide	<0.0650		µg/L	EPA 8260B	0.1	0.0650	0.13	01/28/24	10:36	KZ
Carbon Tetrachloride	<0.0033		µg/L	EPA 8260B	0.1	0.0033	0.0065	01/28/24	10:36	KZ
Chlorobenzene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	10:36	KZ
Chloroethane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	10:36	KZ
Chloroform	<0.0026		µg/L	EPA 8260B	0.1	0.0026	0.0052	01/28/24	10:36	KZ
Chloromethane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	10:36	KZ
2-Chlorotoluene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	10:36	KZ
4-Chlorotoluene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	10:36	KZ
Dibromochloromethane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	10:36	KZ
1,2-Dibromoethane (EDB)	<0.0016		µg/L	EPA 8260B	0.1	0.0016	0.013	01/28/24	10:36	KZ
1,2-Dibromo-3-Chloropropane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	10:36	KZ
Dibromomethane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	10:36	KZ
1,2-Dichlorobenzene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	10:36	KZ
1,3-Dichlorobenzene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	10:36	KZ
1,4-Dichlorobenzene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	10:36	KZ

EXHIBIT "H" (LIMITED PH2 INVESTIGATION)

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CERTIFICATE OF ANALYSIS

2401-00264

ALL PHASE ENVIRONMENTAL, INC.

DAN LOUKS

8792 LAUDER CIRCLE, STE. 200

HUNTINGTON BEACH, CA 92646

Date Reported 02/04/24

Date Received 01/28/24

Invoice No. 470

Cust # A022

Permit Number

Customer P.O.

Project: 27 S. La Patera Lane, Goleta, CA 93117

Analysis	Result	Qual	Units	Method	DF	MDL	RL	Date	Time	Tech
Sample: 009 SG5-5								Date & Time Sampled: 01/28/24	@ 10:25	
Sample Matrix: Air										
Purge Volume Sampled: 3										
.....continued										
Dichlorodifluoromethane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	10:36	KZ
1,1-Dichloroethane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	10:36	KZ
1,2-Dichloroethane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	10:36	KZ
1,1-Dichloroethene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	10:36	KZ
cis-1,2-Dichloroethene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	10:36	KZ
trans-1,2-Dichloroethene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	10:36	KZ
1,2-Dichloropropane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	10:36	KZ
1,3-Dichloropropane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	10:36	KZ
2,2-Dichloropropane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	10:36	KZ
1,1-Dichloropropene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	10:36	KZ
cis-1,3-Dichloropropene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	10:36	KZ
trans-1,3-Dichloropropene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	10:36	KZ
Diisopropyl Ether (DiPE)	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	10:36	KZ
Ethylbenzene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	10:36	KZ
Ethyl-t-Butyl Ether (EtBE)	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	10:36	KZ
Hexachlorobutadiene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	10:36	KZ
2-Hexanone	<0.0650		µg/L	EPA 8260B	0.1	0.0650	0.13	01/28/24	10:36	KZ
Isopropylbenzene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	10:36	KZ
4-Isopropyltoluene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	10:36	KZ
Methylene Chloride	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.01	01/28/24	10:36	KZ
4-Methyl-2-Pentanone (MIBK)	<0.0650		µg/L	EPA 8260B	0.1	0.0650	0.13	01/28/24	10:36	KZ
Methyl-t-butyl Ether (MtBE)	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	10:36	KZ
Naphthalene	<0.0033		µg/L	EPA 8260B	0.1	0.0033	0.0065	01/28/24	10:36	KZ
n-Propylbenzene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	10:36	KZ
Styrene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	10:36	KZ
1,1,1,2-Tetrachloroethane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	10:36	KZ
1,1,2,2-Tetrachloroethane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	10:36	KZ
Tetrachloroethene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	10:36	KZ
Toluene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	10:36	KZ
1,2,3-Trichlorobenzene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	10:36	KZ

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DAN LOUKS

8792 LAUDER CIRCLE, STE. 200

HUNTINGTON BEACH, CA 92646

Date Reported 02/04/24

Date Received 01/28/24

Invoice No. 470

Cust # A022

Permit Number

Customer P.O.

Project: 27 S. La Patera Lane, Goleta, CA 93117

Analysis	Result	Qual	Units	Method	DF	MDL	RL	Date	Time	Tech
Sample: 009 SG5-5						Date & Time Sampled:		01/28/24	@	10:25
Sample Matrix: Air										
Purge Volume Sampled: 3										
.....continued										
1,2,4-Trichlorobenzene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	10:36	KZ
1,1,1-Trichloroethane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	10:36	KZ
1,1,2-Trichloroethane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	10:36	KZ
Trichloroethene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	10:36	KZ
1,2,3-Trichloropropane	<0.0026		µg/L	EPA 8260B	0.1	0.0026	0.013	01/28/24	10:36	KZ
Trichlorofluoromethane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	10:36	KZ
Trichlorotrifluoroethane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	10:36	KZ
1,2,4-Trimethylbenzene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	10:36	KZ
1,3,5-Trimethylbenzene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	10:36	KZ
Vinyl Chloride	<0.0003		µg/L	EPA 8260B	0.1	0.0003	0.0065	01/28/24	10:36	KZ
m,p-Xylenes	<0.0130		µg/L	EPA 8260B	0.1	0.0130	0.026	01/28/24	10:36	KZ
o-Xylene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	10:36	KZ
[VOC Vapor Sampling Tracer]										
Isopropanol (IPA)	<0.0650		µg/L	EPA 8260B	0.1	0.0650	0.13	01/28/24	10:36	KZ
[VOC Surrogates]										
Dibromofluoromethane		93	%REC	EPA 8260B			70-130	01/28/24	10:36	KZ
Toluene-D8		115	%REC	EPA 8260B			70-130	01/28/24	10:36	KZ
Bromofluorobenzene		114	%REC	EPA 8260B			70-130	01/28/24	10:36	KZ
Sample: 010 SG6-5						Date & Time Sampled:		01/28/24	@	10:48
Sample Matrix: Air										
Purge Volume Sampled: 3										
[TPH Gasoline by GCMS]										
C4-C12	<0.6500		µg/L	EPA 8260B	0.1	0.6500	1.3	01/28/24	10:59	KZ
[VOCs by GCMS]										
Acetone	<0.0650		µg/L	EPA 8260B	0.1	0.0650	0.13	01/28/24	10:59	KZ
t-Amyl Methyl Ether (TAME)	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	10:59	KZ
Benzene	<0.0031		µg/L	EPA 8260B	0.1	0.0031	0.013	01/28/24	10:59	KZ
Bromobenzene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	10:59	KZ
Bromochloromethane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	10:59	KZ

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2401-00264

ALL PHASE ENVIRONMENTAL, INC.
DAN LOUKS
8792 LAUDER CIRCLE, STE. 200
HUNTINGTON BEACH, CA 92646

Date Reported 02/04/24

Date Received 01/28/24

Invoice No. 470

Cust # A022

Permit Number

Customer P.O.

Project: 27 S. La Patera Lane, Goleta, CA 93117

Analysis	Result	Qual	Units	Method	DF	MDL	RL	Date	Time	Tech
Sample: 010 SG6-5						Date & Time Sampled:		01/28/24	@	10:48
Sample Matrix: Air										
Purge Volume Sampled: 3										
.....continued										
Bromodichloromethane	<0.0052		µg/L	EPA 8260B	0.1	0.0052	0.010	01/28/24	10:59	KZ
Bromoform	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	10:59	KZ
Bromomethane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	10:59	KZ
t-Butanol (TBA)	<0.0650		µg/L	EPA 8260B	0.1	0.0650	0.13	01/28/24	10:59	KZ
2-Butanone (MEK)	<0.0650		µg/L	EPA 8260B	0.1	0.0650	0.13	01/28/24	10:59	KZ
n-Butylbenzene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	10:59	KZ
sec-Butylbenzene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	10:59	KZ
tert-Butylbenzene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	10:59	KZ
Carbon Disulfide	<0.0650		µg/L	EPA 8260B	0.1	0.0650	0.13	01/28/24	10:59	KZ
Carbon Tetrachloride	<0.0033		µg/L	EPA 8260B	0.1	0.0033	0.0065	01/28/24	10:59	KZ
Chlorobenzene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	10:59	KZ
Chloroethane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	10:59	KZ
Chloroform	<0.0026		µg/L	EPA 8260B	0.1	0.0026	0.0052	01/28/24	10:59	KZ
Chloromethane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	10:59	KZ
2-Chlorotoluene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	10:59	KZ
4-Chlorotoluene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	10:59	KZ
Dibromochloromethane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	10:59	KZ
1,2-Dibromoethane (EDB)	<0.0016		µg/L	EPA 8260B	0.1	0.0016	0.013	01/28/24	10:59	KZ
1,2-Dibromo-3-Chloropropane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	10:59	KZ
Dibromomethane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	10:59	KZ
1,2-Dichlorobenzene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	10:59	KZ
1,3-Dichlorobenzene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	10:59	KZ
1,4-Dichlorobenzene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	10:59	KZ
Dichlorodifluoromethane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	10:59	KZ
1,1-Dichloroethane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	10:59	KZ
1,2-Dichloroethane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	10:59	KZ
1,1-Dichloroethene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	10:59	KZ
cis-1,2-Dichloroethene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	10:59	KZ
trans-1,2-Dichloroethene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	10:59	KZ
1,2-Dichloropropane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	10:59	KZ

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Cust # A022

Permit Number

Customer P.O.

Project: 27 S. La Patera Lane, Goleta, CA 93117

Analysis	Result	Qual	Units	Method	DF	MDL	RL	Date	Time	Tech	
Sample: 010 SG6-5							Date & Time Sampled:	01/28/24	@	10:48	
Sample Matrix: Air											
Purge Volume Sampled: 3											
.....continued											
1,3-Dichloropropane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	10:59	KZ	
2,2-Dichloropropane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	10:59	KZ	
1,1-Dichloropropene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	10:59	KZ	
cis-1,3-Dichloropropene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	10:59	KZ	
trans-1,3-Dichloropropene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	10:59	KZ	
Diisopropyl Ether (DiPE)	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	10:59	KZ	
Ethylbenzene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	10:59	KZ	
Ethyl-t-Butyl Ether (EtBE)	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	10:59	KZ	
Hexachlorobutadiene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	10:59	KZ	
2-Hexanone	<0.0650		µg/L	EPA 8260B	0.1	0.0650	0.13	01/28/24	10:59	KZ	
Isopropylbenzene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	10:59	KZ	
4-Isopropyltoluene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	10:59	KZ	
Methylene Chloride	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.01	01/28/24	10:59	KZ	
4-Methyl-2-Pentanone (MIBK)	<0.0650		µg/L	EPA 8260B	0.1	0.0650	0.13	01/28/24	10:59	KZ	
Methyl-t-butyl Ether (MtBE)	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	10:59	KZ	
Naphthalene	<0.0033		µg/L	EPA 8260B	0.1	0.0033	0.0065	01/28/24	10:59	KZ	
n-Propylbenzene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	10:59	KZ	
Styrene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	10:59	KZ	
1,1,1,2-Tetrachloroethane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	10:59	KZ	
1,1,2,2-Tetrachloroethane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	10:59	KZ	
Tetrachloroethene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	10:59	KZ	
Toluene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	10:59	KZ	
1,2,3-Trichlorobenzene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	10:59	KZ	
1,2,4-Trichlorobenzene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	10:59	KZ	
1,1,1-Trichloroethane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	10:59	KZ	
1,1,2-Trichloroethane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	10:59	KZ	
Trichloroethene	0.010	J	µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	10:59	KZ	
1,2,3-Trichloropropane	<0.0026		µg/L	EPA 8260B	0.1	0.0026	0.013	01/28/24	10:59	KZ	
Trichlorofluoromethane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	10:59	KZ	
Trichlorotrifluoroethane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	10:59	KZ	

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CERTIFICATE OF ANALYSIS

2401-00264

ALL PHASE ENVIRONMENTAL, INC.
DAN LOUKS
8792 LAUDER CIRCLE, STE. 200
HUNTINGTON BEACH, CA 92646

Date Reported 02/04/24

Date Received 01/28/24

Invoice No. 470

Cust # A022

Permit Number

Customer P.O.

Project: 27 S. La Patera Lane, Goleta, CA 93117

Analysis	Result	Qual	Units	Method	DF	MDL	RL	Date	Time	Tech
Sample: 010 SG6-5						Date & Time Sampled:		01/28/24	@	10:48
Sample Matrix: Air										
Purge Volume Sampled: 3										
.....continued										
1,2,4-Trimethylbenzene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	10:59	KZ
1,3,5-Trimethylbenzene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	10:59	KZ
Vinyl Chloride	<0.0003		µg/L	EPA 8260B	0.1	0.0003	0.0065	01/28/24	10:59	KZ
m,p-Xylenes	<0.0130		µg/L	EPA 8260B	0.1	0.0130	0.026	01/28/24	10:59	KZ
o-Xylene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	10:59	KZ
[VOC Vapor Sampling Tracer]										
Isopropanol (IPA)	<0.0650		µg/L	EPA 8260B	0.1	0.0650	0.13	01/28/24	10:59	KZ
[VOC Surrogates]										
Dibromofluoromethane	101		%REC	EPA 8260B			70-130	01/28/24	10:59	KZ
Toluene-D8	118		%REC	EPA 8260B			70-130	01/28/24	10:59	KZ
Bromofluorobenzene	117		%REC	EPA 8260B			70-130	01/28/24	10:59	KZ
Sample: 011 SG7-5						Date & Time Sampled:		01/28/24	@	11:10
Sample Matrix: Air										
Purge Volume Sampled: 3										
[TPH Gasoline by GCMS]										
C4-C12	<0.6500		µg/L	EPA 8260B	0.1	0.6500	1.3	01/28/24	11:23	KZ
[VOCs by GCMS]										
Acetone	<0.0650		µg/L	EPA 8260B	0.1	0.0650	0.13	01/28/24	11:23	KZ
t-Amyl Methyl Ether (TAME)	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	11:23	KZ
Benzene	<0.0031		µg/L	EPA 8260B	0.1	0.0031	0.013	01/28/24	11:23	KZ
Bromobenzene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	11:23	KZ
Bromochloromethane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	11:23	KZ
Bromodichloromethane	<0.0052		µg/L	EPA 8260B	0.1	0.0052	0.010	01/28/24	11:23	KZ
Bromoform	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	11:23	KZ
Bromomethane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	11:23	KZ
t-Butanol (TBA)	<0.0650		µg/L	EPA 8260B	0.1	0.0650	0.13	01/28/24	11:23	KZ
2-Butanone (MEK)	<0.0650		µg/L	EPA 8260B	0.1	0.0650	0.13	01/28/24	11:23	KZ
n-Butylbenzene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	11:23	KZ
sec-Butylbenzene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	11:23	KZ

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CERTIFICATE OF ANALYSIS

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ALL PHASE ENVIRONMENTAL, INC.
DAN LOUKS
8792 LAUDER CIRCLE, STE. 200
HUNTINGTON BEACH, CA 92646

Date Reported 02/04/24
Date Received 01/28/24
Invoice No. 470
Cust # A022
Permit Number
Customer P.O.

Project: 27 S. La Patera Lane, Goleta, CA 93117

Analysis	Result	Qual	Units	Method	DF	MDL	RL	Date	Time	Tech
Sample: 011 SG7-5								Date & Time Sampled: 01/28/24	@ 11:10	
Sample Matrix: Air										
Purge Volume Sampled: 3										
.....continued										
tert-Butylbenzene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	11:23	KZ
Carbon Disulfide	<0.0650		µg/L	EPA 8260B	0.1	0.0650	0.13	01/28/24	11:23	KZ
Carbon Tetrachloride	<0.0033		µg/L	EPA 8260B	0.1	0.0033	0.0065	01/28/24	11:23	KZ
Chlorobenzene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	11:23	KZ
Chloroethane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	11:23	KZ
Chloroform	<0.0026		µg/L	EPA 8260B	0.1	0.0026	0.0052	01/28/24	11:23	KZ
Chloromethane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	11:23	KZ
2-Chlorotoluene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	11:23	KZ
4-Chlorotoluene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	11:23	KZ
Dibromochloromethane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	11:23	KZ
1,2-Dibromoethane (EDB)	<0.0016		µg/L	EPA 8260B	0.1	0.0016	0.013	01/28/24	11:23	KZ
1,2-Dibromo-3-Chloropropane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	11:23	KZ
Dibromomethane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	11:23	KZ
1,2-Dichlorobenzene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	11:23	KZ
1,3-Dichlorobenzene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	11:23	KZ
1,4-Dichlorobenzene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	11:23	KZ
Dichlorodifluoromethane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	11:23	KZ
1,1-Dichloroethane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	11:23	KZ
1,2-Dichloroethane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	11:23	KZ
1,1-Dichloroethene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	11:23	KZ
cis-1,2-Dichloroethene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	11:23	KZ
trans-1,2-Dichloroethene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	11:23	KZ
1,2-Dichloropropane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	11:23	KZ
1,3-Dichloropropane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	11:23	KZ
2,2-Dichloropropane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	11:23	KZ
1,1-Dichloropropene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	11:23	KZ
cis-1,3-Dichloropropene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	11:23	KZ
trans-1,3-Dichloropropene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	11:23	KZ
Diisopropyl Ether (DIPE)	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	11:23	KZ
Ethylbenzene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	11:23	KZ

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CERTIFICATE OF ANALYSIS

2401-00264

ALL PHASE ENVIRONMENTAL, INC.
DAN LOUKS
8792 LAUDER CIRCLE, STE. 200
HUNTINGTON BEACH, CA 92646

Date Reported 02/04/24

Date Received 01/28/24

Invoice No. 470

Cust # A022

Permit Number

Customer P.O.

Project: 27 S. La Patera Lane, Goleta, CA 93117

Analysis	Result	Qual	Units	Method	DF	MDL	RL	Date	Time	Tech
Sample: 011 SG7-5								Date & Time Sampled: 01/28/24	@ 11:10	
Sample Matrix: Air										
Purge Volume Sampled: 3										
.....continued										
Ethyl-t-Butyl Ether (EtBE)	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	11:23	KZ
Hexachlorobutadiene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	11:23	KZ
2-Hexanone	<0.0650		µg/L	EPA 8260B	0.1	0.0650	0.13	01/28/24	11:23	KZ
Isopropylbenzene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	11:23	KZ
4-Isopropyltoluene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	11:23	KZ
Methylene Chloride	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.01	01/28/24	11:23	KZ
4-Methyl-2-Pentanone (MIBK)	<0.0650		µg/L	EPA 8260B	0.1	0.0650	0.13	01/28/24	11:23	KZ
Methyl-t-butyl Ether (MtBE)	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	11:23	KZ
Naphthalene	<0.0033		µg/L	EPA 8260B	0.1	0.0033	0.0065	01/28/24	11:23	KZ
n-Propylbenzene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	11:23	KZ
Styrene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	11:23	KZ
1,1,1,2-Tetrachloroethane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	11:23	KZ
1,1,2,2-Tetrachloroethane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	11:23	KZ
Tetrachloroethene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	11:23	KZ
Toluene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	11:23	KZ
1,2,3-Trichlorobenzene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	11:23	KZ
1,2,4-Trichlorobenzene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	11:23	KZ
1,1,1-Trichloroethane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	11:23	KZ
1,1,2-Trichloroethane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	11:23	KZ
Trichloroethene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	11:23	KZ
1,2,3-Trichloropropane	<0.0026		µg/L	EPA 8260B	0.1	0.0026	0.013	01/28/24	11:23	KZ
Trichlorofluoromethane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	11:23	KZ
Trichlorotrifluoroethane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	11:23	KZ
1,2,4-Trimethylbenzene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	11:23	KZ
1,3,5-Trimethylbenzene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	11:23	KZ
Vinyl Chloride	<0.0003		µg/L	EPA 8260B	0.1	0.0003	0.0065	01/28/24	11:23	KZ
m,p-Xylenes	<0.0130		µg/L	EPA 8260B	0.1	0.0130	0.026	01/28/24	11:23	KZ
o-Xylene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	11:23	KZ
[VOC Vapor Sampling Tracer]										
Isopropanol (IPA)	<0.0650		µg/L	EPA 8260B	0.1	0.0650	0.13	01/28/24	11:23	KZ

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Date Reported 02/04/24
Date Received 01/28/24
Invoice No. 470
Cust # A022
Permit Number
Customer P.O.

Project: 27 S. La Patera Lane, Goleta, CA 93117

Analysis	Result	Qual	Units	Method	DF	MDL	RL	Date	Time	Tech
Sample: 011 SG7-5 Date & Time Sampled: 01/28/24 @ 11:10 Sample Matrix: Air Purge Volume Sampled: 3continued										
[VOC Surrogates]										
Dibromofluoromethane	96		%REC	EPA 8260B			70-130	01/28/24	11:23	KZ
Toluene-D8	116		%REC	EPA 8260B			70-130	01/28/24	11:23	KZ
Bromofluorobenzene	111		%REC	EPA 8260B			70-130	01/28/24	11:23	KZ
Sample: 012 SG8-5 Date & Time Sampled: 01/28/24 @ 11:36 Sample Matrix: Air Purge Volume Sampled: 3										
[TPH Gasoline by GCMS]										
C4-C12	<0.6500		µg/L	EPA 8260B	0.1	0.6500	1.3	01/28/24	11:48	KZ
[VOCs by GCMS]										
Acetone	<0.0650		µg/L	EPA 8260B	0.1	0.0650	0.13	01/28/24	11:48	KZ
t-Amyl Methyl Ether (TAME)	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	11:48	KZ
Benzene	<0.0031		µg/L	EPA 8260B	0.1	0.0031	0.013	01/28/24	11:48	KZ
Bromobenzene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	11:48	KZ
Bromochloromethane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	11:48	KZ
Bromodichloromethane	<0.0052		µg/L	EPA 8260B	0.1	0.0052	0.010	01/28/24	11:48	KZ
Bromoform	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	11:48	KZ
Bromomethane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	11:48	KZ
t-Butanol (TBA)	<0.0650		µg/L	EPA 8260B	0.1	0.0650	0.13	01/28/24	11:48	KZ
2-Butanone (MEK)	<0.0650		µg/L	EPA 8260B	0.1	0.0650	0.13	01/28/24	11:48	KZ
n-Butylbenzene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	11:48	KZ
sec-Butylbenzene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	11:48	KZ
tert-Butylbenzene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	11:48	KZ
Carbon Disulfide	<0.0650		µg/L	EPA 8260B	0.1	0.0650	0.13	01/28/24	11:48	KZ
Carbon Tetrachloride	<0.0033		µg/L	EPA 8260B	0.1	0.0033	0.0065	01/28/24	11:48	KZ
Chlorobenzene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	11:48	KZ
Chloroethane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	11:48	KZ
Chloroform	<0.0026		µg/L	EPA 8260B	0.1	0.0026	0.0052	01/28/24	11:48	KZ
Chloromethane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	11:48	KZ

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CERTIFICATE OF ANALYSIS

2401-00264

ALL PHASE ENVIRONMENTAL, INC.
DAN LOUKS
8792 LAUDER CIRCLE, STE. 200
HUNTINGTON BEACH, CA 92646

Date Reported 02/04/24

Date Received 01/28/24

Invoice No. 470

Cust # A022

Permit Number

Customer P.O.

Project: 27 S. La Patera Lane, Goleta, CA 93117

Analysis	Result	Qual	Units	Method	DF	MDL	RL	Date	Time	Tech
Sample: 012 SG8-5								Date & Time Sampled: 01/28/24	@ 11:36	
Sample Matrix: Air										
Purge Volume Sampled: 3										
.....continued										
2-Chlorotoluene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	11:48	KZ
4-Chlorotoluene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	11:48	KZ
Dibromochloromethane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	11:48	KZ
1,2-Dibromoethane (EDB)	<0.0016		µg/L	EPA 8260B	0.1	0.0016	0.013	01/28/24	11:48	KZ
1,2-Dibromo-3-Chloropropane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	11:48	KZ
Dibromomethane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	11:48	KZ
1,2-Dichlorobenzene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	11:48	KZ
1,3-Dichlorobenzene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	11:48	KZ
1,4-Dichlorobenzene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	11:48	KZ
Dichlorodifluoromethane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	11:48	KZ
1,1-Dichloroethane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	11:48	KZ
1,2-Dichloroethane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	11:48	KZ
1,1-Dichloroethene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	11:48	KZ
cis-1,2-Dichloroethene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	11:48	KZ
trans-1,2-Dichloroethene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	11:48	KZ
1,2-Dichloropropane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	11:48	KZ
1,3-Dichloropropane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	11:48	KZ
2,2-Dichloropropane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	11:48	KZ
1,1-Dichloropropene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	11:48	KZ
cis-1,3-Dichloropropene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	11:48	KZ
trans-1,3-Dichloropropene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	11:48	KZ
Diisopropyl Ether (DiPE)	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	11:48	KZ
Ethylbenzene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	11:48	KZ
Ethyl-t-Butyl Ether (EtBE)	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	11:48	KZ
Hexachlorobutadiene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	11:48	KZ
2-Hexanone	<0.0650		µg/L	EPA 8260B	0.1	0.0650	0.13	01/28/24	11:48	KZ
Isopropylbenzene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	11:48	KZ
4-Isopropyltoluene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	11:48	KZ
Methylene Chloride	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.01	01/28/24	11:48	KZ
4-Methyl-2-Pentanone (MIBK)	<0.0650		µg/L	EPA 8260B	0.1	0.0650	0.13	01/28/24	11:48	KZ

EXHIBIT "H" (LIMITED PH2 INVESTIGATION)

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Date Reported 02/04/24

Date Received 01/28/24

Invoice No. 470

Cust # A022

Permit Number

Customer P.O.

Project: 27 S. La Patera Lane, Goleta, CA 93117

Analysis	Result	Qual	Units	Method	DF	MDL	RL	Date	Time	Tech
Sample: 012 SG8-5								Date & Time Sampled:	01/28/24	@ 11:36
Sample Matrix: Air										
Purge Volume Sampled: 3										
.....continued										
Methyl-t-butyl Ether (MtBE)	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	11:48	KZ
Naphthalene	<0.0033		µg/L	EPA 8260B	0.1	0.0033	0.0065	01/28/24	11:48	KZ
n-Propylbenzene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	11:48	KZ
Styrene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	11:48	KZ
1,1,1,2-Tetrachloroethane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	11:48	KZ
1,1,1,2,2-Tetrachloroethane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	11:48	KZ
Tetrachloroethane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	11:48	KZ
Toluene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	11:48	KZ
1,2,3-Trichlorobenzene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	11:48	KZ
1,2,4-Trichlorobenzene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	11:48	KZ
1,1,1-Trichloroethane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	11:48	KZ
1,1,2-Trichloroethane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	11:48	KZ
Trichloroethene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	11:48	KZ
1,2,3-Trichloropropane	<0.0026		µg/L	EPA 8260B	0.1	0.0026	0.013	01/28/24	11:48	KZ
Trichlorofluoromethane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	11:48	KZ
Trichlorotrifluoroethane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	11:48	KZ
1,2,4-Trimethylbenzene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	11:48	KZ
1,3,5-Trimethylbenzene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	11:48	KZ
Vinyl Chloride	<0.0003		µg/L	EPA 8260B	0.1	0.0003	0.0065	01/28/24	11:48	KZ
m,p-Xylenes	<0.0130		µg/L	EPA 8260B	0.1	0.0130	0.026	01/28/24	11:48	KZ
o-Xylene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	11:48	KZ
[VOC Vapor Sampling Tracer]										
Isopropanol (IPA)	<0.0650		µg/L	EPA 8260B	0.1	0.0650	0.13	01/28/24	11:48	KZ
[VOC Surrogates]										
Dibromofluoromethane	96		%REC	EPA 8260B			70-130	01/28/24	11:48	KZ
Toluene-D8	117		%REC	EPA 8260B			70-130	01/28/24	11:48	KZ
Bromofluorobenzene	118		%REC	EPA 8260B			70-130	01/28/24	11:48	KZ

Sample: 013 **SG9-5**Sample Matrix: **Air**

Date & Time Sampled: 01/28/24 @ 12:02

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DAN LOUKS
8792 LAUDER CIRCLE, STE. 200
HUNTINGTON BEACH, CA 92646

Date Reported 02/04/24

Date Received 01/28/24

Invoice No. 470

Cust # A022

Permit Number

Customer P.O.

Project: 27 S. La Patera Lane, Goleta, CA 93117

Analysis	Result	Qual	Units	Method	DF	MDL	RL	Date	Time	Tech
Sample: 013 SG9-5								Date & Time Sampled: 01/28/24	@ 12:02	
Sample Matrix: Air										
Purge Volume Sampled: 3										
[TPH Gasoline by GCMS]										
C4-C12	<0.6500		µg/L	EPA 8260B	0.1	0.6500	1.3	01/28/24	12:12	KZ
[VOCs by GCMS]										
Acetone	<0.0650		µg/L	EPA 8260B	0.1	0.0650	0.13	01/28/24	12:12	KZ
t-Amyl Methyl Ether (TAME)	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	12:12	KZ
Benzene	<0.0031		µg/L	EPA 8260B	0.1	0.0031	0.013	01/28/24	12:12	KZ
Bromobenzene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	12:12	KZ
Bromochloromethane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	12:12	KZ
Bromodichloromethane	<0.0052		µg/L	EPA 8260B	0.1	0.0052	0.010	01/28/24	12:12	KZ
Bromoform	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	12:12	KZ
Bromomethane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	12:12	KZ
t-Butanol (TBA)	<0.0650		µg/L	EPA 8260B	0.1	0.0650	0.13	01/28/24	12:12	KZ
2-Butanone (MEK)	<0.0650		µg/L	EPA 8260B	0.1	0.0650	0.13	01/28/24	12:12	KZ
n-Butylbenzene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	12:12	KZ
sec-Butylbenzene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	12:12	KZ
tert-Butylbenzene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	12:12	KZ
Carbon Disulfide	<0.0650		µg/L	EPA 8260B	0.1	0.0650	0.13	01/28/24	12:12	KZ
Carbon Tetrachloride	<0.0033		µg/L	EPA 8260B	0.1	0.0033	0.0065	01/28/24	12:12	KZ
Chlorobenzene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	12:12	KZ
Chloroethane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	12:12	KZ
Chloroform	0.010		µg/L	EPA 8260B	0.1	0.0026	0.0052	01/28/24	12:12	KZ
Chloromethane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	12:12	KZ
2-Chlorotoluene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	12:12	KZ
4-Chlorotoluene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	12:12	KZ
Dibromochloromethane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	12:12	KZ
1,2-Dibromoethane (EDB)	<0.0016		µg/L	EPA 8260B	0.1	0.0016	0.013	01/28/24	12:12	KZ
1,2-Dibromo-3-Chloropropane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	12:12	KZ
Dibromomethane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	12:12	KZ
1,2-Dichlorobenzene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	12:12	KZ
1,3-Dichlorobenzene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	12:12	KZ
1,4-Dichlorobenzene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	12:12	KZ

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Date Received 01/28/24

Invoice No. 470

Cust # A022

Permit Number

Customer P.O.

Project: 27 S. La Patera Lane, Goleta, CA 93117

Analysis	Result	Qual	Units	Method	DF	MDL	RL	Date	Time	Tech
Sample: 013 SG9-5								Date & Time Sampled:	01/28/24	@ 12:02
Sample Matrix: Air										
Purge Volume Sampled: 3										
.....continued										
Dichlorodifluoromethane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	12:12	KZ
1,1-Dichloroethane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	12:12	KZ
1,2-Dichloroethane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	12:12	KZ
1,1-Dichloroethene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	12:12	KZ
cis-1,2-Dichloroethene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	12:12	KZ
trans-1,2-Dichloroethene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	12:12	KZ
1,2-Dichloropropane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	12:12	KZ
1,3-Dichloropropane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	12:12	KZ
2,2-Dichloropropane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	12:12	KZ
1,1-Dichloropropene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	12:12	KZ
cis-1,3-Dichloropropene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	12:12	KZ
trans-1,3-Dichloropropene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	12:12	KZ
Diisopropyl Ether (DiPE)	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	12:12	KZ
Ethylbenzene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	12:12	KZ
Ethyl-t-Butyl Ether (EtBE)	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	12:12	KZ
Hexachlorobutadiene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	12:12	KZ
2-Hexanone	<0.0650		µg/L	EPA 8260B	0.1	0.0650	0.13	01/28/24	12:12	KZ
Isopropylbenzene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	12:12	KZ
4-Isopropyltoluene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	12:12	KZ
Methylene Chloride	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.01	01/28/24	12:12	KZ
4-Methyl-2-Pentanone (MIBK)	<0.0650		µg/L	EPA 8260B	0.1	0.0650	0.13	01/28/24	12:12	KZ
Methyl-t-butyl Ether (MtBE)	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	12:12	KZ
Naphthalene	<0.0033		µg/L	EPA 8260B	0.1	0.0033	0.0065	01/28/24	12:12	KZ
n-Propylbenzene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	12:12	KZ
Styrene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	12:12	KZ
1,1,1,2-Tetrachloroethane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	12:12	KZ
1,1,2,2-Tetrachloroethane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	12:12	KZ
Tetrachloroethene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	12:12	KZ
Toluene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	12:12	KZ
1,2,3-Trichlorobenzene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	12:12	KZ

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Analysis	Result	Qual	Units	Method	DF	MDL	RL	Date	Time	Tech
Sample: 013 SG9-5 Date & Time Sampled: 01/28/24 @ 12:02 Sample Matrix: Air Purge Volume Sampled: 3continued										
1,2,4-Trichlorobenzene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	12:12	KZ
1,1,1-Trichloroethane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	12:12	KZ
1,1,2-Trichloroethane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	12:12	KZ
Trichloroethene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	12:12	KZ
1,2,3-Trichloropropane	<0.0026		µg/L	EPA 8260B	0.1	0.0026	0.013	01/28/24	12:12	KZ
Trichlorofluoromethane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	12:12	KZ
Trichlorotrifluoroethane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	12:12	KZ
1,2,4-Trimethylbenzene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	12:12	KZ
1,3,5-Trimethylbenzene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	12:12	KZ
Vinyl Chloride	<0.0003		µg/L	EPA 8260B	0.1	0.0003	0.0065	01/28/24	12:12	KZ
m,p-Xylenes	<0.0130		µg/L	EPA 8260B	0.1	0.0130	0.026	01/28/24	12:12	KZ
o-Xylene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	12:12	KZ
[VOC Vapor Sampling Tracer]										
Isopropanol (IPA)	<0.0650		µg/L	EPA 8260B	0.1	0.0650	0.13	01/28/24	12:12	KZ
[VOC Surrogates]										
Dibromofluoromethane	93		%REC	EPA 8260B			70-130	01/28/24	12:12	KZ
Toluene-D8	115		%REC	EPA 8260B			70-130	01/28/24	12:12	KZ
Bromofluorobenzene	115		%REC	EPA 8260B			70-130	01/28/24	12:12	KZ
Sample: 014 SG9-15 Date & Time Sampled: 01/28/24 @ 12:30 Sample Matrix: Air Purge Volume Sampled: 3										
[TPH Gasoline by GCMS]										
C4-C12	1.8		µg/L	EPA 8260B	0.1	0.6500	1.3	01/28/24	12:41	KZ
[VOCs by GCMS]										
Acetone	<0.0650		µg/L	EPA 8260B	0.1	0.0650	0.13	01/28/24	12:41	KZ
t-Amyl Methyl Ether (TAME)	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	12:41	KZ
Benzene	0.010	J	µg/L	EPA 8260B	0.1	0.0031	0.013	01/28/24	12:41	KZ
Bromobenzene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	12:41	KZ
Bromochloromethane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	12:41	KZ

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CERTIFICATE OF ANALYSIS

2401-00264

ALL PHASE ENVIRONMENTAL, INC.

DAN LOUKS

8792 LAUDER CIRCLE, STE. 200

HUNTINGTON BEACH, CA 92646

Date Reported 02/04/24

Date Received 01/28/24

Invoice No. 470

Cust # A022

Permit Number

Customer P.O.

Project: 27 S. La Patera Lane, Goleta, CA 93117

Analysis	Result	Qual	Units	Method	DF	MDL	RL	Date	Time	Tech
Sample: 014 SG9-15								Date & Time Sampled:	01/28/24	@ 12:30
Sample Matrix: Air										
Purge Volume Sampled: 3										
.....continued										
Bromodichloromethane	<0.0052		µg/L	EPA 8260B	0.1	0.0052	0.010	01/28/24	12:41	KZ
Bromoform	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	12:41	KZ
Bromomethane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	12:41	KZ
t-Butanol (TBA)	<0.0650		µg/L	EPA 8260B	0.1	0.0650	0.13	01/28/24	12:41	KZ
2-Butanone (MEK)	<0.0650		µg/L	EPA 8260B	0.1	0.0650	0.13	01/28/24	12:41	KZ
n-Butylbenzene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	12:41	KZ
sec-Butylbenzene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	12:41	KZ
tert-Butylbenzene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	12:41	KZ
Carbon Disulfide	<0.0650		µg/L	EPA 8260B	0.1	0.0650	0.13	01/28/24	12:41	KZ
Carbon Tetrachloride	<0.0033		µg/L	EPA 8260B	0.1	0.0033	0.0065	01/28/24	12:41	KZ
Chlorobenzene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	12:41	KZ
Chloroethane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	12:41	KZ
Chloroform	0.010		µg/L	EPA 8260B	0.1	0.0026	0.0052	01/28/24	12:41	KZ
Chloromethane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	12:41	KZ
2-Chlorotoluene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	12:41	KZ
4-Chlorotoluene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	12:41	KZ
Dibromochloromethane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	12:41	KZ
1,2-Dibromoethane (EDB)	<0.0016		µg/L	EPA 8260B	0.1	0.0016	0.013	01/28/24	12:41	KZ
1,2-Dibromo-3-Chloropropane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	12:41	KZ
Dibromomethane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	12:41	KZ
1,2-Dichlorobenzene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	12:41	KZ
1,3-Dichlorobenzene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	12:41	KZ
1,4-Dichlorobenzene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	12:41	KZ
Dichlorodifluoromethane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	12:41	KZ
1,1-Dichloroethane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	12:41	KZ
1,2-Dichloroethane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	12:41	KZ
1,1-Dichloroethene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	12:41	KZ
cis-1,2-Dichloroethene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	12:41	KZ
trans-1,2-Dichloroethene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	12:41	KZ
1,2-Dichloropropane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	12:41	KZ

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CERTIFICATE OF ANALYSIS

2401-00264

ALL PHASE ENVIRONMENTAL, INC.

DAN LOUKS

8792 LAUDER CIRCLE, STE. 200

HUNTINGTON BEACH, CA 92646

Date Reported 02/04/24

Date Received 01/28/24

Invoice No. 470

Cust # A022

Permit Number

Customer P.O.

Project: 27 S. La Patera Lane, Goleta, CA 93117

Analysis	Result	Qual	Units	Method	DF	MDL	RL	Date	Time	Tech
Sample: 014 SG9-15								Date & Time Sampled: 01/28/24	@ 12:30	
Sample Matrix: Air										
Purge Volume Sampled: 3										
.....continued										
1,3-Dichloropropane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	12:41	KZ
2,2-Dichloropropane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	12:41	KZ
1,1-Dichloropropene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	12:41	KZ
cis-1,3-Dichloropropene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	12:41	KZ
trans-1,3-Dichloropropene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	12:41	KZ
Diisopropyl Ether (DiPE)	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	12:41	KZ
Ethylbenzene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	12:41	KZ
Ethyl-t-Butyl Ether (EtBE)	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	12:41	KZ
Hexachlorobutadiene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	12:41	KZ
2-Hexanone	<0.0650		µg/L	EPA 8260B	0.1	0.0650	0.13	01/28/24	12:41	KZ
Isopropylbenzene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	12:41	KZ
4-Isopropyltoluene	0.020		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	12:41	KZ
Methylene Chloride	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.01	01/28/24	12:41	KZ
4-Methyl-2-Pentanone (MIBK)	<0.0650		µg/L	EPA 8260B	0.1	0.0650	0.13	01/28/24	12:41	KZ
Methyl-t-butyl Ether (MtBE)	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	12:41	KZ
Naphthalene	<0.0033		µg/L	EPA 8260B	0.1	0.0033	0.0065	01/28/24	12:41	KZ
n-Propylbenzene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	12:41	KZ
Styrene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	12:41	KZ
1,1,1,2-Tetrachloroethane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	12:41	KZ
1,1,2,2-Tetrachloroethane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	12:41	KZ
Tetrachloroethene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	12:41	KZ
Toluene	0.010	J	µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	12:41	KZ
1,2,3-Trichlorobenzene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	12:41	KZ
1,2,4-Trichlorobenzene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	12:41	KZ
1,1,1-Trichloroethane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	12:41	KZ
1,1,2-Trichloroethane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	12:41	KZ
Trichloroethene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	12:41	KZ
1,2,3-Trichloropropane	<0.0026		µg/L	EPA 8260B	0.1	0.0026	0.013	01/28/24	12:41	KZ
Trichlorofluoromethane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	12:41	KZ
Trichlorotrifluoroethane	0.040		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	12:41	KZ

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CERTIFICATE OF ANALYSIS

2401-00264

ALL PHASE ENVIRONMENTAL, INC.
DAN LOUKS
8792 LAUDER CIRCLE, STE. 200
HUNTINGTON BEACH, CA 92646

Date Reported 02/04/24
Date Received 01/28/24
Invoice No. 470
Cust # A022
Permit Number
Customer P.O.

Project: 27 S. La Patera Lane, Goleta, CA 93117

Analysis	Result	Qual	Units	Method	DF	MDL	RL	Date	Time	Tech
Sample: 014 SG9-15								Date & Time Sampled:	01/28/24	@ 12:30
Sample Matrix: Air										
Purge Volume Sampled: 3										
.....continued										
1,2,4-Trimethylbenzene	0.010	J	µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	12:41	KZ
1,3,5-Trimethylbenzene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	12:41	KZ
Vinyl Chloride	<0.0003		µg/L	EPA 8260B	0.1	0.0003	0.0065	01/28/24	12:41	KZ
m,p-Xylenes	<0.0130		µg/L	EPA 8260B	0.1	0.0130	0.026	01/28/24	12:41	KZ
o-Xylene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	12:41	KZ
[VOC Vapor Sampling Tracer]										
Isopropanol (IPA)	<0.0650		µg/L	EPA 8260B	0.1	0.0650	0.13	01/28/24	12:41	KZ
[VOC Surrogates]										
Dibromofluoromethane	101		%REC	EPA 8260B			70-130	01/28/24	12:41	KZ
Toluene-D8	115		%REC	EPA 8260B			70-130	01/28/24	12:41	KZ
Bromofluorobenzene	121		%REC	EPA 8260B			70-130	01/28/24	12:41	KZ
Sample: 015 SG10-5								Date & Time Sampled:	01/28/24	@ 13:00
Sample Matrix: Air										
Purge Volume Sampled: 3										
[TPH Gasoline by GCMS]										
C4-C12	<0.6500		µg/L	EPA 8260B	0.1	0.6500	1.3	01/28/24	1:10	KZ
[VOCs by GCMS]										
Acetone	<0.0650		µg/L	EPA 8260B	0.1	0.0650	0.13	01/28/24	1:10	KZ
t-Amyl Methyl Ether (TAME)	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	1:10	KZ
Benzene	<0.0031		µg/L	EPA 8260B	0.1	0.0031	0.013	01/28/24	1:10	KZ
Bromobenzene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	1:10	KZ
Bromochloromethane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	1:10	KZ
Bromodichloromethane	<0.0052		µg/L	EPA 8260B	0.1	0.0052	0.010	01/28/24	1:10	KZ
Bromoform	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	1:10	KZ
Bromomethane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	1:10	KZ
t-Butanol (TBA)	<0.0650		µg/L	EPA 8260B	0.1	0.0650	0.13	01/28/24	1:10	KZ
2-Butanone (MEK)	<0.0650		µg/L	EPA 8260B	0.1	0.0650	0.13	01/28/24	1:10	KZ
n-Butylbenzene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	1:10	KZ
sec-Butylbenzene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	1:10	KZ

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Date Reported 02/04/24

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Invoice No. 470

Cust # A022

Permit Number

Customer P.O.

Project: 27 S. La Patera Lane, Goleta, CA 93117

Analysis	Result	Qual	Units	Method	DF	MDL	RL	Date	Time	Tech
Sample: 015 SG10-5								Date & Time Sampled: 01/28/24	@ 13:00	
Sample Matrix: Air										
Purge Volume Sampled: 3										
.....continued										
tert-Butylbenzene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	1:10	KZ
Carbon Disulfide	<0.0650		µg/L	EPA 8260B	0.1	0.0650	0.13	01/28/24	1:10	KZ
Carbon Tetrachloride	<0.0033		µg/L	EPA 8260B	0.1	0.0033	0.0065	01/28/24	1:10	KZ
Chlorobenzene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	1:10	KZ
Chloroethane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	1:10	KZ
Chloroform	0.020		µg/L	EPA 8260B	0.1	0.0026	0.0052	01/28/24	1:10	KZ
Chloromethane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	1:10	KZ
2-Chlorotoluene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	1:10	KZ
4-Chlorotoluene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	1:10	KZ
Dibromochloromethane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	1:10	KZ
1,2-Dibromoethane (EDB)	<0.0016		µg/L	EPA 8260B	0.1	0.0016	0.013	01/28/24	1:10	KZ
1,2-Dibromo-3-Chloropropane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	1:10	KZ
Dibromomethane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	1:10	KZ
1,2-Dichlorobenzene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	1:10	KZ
1,3-Dichlorobenzene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	1:10	KZ
1,4-Dichlorobenzene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	1:10	KZ
Dichlorodifluoromethane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	1:10	KZ
1,1-Dichloroethane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	1:10	KZ
1,2-Dichloroethane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	1:10	KZ
1,1-Dichloroethene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	1:10	KZ
cis-1,2-Dichloroethene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	1:10	KZ
trans-1,2-Dichloroethene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	1:10	KZ
1,2-Dichloropropane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	1:10	KZ
1,3-Dichloropropane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	1:10	KZ
2,2-Dichloropropane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	1:10	KZ
1,1-Dichloropropene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	1:10	KZ
cis-1,3-Dichloropropene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	1:10	KZ
trans-1,3-Dichloropropene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	1:10	KZ
Diisopropyl Ether (DIPE)	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	1:10	KZ
Ethylbenzene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	1:10	KZ

EXHIBIT "H" (LIMITED PH2 INVESTIGATION)

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USDA-EPA-NIOSH Testing Food Sanitation Consulting Chemical and Microbiological Analyses and Research



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CERTIFICATE OF ANALYSIS

2401-00264

ALL PHASE ENVIRONMENTAL, INC.

DAN LOUKS

8792 LAUDER CIRCLE, STE. 200

HUNTINGTON BEACH, CA 92646

Date Reported 02/04/24

Date Received 01/28/24

Invoice No. 470

Cust # A022

Permit Number

Customer P.O.

Project: 27 S. La Patera Lane, Goleta, CA 93117

Analysis	Result	Qual	Units	Method	DF	MDL	RL	Date	Time	Tech
Sample: 015 SG10-5								Date & Time Sampled: 01/28/24	@ 13:00	
Sample Matrix: Air										
Purge Volume Sampled: 3										
.....continued										
Ethyl-t-Butyl Ether (EtBE)	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	1:10	KZ
Hexachlorobutadiene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	1:10	KZ
2-Hexanone	<0.0650		µg/L	EPA 8260B	0.1	0.0650	0.13	01/28/24	1:10	KZ
Isopropylbenzene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	1:10	KZ
4-Isopropyltoluene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	1:10	KZ
Methylene Chloride	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.01	01/28/24	1:10	KZ
4-Methyl-2-Pentanone (MIBK)	<0.0650		µg/L	EPA 8260B	0.1	0.0650	0.13	01/28/24	1:10	KZ
Methyl-t-butyl Ether (MtBE)	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	1:10	KZ
Naphthalene	<0.0033		µg/L	EPA 8260B	0.1	0.0033	0.0065	01/28/24	1:10	KZ
n-Propylbenzene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	1:10	KZ
Styrene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	1:10	KZ
1,1,1,2-Tetrachloroethane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	1:10	KZ
1,1,2,2-Tetrachloroethane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	1:10	KZ
Tetrachloroethene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	1:10	KZ
Toluene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	1:10	KZ
1,2,3-Trichlorobenzene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	1:10	KZ
1,2,4-Trichlorobenzene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	1:10	KZ
1,1,1-Trichloroethane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	1:10	KZ
1,1,2-Trichloroethane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	1:10	KZ
Trichloroethene	0.010	J	µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	1:10	KZ
1,2,3-Trichloropropane	<0.0026		µg/L	EPA 8260B	0.1	0.0026	0.013	01/28/24	1:10	KZ
Trichlorofluoromethane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	1:10	KZ
Trichlorotrifluoroethane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	1:10	KZ
1,2,4-Trimethylbenzene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	1:10	KZ
1,3,5-Trimethylbenzene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	1:10	KZ
Vinyl Chloride	<0.0003		µg/L	EPA 8260B	0.1	0.0003	0.0065	01/28/24	1:10	KZ
m,p-Xylenes	<0.0130		µg/L	EPA 8260B	0.1	0.0130	0.026	01/28/24	1:10	KZ
o-Xylene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	1:10	KZ
[VOC Vapor Sampling Tracer]										
Isopropanol (IPA)	<0.0650		µg/L	EPA 8260B	0.1	0.0650	0.13	01/28/24	1:10	KZ

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DAN LOUKS

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HUNTINGTON BEACH, CA 92646

Date Reported 02/04/24

Date Received 01/28/24

Invoice No. 470

Cust # A022

Permit Number

Customer P.O.

Project: 27 S. La Patera Lane, Goleta, CA 93117

Analysis	Result	Qual	Units	Method	DF	MDL	RL	Date	Time	Tech
Sample: 015 SG10-5 Date & Time Sampled: 01/28/24 @ 13:00 Sample Matrix: Air Purge Volume Sampled: 3continued										
[VOC Surrogates]										
Dibromofluoromethane	93	%REC		EPA 8260B			70-130	01/28/24	1:10	KZ
Toluene-D8	112	%REC		EPA 8260B			70-130	01/28/24	1:10	KZ
Bromofluorobenzene	105	%REC		EPA 8260B			70-130	01/28/24	1:10	KZ
Sample: 016 SG10-15 Date & Time Sampled: 01/28/24 @ 13:24 Sample Matrix: Air Purge Volume Sampled: 3										
[TPH Gasoline by GCMS]										
C4-C12	<0.6500		µg/L	EPA 8260B	0.1	0.6500	1.3	01/28/24	1:34	KZ
[VOCs by GCMS]										
Acetone	<0.0650		µg/L	EPA 8260B	0.1	0.0650	0.13	01/28/24	1:34	KZ
t-Amyl Methyl Ether (TAME)	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	1:34	KZ
Benzene	<0.0031		µg/L	EPA 8260B	0.1	0.0031	0.013	01/28/24	1:34	KZ
Bromobenzene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	1:34	KZ
Bromochloromethane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	1:34	KZ
Bromodichloromethane	<0.0052		µg/L	EPA 8260B	0.1	0.0052	0.010	01/28/24	1:34	KZ
Bromoform	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	1:34	KZ
Bromomethane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	1:34	KZ
t-Butanol (TBA)	<0.0650		µg/L	EPA 8260B	0.1	0.0650	0.13	01/28/24	1:34	KZ
2-Butanone (MEK)	<0.0650		µg/L	EPA 8260B	0.1	0.0650	0.13	01/28/24	1:34	KZ
n-Butylbenzene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	1:34	KZ
sec-Butylbenzene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	1:34	KZ
tert-Butylbenzene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	1:34	KZ
Carbon Disulfide	<0.0650		µg/L	EPA 8260B	0.1	0.0650	0.13	01/28/24	1:34	KZ
Carbon Tetrachloride	<0.0033		µg/L	EPA 8260B	0.1	0.0033	0.0065	01/28/24	1:34	KZ
Chlorobenzene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	1:34	KZ
Chloroethane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	1:34	KZ
Chloroform	<0.0026		µg/L	EPA 8260B	0.1	0.0026	0.0052	01/28/24	1:34	KZ
Chloromethane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	1:34	KZ

EXHIBIT "H" (LIMITED PH2 INVESTIGATION)

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CERTIFICATE OF ANALYSIS

2401-00264

ALL PHASE ENVIRONMENTAL, INC.

DAN LOUKS

8792 LAUDER CIRCLE, STE. 200

HUNTINGTON BEACH, CA 92646

Date Reported 02/04/24

Date Received 01/28/24

Invoice No. 470

Cust # A022

Permit Number

Customer P.O.

Project: 27 S. La Patera Lane, Goleta, CA 93117

Analysis	Result	Qual	Units	Method	DF	MDL	RL	Date	Time	Tech
Sample: 016 SG10-15						Date & Time Sampled:		01/28/24	@	13:24
Sample Matrix: Air										
Purge Volume Sampled: 3										
.....continued										
2-Chlorotoluene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	1:34	KZ
4-Chlorotoluene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	1:34	KZ
Dibromochloromethane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	1:34	KZ
1,2-Dibromoethane (EDB)	<0.0016		µg/L	EPA 8260B	0.1	0.0016	0.013	01/28/24	1:34	KZ
1,2-Dibromo-3-Chloropropane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	1:34	KZ
Dibromomethane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	1:34	KZ
1,2-Dichlorobenzene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	1:34	KZ
1,3-Dichlorobenzene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	1:34	KZ
1,4-Dichlorobenzene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	1:34	KZ
Dichlorodifluoromethane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	1:34	KZ
1,1-Dichloroethane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	1:34	KZ
1,2-Dichloroethane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	1:34	KZ
1,1-Dichloroethene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	1:34	KZ
cis-1,2-Dichloroethene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	1:34	KZ
trans-1,2-Dichloroethene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	1:34	KZ
1,2-Dichloropropane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	1:34	KZ
1,3-Dichloropropane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	1:34	KZ
2,2-Dichloropropane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	1:34	KZ
1,1-Dichloropropene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	1:34	KZ
cis-1,3-Dichloropropene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	1:34	KZ
trans-1,3-Dichloropropene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	1:34	KZ
Diisopropyl Ether (DiPE)	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	1:34	KZ
Ethylbenzene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	1:34	KZ
Ethyl-t-Butyl Ether (EtBE)	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	1:34	KZ
Hexachlorobutadiene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	1:34	KZ
2-Hexanone	<0.0650		µg/L	EPA 8260B	0.1	0.0650	0.13	01/28/24	1:34	KZ
Isopropylbenzene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	1:34	KZ
4-Isopropyltoluene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	1:34	KZ
Methylene Chloride	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.01	01/28/24	1:34	KZ
4-Methyl-2-Pentanone (MIBK)	<0.0650		µg/L	EPA 8260B	0.1	0.0650	0.13	01/28/24	1:34	KZ

EXHIBIT "H" (LIMITED PH2 INVESTIGATION)

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DAN LOUKS

8792 LAUDER CIRCLE, STE. 200

HUNTINGTON BEACH, CA 92646

Date Reported 02/04/24

Date Received 01/28/24

Invoice No. 470

Cust # A022

Permit Number

Customer P.O.

Project: 27 S. La Patera Lane, Goleta, CA 93117

Analysis	Result	Qual	Units	Method	DF	MDL	RL	Date	Time	Tech
Sample: 016 SG10-15								Date & Time Sampled: 01/28/24	@ 13:24	
Sample Matrix: Air										
Purge Volume Sampled: 3										
.....continued										
Methyl-t-butyl Ether (MtBE)	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	1:34	KZ
Naphthalene	<0.0033		µg/L	EPA 8260B	0.1	0.0033	0.0065	01/28/24	1:34	KZ
n-Propylbenzene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	1:34	KZ
Styrene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	1:34	KZ
1,1,1,2-Tetrachloroethane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	1:34	KZ
1,1,1,2,2-Tetrachloroethane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	1:34	KZ
Tetrachloroethane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	1:34	KZ
Toluene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	1:34	KZ
1,2,3-Trichlorobenzene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	1:34	KZ
1,2,4-Trichlorobenzene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	1:34	KZ
1,1,1-Trichloroethane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	1:34	KZ
1,1,2-Trichloroethane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	1:34	KZ
Trichloroethene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	1:34	KZ
1,2,3-Trichloropropane	<0.0026		µg/L	EPA 8260B	0.1	0.0026	0.013	01/28/24	1:34	KZ
Trichlorofluoromethane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	1:34	KZ
Trichlorotrifluoroethane	0.010	J	µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	1:34	KZ
1,2,4-Trimethylbenzene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	1:34	KZ
1,3,5-Trimethylbenzene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	1:34	KZ
Vinyl Chloride	<0.0003		µg/L	EPA 8260B	0.1	0.0003	0.0065	01/28/24	1:34	KZ
m,p-Xylenes	<0.0130		µg/L	EPA 8260B	0.1	0.0130	0.026	01/28/24	1:34	KZ
o-Xylene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	1:34	KZ
[VOC Vapor Sampling Tracer]										
Isopropanol (IPA)	<0.0650		µg/L	EPA 8260B	0.1	0.0650	0.13	01/28/24	1:34	KZ
[VOC Surrogates]										
Dibromofluoromethane	95		%REC	EPA 8260B			70-130	01/28/24	1:34	KZ
Toluene-D8	116		%REC	EPA 8260B			70-130	01/28/24	1:34	KZ
Bromofluorobenzene	110		%REC	EPA 8260B			70-130	01/28/24	1:34	KZ

Sample: 017 **SG10-15 DUP**Sample Matrix: **Air**

Date & Time Sampled: 01/28/24 @ 13:24

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Cust # A022

Permit Number

Customer P.O.

Project: 27 S. La Patera Lane, Goleta, CA 93117

Analysis	Result	Qual	Units	Method	DF	MDL	RL	Date	Time	Tech
Sample: 017 SG10-15 DUP								Date & Time Sampled: 01/28/24 @ 13:24		
Sample Matrix: Air										
Purge Volume Sampled: 3										
[TPH Gasoline by GCMS]										
C4-C12	<0.6500		µg/L	EPA 8260B	0.1	0.6500	1.3	01/28/24	1:58	KZ
[VOCs by GCMS]										
Acetone	<0.0650		µg/L	EPA 8260B	0.1	0.0650	0.13	01/28/24	1:58	KZ
t-Amyl Methyl Ether (TAME)	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	1:58	KZ
Benzene	<0.0031		µg/L	EPA 8260B	0.1	0.0031	0.013	01/28/24	1:58	KZ
Bromobenzene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	1:58	KZ
Bromochloromethane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	1:58	KZ
Bromodichloromethane	<0.0052		µg/L	EPA 8260B	0.1	0.0052	0.010	01/28/24	1:58	KZ
Bromoform	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	1:58	KZ
Bromomethane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	1:58	KZ
t-Butanol (TBA)	<0.0650		µg/L	EPA 8260B	0.1	0.0650	0.13	01/28/24	1:58	KZ
2-Butanone (MEK)	<0.0650		µg/L	EPA 8260B	0.1	0.0650	0.13	01/28/24	1:58	KZ
n-Butylbenzene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	1:58	KZ
sec-Butylbenzene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	1:58	KZ
tert-Butylbenzene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	1:58	KZ
Carbon Disulfide	<0.0650		µg/L	EPA 8260B	0.1	0.0650	0.13	01/28/24	1:58	KZ
Carbon Tetrachloride	<0.0033		µg/L	EPA 8260B	0.1	0.0033	0.0065	01/28/24	1:58	KZ
Chlorobenzene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	1:58	KZ
Chloroethane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	1:58	KZ
Chloroform	<0.0026		µg/L	EPA 8260B	0.1	0.0026	0.0052	01/28/24	1:58	KZ
Chloromethane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	1:58	KZ
2-Chlorotoluene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	1:58	KZ
4-Chlorotoluene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	1:58	KZ
Dibromochloromethane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	1:58	KZ
1,2-Dibromoethane (EDB)	<0.0016		µg/L	EPA 8260B	0.1	0.0016	0.013	01/28/24	1:58	KZ
1,2-Dibromo-3-Chloropropane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	1:58	KZ
Dibromomethane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	1:58	KZ
1,2-Dichlorobenzene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	1:58	KZ
1,3-Dichlorobenzene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	1:58	KZ
1,4-Dichlorobenzene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	1:58	KZ

EXHIBIT "H" (LIMITED PH2 INVESTIGATION)

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CERTIFICATE OF ANALYSIS

2401-00264

ALL PHASE ENVIRONMENTAL, INC.

DAN LOUKS

8792 LAUDER CIRCLE, STE. 200

HUNTINGTON BEACH, CA 92646

Date Reported 02/04/24

Date Received 01/28/24

Invoice No. 470

Cust # A022

Permit Number

Customer P.O.

Project: 27 S. La Patera Lane, Goleta, CA 93117

Analysis	Result	Qual	Units	Method	DF	MDL	RL	Date	Time	Tech
Sample: 017 SG10-15 DUP								Date & Time Sampled: 01/28/24	@ 13:24	
Sample Matrix: Air										
Purge Volume Sampled: 3										
.....continued										
Dichlorodifluoromethane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	1:58	KZ
1,1-Dichloroethane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	1:58	KZ
1,2-Dichloroethane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	1:58	KZ
1,1-Dichloroethene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	1:58	KZ
cis-1,2-Dichloroethene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	1:58	KZ
trans-1,2-Dichloroethene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	1:58	KZ
1,2-Dichloropropane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	1:58	KZ
1,3-Dichloropropane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	1:58	KZ
2,2-Dichloropropane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	1:58	KZ
1,1-Dichloropropene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	1:58	KZ
cis-1,3-Dichloropropene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	1:58	KZ
trans-1,3-Dichloropropene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	1:58	KZ
Diisopropyl Ether (DiPE)	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	1:58	KZ
Ethylbenzene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	1:58	KZ
Ethyl-t-Butyl Ether (EtBE)	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	1:58	KZ
Hexachlorobutadiene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	1:58	KZ
2-Hexanone	<0.0650		µg/L	EPA 8260B	0.1	0.0650	0.13	01/28/24	1:58	KZ
Isopropylbenzene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	1:58	KZ
4-Isopropyltoluene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	1:58	KZ
Methylene Chloride	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.01	01/28/24	1:58	KZ
4-Methyl-2-Pentanone (MIBK)	<0.0650		µg/L	EPA 8260B	0.1	0.0650	0.13	01/28/24	1:58	KZ
Methyl-t-butyl Ether (MtBE)	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	1:58	KZ
Naphthalene	<0.0033		µg/L	EPA 8260B	0.1	0.0033	0.0065	01/28/24	1:58	KZ
n-Propylbenzene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	1:58	KZ
Styrene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	1:58	KZ
1,1,1,2-Tetrachloroethane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	1:58	KZ
1,1,2,2-Tetrachloroethane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	1:58	KZ
Tetrachloroethene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	1:58	KZ
Toluene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	1:58	KZ
1,2,3-Trichlorobenzene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	1:58	KZ

EXHIBIT "H" (LIMITED PH2 INVESTIGATION)

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CERTIFICATE OF ANALYSIS

2401-00264

ALL PHASE ENVIRONMENTAL, INC.
DAN LOUKS
8792 LAUDER CIRCLE, STE. 200
HUNTINGTON BEACH, CA 92646

Date Reported 02/04/24
Date Received 01/28/24
Invoice No. 470
Cust # A022
Permit Number
Customer P.O.

Project: 27 S. La Patera Lane, Goleta, CA 93117

Analysis	Result	Qual	Units	Method	DF	MDL	RL	Date	Time	Tech
Sample: 017 SG10-15 DUP								Date & Time Sampled: 01/28/24	@ 13:24	
Sample Matrix: Air										
Purge Volume Sampled: 3										
.....continued										
1,2,4-Trichlorobenzene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	1:58	KZ
1,1,1-Trichloroethane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	1:58	KZ
1,1,2-Trichloroethane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	1:58	KZ
Trichloroethene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	1:58	KZ
1,2,3-Trichloropropane	<0.0026		µg/L	EPA 8260B	0.1	0.0026	0.013	01/28/24	1:58	KZ
Trichlorofluoromethane	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	1:58	KZ
Trichlorotrifluoroethane	0.010	J	µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	1:58	KZ
1,2,4-Trimethylbenzene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	1:58	KZ
1,3,5-Trimethylbenzene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	1:58	KZ
Vinyl Chloride	<0.0003		µg/L	EPA 8260B	0.1	0.0003	0.0065	01/28/24	1:58	KZ
m,p-Xylenes	<0.0130		µg/L	EPA 8260B	0.1	0.0130	0.026	01/28/24	1:58	KZ
o-Xylene	<0.0065		µg/L	EPA 8260B	0.1	0.0065	0.013	01/28/24	1:58	KZ
[VOC Vapor Sampling Tracer]										
Isopropanol (IPA)	<0.0650		µg/L	EPA 8260B	0.1	0.0650	0.13	01/28/24	1:58	KZ
[VOC Surrogates]										
Dibromofluoromethane	97		%REC	EPA 8260B			70-130	01/28/24	1:58	KZ
Toluene-D8	114		%REC	EPA 8260B			70-130	01/28/24	1:58	KZ
Bromofluorobenzene	117		%REC	EPA 8260B			70-130	01/28/24	1:58	KZ

Respectfully Submitted:

Ken Zheng - President

EXHIBIT "H" (LIMITED PH2 INVESTIGATION)

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QUALIFIERS

B = Detected in the associated Method Blank at a concentration above the routine RL.
 B1 = BOD dilution water is over specifications . The reported result may be biased high.
 D = Surrogate recoveries are not calculated due to sample dilution.
 E = Estimated value; Value exceeds calibration level of instrument.
 H = Analyte was prepared and/or analyzed outside of the analytical method holding time
 I = Matrix Interference.
 J = Analyte concentration detected between RL and MDL.
 Q = One or more quality control criteria did not meet specifications. See Comments for further explanation.
 S = Customer provided specification limit exceeded.

ABBREVIATIONS

DF = Dilution Factor
 RL = Reporting Limit, Adjusted by DF
 MDL = Method Detection Limit, Adjusted by DF
 Qual = Qualifier
 Tech = Technician

EXHIBIT "H" (LIMITED PH2 INVESTIGATION)

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QUALITY CONTROL DATA REPORT

ALL PHASE ENVIRONMENTAL, INC.
 DAN LOUKS
 8792 LAUDER CIRCLE, STE. 200
 HUNTINGTON BEACH, CA 92646

2401-00264

Date Reported 02/04/2024
 Date Received 01/28/2024
 Date Sampled 01/28/2024
 Invoice No. 470
 Customer # A022
 Customer P.O.

Project: 27 S. La Patera Lane, Goleta, CA 93117

Method # EPA 8260B

QC Reference # 113986 Date Analyzed: 1/28/2024 Technician: KZ
 Samples 001 002 003 004 005 006 007 008 009 010 011 012 013 014 015 016 017

Results	LCS %REC	LCS %DUP	LCS %RPD	BLKSRR% REC
1,1-Dichloroethene	86	79	8.9	
Benzene	111	100	10.8	
Bromofluorobenzene				130
Chlorobenzene	111	89	21.7	
Dibromofluoromethan				94
Toluene	107	99	7.8	
Toluene-D8				116
Trichloroethene	86	84	2.9	

Control Ranges	LCS %REC	LCS %RPD	BLKSRR%REC
	70 - 130	0 - 25	
	70 - 130	0 - 25	
	70 - 130	0 - 25	50 - 150
	70 - 130	0 - 25	50 - 150
	70 - 130	0 - 25	50 - 150
	70 - 130	0 - 25	

QC Reference # 113987 Date Analyzed: 1/28/2024 Technician: KZ
 Samples 001 002 003 004 005 006 007 008 009 010 011 012 013 014 015 016 017

Results	LCS %REC	LCS %DUP	LCS %RPD
C4-C12	95	90	5

Control Ranges	LCS %REC	LCS %RPD
	70 - 130	0 - 25

EXHIBIT "H" (LIMITED PH2 INVESTIGATION)



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QUALITY CONTROL DATA REPORT

ALL PHASE ENVIRONMENTAL, INC.
 DAN LOUKS

2401-00264

Date Reported 02/04/2024
 Date Received 01/28/2024
 Date Sampled 01/28/2024

Project: 27 S. La Patera Lane, Goleta, CA 93117

Method blank results

Ref	Test Name	Result	Qualif	Units	MDL	Ref	Test Name	Result	Qualif	Units	MDL
113986	Acetone	<0.0650		µg/L	0.0650		Isopropylbenzene	<0.0065		µg/L	0.0065
	t-Amyl Methyl Ether (TAME)	<0.0065		µg/L	0.0065		4-Isopropyltoluene	<0.0065		µg/L	0.0065
	Benzene	<0.0031		µg/L	0.0031		Methylene Chloride	<0.0065		µg/L	0.0065
	Bromobenzene	<0.0065		µg/L	0.0065		4-Methyl-2-Pentanone (MIBK)	<0.0650		µg/L	0.0650
	Bromochloromethane	<0.0065		µg/L	0.0065		Methyl-t-butyl Ether (MTBE)	<0.0065		µg/L	0.0065
	Bromodichloromethane	<0.0052		µg/L	0.0052		Naphthalene	<0.0033		µg/L	0.0033
	Bromoform	<0.0065		µg/L	0.0065		n-Propylbenzene	<0.0065		µg/L	0.0065
	Bromomethane	<0.0065		µg/L	0.0065		Styrene	<0.0065		µg/L	0.0065
	t-Butanol (TBA)	<0.0650		µg/L	0.0650		1,1,1,2-Tetrachloroethane	<0.0065		µg/L	0.0065
	2-Butanone (MEK)	<0.0650		µg/L	0.0650		1,1,2,2-Tetrachloroethane	<0.0065		µg/L	0.0065
	n-Butylbenzene	<0.0065		µg/L	0.0065		Tetrachloroethene	<0.0065		µg/L	0.0065
	sec-Butylbenzene	<0.0065		µg/L	0.0065		Toluene	<0.0065		µg/L	0.0065
	tert-Butylbenzene	<0.0065		µg/L	0.0065		1,2,3-Trichlorobenzene	<0.0065		µg/L	0.0065
	Carbon Disulfide	<0.0650		µg/L	0.0650		1,2,4-Trichlorobenzene	<0.0065		µg/L	0.0065
	Carbon Tetrachloride	<0.0033		µg/L	0.0033		1,1,1-Trichloroethane	<0.0065		µg/L	0.0065
	Chlorobenzene	<0.0065		µg/L	0.0065		1,1,2-Trichloroethane	<0.0065		µg/L	0.0065
	Chloroethane	<0.0065		µg/L	0.0065		Trichloroethene	<0.0065		µg/L	0.0065
	Chloroform	<0.0026		µg/L	0.0026		1,2,3-Trichloropropane	<0.0026		µg/L	0.0026
	Chloromethane	<0.0065		µg/L	0.0065		Trichlorofluoromethane	<0.0065		µg/L	0.0065
	2-Chlorotoluene	<0.0065		µg/L	0.0065		Trichlorotrifluoroethane	<0.0065		µg/L	0.0065
	4-Chlorotoluene	<0.0065		µg/L	0.0065		1,2,4-Trimethylbenzene	<0.0065		µg/L	0.0065
	Dibromochloromethane	<0.0065		µg/L	0.0065		1,3,5-Trimethylbenzene	<0.0065		µg/L	0.0065
	1,2-Dibromoethane (EDB)	<0.0016		µg/L	0.0016		Vinyl Chloride	<0.0003		µg/L	0.0003
	1,2-Dibromo-3-Chloropropane	<0.0065		µg/L	0.0065		m,p-Xylenes	<0.0130		µg/L	0.0130
	Dibromomethane	<0.0065		µg/L	0.0065		o-Xylene	<0.0065		µg/L	0.0065
	1,2-Dichlorobenzene	<0.0065		µg/L	0.0065		Isopropanol (IPA)	<0.0650		µg/L	0.0650
	1,3-Dichlorobenzene	<0.0065		µg/L	0.0065	113987	C4-C12	<0.6500		µg/L	0.6500
	1,4-Dichlorobenzene	<0.0065		µg/L	0.0065						
	Dichlorodifluoromethane	<0.0065		µg/L	0.0065						
	1,1-Dichloroethane	<0.0065		µg/L	0.0065						
	1,2-Dichloroethane	<0.0065		µg/L	0.0065						
	1,1-Dichloroethene	<0.0065		µg/L	0.0065						
	cis-1,2-Dichloroethene	<0.0065		µg/L	0.0065						
	trans-1,2-Dichloroethene	<0.0065		µg/L	0.0065						
	1,2-Dichloropropane	<0.0065		µg/L	0.0065						
	1,3-Dichloropropane	<0.0065		µg/L	0.0065						
	2,2-Dichloropropane	<0.0065		µg/L	0.0065						
	1,1-Dichloropropene	<0.0065		µg/L	0.0065						
	cis-1,3-Dichloropropene	<0.0065		µg/L	0.0065						
	trans-1,3-Dichloropropene	<0.0065		µg/L	0.0065						
	Diisopropyl Ether (DIPE)	<0.0065		µg/L	0.0065						
	Ethylbenzene	<0.0065		µg/L	0.0065						
	Ethyl-t-Butyl Ether (EtBE)	<0.0065		µg/L	0.0065						
	Hexachlorobutadiene	<0.0065		µg/L	0.0065						
	2-Hexanone	<0.0650		µg/L	0.0650						

EXHIBIT "H" (LIMITED PH2 INVESTIGATION)



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QUALITY CONTROL DATA REPORT

ALL PHASE ENVIRONMENTAL, INC.
DAN LOUKS

2401-00264

Date Reported 02/04/2024
Date Received 01/28/2024
Date Sampled 01/28/2024

Project: 27 S. La Patera Lane, Goleta, CA 93117

Respectfully Submitted:

Ken Zheng - President

EXHIBIT "H" (LIMITED PH2 INVESTIGATION)

**A & R Laboratories**

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 Tel: 951-779-0310 / 909-781-6335 Fax: 951-779-0344
 E-mail: office@arlaboratories.com

CHAIN OF CUSTODY

A & R Work Order #:

2401-264

Page 1 of 1

Client Name <i>All phase Env.</i>		<input type="checkbox"/> Chilled		Analyses Requested										Turn Around Time Requested									
E-mail <i>dan@gsaengineer.com</i>		<input checked="" type="checkbox"/> Intact												EPA8260B (VOCs & Oxygenates)		EPA8260B(BTEX & Oxygenates)		8260B / 8015 (Gasoline)		8015 (Diesel)		EPA8081A (Organochlorine Pesticides)	
Address <i>5792 Rauder Circle, Ste. 200, Huntington Beach</i>		<input type="checkbox"/> Seal		Remarks																			
Report Attention <i>Dan O'Neil</i>		Phone # <i>800-567-7729</i>		Sampled By <i>VZ</i>		Project No./Name		Project Site <i>27 S La Puente Ln, Goleta, CA</i>															
Lab # <small>(Lab use)</small>	Client Sample ID	Sample Collection		Matrix Type	Sample Preserve	No., type* & size of container																	
		Date	Time																				
-1	SG 2-5	<i>1/28/14</i>	<i>6:30</i>																				
-2	SG 2-10		<i>6:59</i>	<i>br</i>		<i>25ml G</i>		X	X														
-3	SG 1-30		<i>7:35</i>																				
-4	SG 1-10		<i>8:00</i>																				
-5	SG 3-5		<i>8:35</i>																				
-6	SG 3-10		<i>9:00</i>																				
-7	SG 4-10		<i>9:35</i>																				
-8	SG 4-30		<i>10:00</i>																				
-9	SG 5-5		<i>10:25</i>																				
-10	SG 6-5		<i>10:48</i>																				
-11	SG 7-5		<i>11:10</i>																				
-12	SG 8-5		<i>11:36</i>																				
-13	SG 9-5		<i>12:02</i>																				
-14	SG 9-15		<i>12:30</i>																				
-15	SG 10-5		<i>13:00</i>																				
-16	SG 10-15		<i>13:24</i>																				
-17	SG 10-15 DWP		<i>13:24</i>																				
Relinquished By <i>Ned Mullett</i>		Company		Date <i>1/28/14</i>		Time <i>15:00</i>		Received By <i>VZ</i>		Company <i>ARL</i>		Date <i>1/28/14</i>		Time <i>15:00</i>		Note: Samples are discarded 30 days after results are reported unless other arrangements are made.							
Relinquished By		Company		Date		Time		Received By		Company		Date		Time									

Matrix Code:	DW=Drinking Water GW=Ground Water WW=Waste Water SD=Solid Waste	SL=Sludge SS=Soil/Sediment AR=Air PP=Pure Product	Preservative Code	IC=Ice HC=HCl HN=HNO ₃	SH=NaOH ST=Na ₂ S ₂ O ₃ HS=H ₂ SO ₄	* Sample Container Types: T=Tedlar Air Bag G=Glass Container ST= Steel Tube	B= Brass Tube P=Plastic Bottle V=VOA Vial	E= EnCore
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CASE NARRATIVE

Authorized Signature Name / Title (print)

Ken Zheng, President

Signature / Date

Ken Zheng

Ken Zheng, President
02/04/2024 20:20:24

Laboratory Job No. (Certificate of Analysis No.)

2401-00302

Project Name / No.

27 S. La Patera Lane, Goleta, CA 93117

Dates Sampled (from/to)

01/28/24 To 01/28/24

Dates Received (from/to)

01/28/24 To 01/28/24

Dates Reported (from/to)

02/04/24 To 2/4/2024

Chains of Custody Received

Yes

Comments:

Subcontracting

Organic Analyses

No analyses sub-contracted

Sample Condition(s)

All samples intact

Positive Results (Organic Compounds)

None

EXHIBIT "H" (LIMITED PH2 INVESTIGATION)

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CERTIFICATE OF ANALYSIS

2401-00302

ALL PHASE ENVIRONMENTAL, INC.
 DAN LOUKS
 8792 LAUDER CIRCLE, STE. 200
 HUNTINGTON BEACH, CA 92646

Date Reported 02/04/24
 Date Received 01/28/24
 Invoice No. 481
 Cust # A022
 Permit Number
 Customer P.O.

Project: 27 S. La Patera Lane, Goleta, CA 93117

Analysis	Result	Qual	Units	Method	DF	RL	Date	Tech
Sample: 001 SG2-5 Sample Matrix: Air Purge Volume Sampled: 3							Date & Time Sampled: 01/28/24 @ 11:15	
Methane	<15		ppmv	EPA 8015M	1.0	15	01/29/24	KZ
Sample: 002 SG4-10 Sample Matrix: Air Purge Volume Sampled: 3							Date & Time Sampled: 01/28/24 @ 13:00	
Methane	<15		ppmv	EPA 8015M	1.0	15	01/29/24	KZ

Respectfully Submitted:

Ken Zheng

Ken Zheng - Lab Director

QUALIFIERS

B = Detected in the associated Method Blank at a concentration above the routine RL.
 B1 = BOD dilution water is over specifications . The reported result may be biased high.
 D = Surrogate recoveries are not calculated due to sample dilution.
 E = Estimated value; Value exceeds calibration level of instrument.
 H = Analyte was prepared and/or analyzed outside of the analytical method holding time
 I = Matrix Interference.
 J = Analyte concentration detected between RL and MDL.
 Q = One or more quality control criteria did not meet specifications. See Comments for further explanation.
 S = Customer provided specification limit exceeded.

ABBREVIATIONS

DF = Dilution Factor
 RL = Reporting Limit, Adjusted by DF
 MDL = Method Detection Limit, Adjusted by DF
 Qual = Qualifier
 Tech = Technician

EXHIBIT "H" (LIMITED PH2 INVESTIGATION)

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QUALITY CONTROL DATA REPORT

ALL PHASE ENVIRONMENTAL, INC.
DAN LOUKS
8792 LAUDER CIRCLE, STE. 200
HUNTINGTON BEACH, CA 92646

2401-00302

Date Reported 02/04/2024
Date Received 01/28/2024
Date Sampled 01/28/2024
Invoice No. 481
Customer # A022
Customer P.O.

Project: 27 S. La Patera Lane, Goleta, CA 93117

Method #	EPA 8015M		
QC Reference #	113988	Date Analyzed: 1/29/2024	Technician: KZ
Samples	001 002		
Results			Control Ranges
	LCS %REC	LCS %DUP	LCS %RPD
Methane	98	90	8
			LCS %REC
			LCS %RPD
			70 - 130
			0 - 25

No method blank results were above reporting limit

Respectfully Submitted:

Ken Zheng - President

EXHIBIT "H" (LIMITED PH2 INVESTIGATION)



A & R Laboratories
 1650 S. Grove Ave., Ste C, Ontario, CA 91761
 Tel: 951-779-0310 / 909-781-6335 Fax: 951-779-0344
 E-mail: office@arlaboratories.com

CHAIN OF CUSTODY

A & R Work Order #: 2401-302

Page 1 of 1

Client Name ALL PHASE ENVIRONMENTAL		<input type="checkbox"/> Chilled		Analyses Requested										Turn Around Time Requested												
E-mail dan@gsaenr.com		<input checked="" type="checkbox"/> Intact		EPA8260B (VOCs & Oxygenates)	EPA8260B(BTEX & Oxygenates)	8260B / 8015 (Gasoline)	8015 (Diesel)	EPA8081A (Organochlorine Pesticides)	EPA 8082 (PCBs)	EPA 8015M (Carbon Chain C4-C40)	EPA 6010B/7000 (CAM 17 Metals)	Micro: Plate Cnt., Coliform, E-Coli	METHANE									<input type="checkbox"/> Rush 8 12 24 48 Hours <input checked="" type="checkbox"/> Normal <i>mobile</i>				
Address 8792 LAUDER CIRCLE DR #200 HUNTINGTON BEACH		<input type="checkbox"/> Seal																								
Report Attention Dan Mullen		Phone # 1-800-567-7729		Sampled By NH																						
Project No./ Name		Project Site 27 LA PATERA LANE GOIETA																								
Lab # <small>(Lab use)</small>	Client Sample ID	Sample Collection		Matrix Type	Sample Preserve	No., type* & size of container																			Remarks	
		Date	Time																							
1	SG2-5	1-29-24	11:15	VAPOR		Tedlar Bag																			change	
2	SG4-10	↓	13:00	↓		↓																				
Relinquished By Dan Mullen Company		Date 1/29/24	Time 11:30	Received By NH Company		Date 1/29/24	Time 11:30																			Note: Samples are discarded 30 days after results are reported unless other arrangements are made.
Relinquished By Company		Date	Time	Received By Company		Date	Time																			

Matrix Code:	DW=Drinking Water GW=Ground Water WW=Waste Water SD=Solid Waste	SL=Sludge SS=Soil/Sediment AR=Air PP=Pure Product	Preservative Code	IC=Ice HC=HCl HN=HNO3	SH=NaOH ST=Na2S2O3 HS=H2SO4	* Sample Container Types: T=Tedlar Air Bag G=Glass Container ST= Steel Tube	B= Brass Tube P=Plastic Bottle V=VOA Vial	E= EnCore
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APPENDIX E

Soil Analytical Laboratory Report



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CASE NARRATIVE

Authorized Signature Name / Title (print)

Ken Zheng, President

Signature / Date

Ken Zheng, President
02/04/2024 20:37:40

Laboratory Job No. (Certificate of Analysis No.)

2401-00265

Project Name / No.

27 S-LA PATERA LANE, GOLETA CA 93117

Dates Sampled (from/to)

01/25/24 To 01/25/24

Dates Received (from/to)

01/26/24 To 01/26/24

Dates Reported (from/to)

02/04/24 To 2/4/2024

Chains of Custody Received

Yes

Comments:

Subcontracting

Organic Analyses

No analyses sub-contracted

Inorganic Analyses

No analyses sub-contracted

Sample Condition(s)

All samples intact

Positive Results (Organic Compounds)

None

EXHIBIT "H" (LIMITED PH2 INVESTIGATION)

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CERTIFICATE OF ANALYSIS

2401-00265

ALL PHASE ENVIRONMENTAL, INC.
 DAN LOUKS
 8792 LAUDER CIRCLE, STE. 200
 HUNTINGTON BEACH, CA 92646

Date Reported 02/04/24
 Date Received 01/26/24
 Invoice No. 471
 Cust # A022
 Permit Number
 Customer P.O.

Project: 27 S-LA PATERA LANE, GOLETA CA 93117

Analysis	Result	Qual	Units	Method	DF	RL	Date	Tech
Sample: 001 B1-5					Date & Time Sampled:		01/25/24 @	8:20
Sample Matrix: Soil								
[TPH Gasoline (C4-C12)]								
Closed System P&T TPHg Soil	Complete			EPA 5035	1.0		01/29/24	IG
C4-C12	<0.50		mg/Kg	EPA 8260B	1.0	0.50	01/29/24	IG
[Extractable Hydrocarbons]								
Extraction	Complete			EPA 3550B	1.0		01/30/24	IG
C13-C22	<10		mg/Kg	EPA 8015M	1.0	10	01/30/24	IG
C23-C40	<20		mg/Kg	EPA 8015M	1.0	20	01/30/24	IG
[Surrogate]								
Hexacosane	89		%REC	EPA 8015B		50-150	01/30/24	IG
Sample: 002 B1-10					Date & Time Sampled:		01/25/24 @	8:25
Sample Matrix: Soil								
[TPH Gasoline (C4-C12)]								
Closed System P&T TPHg Soil	Complete			EPA 5035	1.0		01/29/24	IG
C4-C12	<0.50		mg/Kg	EPA 8260B	1.0	0.50	01/29/24	IG
[Extractable Hydrocarbons]								
Extraction	Complete			EPA 3550B	1.0		01/30/24	IG
C13-C22	<10		mg/Kg	EPA 8015M	1.0	10	01/30/24	IG
C23-C40	<20		mg/Kg	EPA 8015M	1.0	20	01/30/24	IG
[Surrogate]								
Hexacosane	83		%REC	EPA 8015B		50-150	01/30/24	IG
Sample: 003 B1-15					Date & Time Sampled:		01/25/24 @	8:30
Sample Matrix: Soil								
[TPH Gasoline (C4-C12)]								
Closed System P&T TPHg Soil	Complete			EPA 5035	1.0		01/29/24	IG
C4-C12	<0.50		mg/Kg	EPA 8260B	1.0	0.50	01/29/24	IG
[Extractable Hydrocarbons]								
Extraction	Complete			EPA 3550B	1.0		01/30/24	IG
C13-C22	<10		mg/Kg	EPA 8015M	1.0	10	01/30/24	IG
C23-C40	<20		mg/Kg	EPA 8015M	1.0	20	01/30/24	IG
[Surrogate]								
Hexacosane	89		%REC	EPA 8015B		50-150	01/30/24	IG

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ALL PHASE ENVIRONMENTAL, INC.
 DAN LOUKS
 8792 LAUDER CIRCLE, STE. 200
 HUNTINGTON BEACH, CA 92646

Date Reported 02/04/24
 Date Received 01/26/24
 Invoice No. 471
 Cust # A022
 Permit Number
 Customer P.O.

Project: 27 S-LA PATERA LANE, GOLETA CA 93117

Analysis	Result	Qual	Units	Method	DF	RL	Date	Tech
Sample: 004 B1-20					Date & Time Sampled:		01/25/24 @	8:40
Sample Matrix: Soil								
[TPH Gasoline (C4-C12)]								
Closed System P&T TPHg Soil	Complete			EPA 5035	1.0		01/29/24	IG
C4-C12	<0.50		mg/Kg	EPA 8260B	1.0	0.50	01/29/24	IG
[Extractable Hydrocarbons]								
Extraction	Complete			EPA 3550B	1.0		01/30/24	IG
C13-C22	<10		mg/Kg	EPA 8015M	1.0	10	01/30/24	IG
C23-C40	<20		mg/Kg	EPA 8015M	1.0	20	01/30/24	IG
[Surrogate]								
Hexacosane	89		%REC	EPA 8015B		50-150	01/30/24	IG
Sample: 005 B1-30					Date & Time Sampled:		01/25/24 @	9:20
Sample Matrix: Soil								
[TPH Gasoline (C4-C12)]								
Closed System P&T TPHg Soil	Complete			EPA 5035	1.0		01/29/24	IG
C4-C12	<0.50		mg/Kg	EPA 8260B	1.0	0.50	01/29/24	IG
[Extractable Hydrocarbons]								
Extraction	Complete			EPA 3550B	1.0		01/30/24	IG
C13-C22	<10		mg/Kg	EPA 8015M	1.0	10	01/30/24	IG
C23-C40	<20		mg/Kg	EPA 8015M	1.0	20	01/30/24	IG
[Surrogate]								
Hexacosane	87		%REC	EPA 8015B		50-150	01/30/24	IG
Sample: 006 B2-5					Date & Time Sampled:		01/25/24 @	9:40
Sample Matrix: Soil								
[TPH Gasoline (C4-C12)]								
Closed System P&T TPHg Soil	Complete			EPA 5035	1.0		01/29/24	IG
C4-C12	<0.50		mg/Kg	EPA 8260B	1.0	0.50	01/29/24	IG
[Extractable Hydrocarbons]								
Extraction	Complete			EPA 3550B	1.0		01/30/24	IG
C13-C22	<10		mg/Kg	EPA 8015M	1.0	10	01/30/24	IG
C23-C40	<20		mg/Kg	EPA 8015M	1.0	20	01/30/24	IG
[Surrogate]								

EXHIBIT "H" (LIMITED PH2 INVESTIGATION)

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CERTIFICATE OF ANALYSIS

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ALL PHASE ENVIRONMENTAL, INC.
 DAN LOUKS
 8792 LAUDER CIRCLE, STE. 200
 HUNTINGTON BEACH, CA 92646

Date Reported 02/04/24
 Date Received 01/26/24
 Invoice No. 471
 Cust # A022
 Permit Number
 Customer P.O.

Project: 27 S-LA PATERA LANE, GOLETA CA 93117

Analysis	Result	Qual	Units	Method	DF	RL	Date	Tech
Sample: 006 B2-5 Sample Matrix: Soilcontinued							Date & Time Sampled: 01/25/24 @ 9:40	
Hexacosane	99		%REC	EPA 8015B		50-150	01/30/24	IG
Sample: 007 B2-10 Sample Matrix: Soil							Date & Time Sampled: 01/25/24 @ 9:45	
[TPH Gasoline (C4-C12)]								
Closed System P&T TPHg Soil	Complete			EPA 5035	1.0		01/29/24	IG
C4-C12	<0.50		mg/Kg	EPA 8260B	1.0	0.50	01/29/24	IG
[Extractable Hydrocarbons]								
Extraction	Complete			EPA 3550B	1.0		01/30/24	IG
C13-C22	<10		mg/Kg	EPA 8015M	1.0	10	01/30/24	IG
C23-C40	<20		mg/Kg	EPA 8015M	1.0	20	01/30/24	IG
[Surrogate]								
Hexacosane	87		%REC	EPA 8015B		50-150	01/30/24	IG
Sample: 008 B3-5 Sample Matrix: Soil							Date & Time Sampled: 01/25/24 @ 10:00	
[TPH Gasoline (C4-C12)]								
Closed System P&T TPHg Soil	Complete			EPA 5035	1.0		01/29/24	IG
C4-C12	<0.50		mg/Kg	EPA 8260B	1.0	0.50	01/29/24	IG
[Extractable Hydrocarbons]								
Extraction	Complete			EPA 3550B	1.0		01/30/24	IG
C13-C22	<10		mg/Kg	EPA 8015M	1.0	10	01/30/24	IG
C23-C40	<20		mg/Kg	EPA 8015M	1.0	20	01/30/24	IG
[Surrogate]								
Hexacosane	91		%REC	EPA 8015B		50-150	01/30/24	IG
Sample: 009 B3-10 Sample Matrix: Soil							Date & Time Sampled: 01/25/24 @ 10:10	
[TPH Gasoline (C4-C12)]								
Closed System P&T TPHg Soil	Complete			EPA 5035	1.0		01/29/24	IG
C4-C12	<0.50		mg/Kg	EPA 8260B	1.0	0.50	01/29/24	IG
[Extractable Hydrocarbons]								

EXHIBIT "H" (LIMITED PH2 INVESTIGATION)

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CERTIFICATE OF ANALYSIS

2401-00265

ALL PHASE ENVIRONMENTAL, INC.
 DAN LOUKS
 8792 LAUDER CIRCLE, STE. 200
 HUNTINGTON BEACH, CA 92646

Date Reported 02/04/24
 Date Received 01/26/24
 Invoice No. 471
 Cust # A022
 Permit Number
 Customer P.O.

Project: 27 S-LA PATERA LANE, GOLETA CA 93117

Analysis	Result	Qual	Units	Method	DF	RL	Date	Tech
Sample: 009 B3-10					Date & Time Sampled:		01/25/24 @	10:10
Sample Matrix: Soil								
.....continued								
Extraction	Complete			EPA 3550B	1.0		01/30/24	IG
C13-C22	<10		mg/Kg	EPA 8015M	1.0	10	01/30/24	IG
C23-C40	<20		mg/Kg	EPA 8015M	1.0	20	01/30/24	IG
[Surrogate]								
Hexacosane	87		%REC	EPA 8015B		50-150	01/30/24	IG
Sample: 010 B4-5					Date & Time Sampled:		01/25/24 @	10:30
Sample Matrix: Soil								
[TPH Gasoline (C4-C12)]								
Closed System P&T TPHg Soil	Complete			EPA 5035	1.0		01/29/24	IG
C4-C12	<0.50		mg/Kg	EPA 8260B	1.0	0.50	01/29/24	IG
[Extractable Hydrocarbons]								
Extraction	Complete			EPA 3550B	1.0		01/30/24	IG
C13-C22	<10		mg/Kg	EPA 8015M	1.0	10	01/30/24	IG
C23-C40	<20		mg/Kg	EPA 8015M	1.0	20	01/30/24	IG
[Surrogate]								
Hexacosane	89		%REC	EPA 8015B		50-150	01/30/24	IG
Sample: 011 B4-10					Date & Time Sampled:		01/25/24 @	10:35
Sample Matrix: Soil								
[TPH Gasoline (C4-C12)]								
Closed System P&T TPHg Soil	Complete			EPA 5035	1.0		01/29/24	IG
C4-C12	<0.50		mg/Kg	EPA 8260B	1.0	0.50	01/29/24	IG
[Extractable Hydrocarbons]								
Extraction	Complete			EPA 3550B	1.0		01/30/24	IG
C13-C22	<10		mg/Kg	EPA 8015M	1.0	10	01/30/24	IG
C23-C40	<20		mg/Kg	EPA 8015M	1.0	20	01/30/24	IG
[Surrogate]								
Hexacosane	88		%REC	EPA 8015B		50-150	01/30/24	IG
Sample: 012 B4-15					Date & Time Sampled:		01/25/24 @	10:45
Sample Matrix: Soil								

EXHIBIT "H" (LIMITED PH2 INVESTIGATION)

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CERTIFICATE OF ANALYSIS

2401-00265

ALL PHASE ENVIRONMENTAL, INC.
DAN LOUKS
8792 LAUDER CIRCLE, STE. 200
HUNTINGTON BEACH, CA 92646

Date Reported 02/04/24
Date Received 01/26/24
Invoice No. 471
Cust # A022
Permit Number
Customer P.O.

Project: 27 S-LA PATERA LANE, GOLETA CA 93117

Analysis	Result	Qual	Units	Method	DF	RL	Date	Tech
Sample: 012 B4-15					Date & Time Sampled:		01/25/24 @	10:45
Sample Matrix: Soil								
[TPH Gasoline (C4-C12)]								
Closed System P&T TPHg Soil	Complete			EPA 5035	1.0		01/29/24	IG
C4-C12	<0.50		mg/Kg	EPA 8260B	1.0	0.50	01/29/24	IG
[Extractable Hydrocarbons]								
Extraction	Complete			EPA 3550B	1.0		01/30/24	IG
C13-C22	<10		mg/Kg	EPA 8015M	1.0	10	01/30/24	IG
C23-C40	<20		mg/Kg	EPA 8015M	1.0	20	01/30/24	IG
[Surrogate]								
Hexacosane	85		%REC	EPA 8015B		50-150	01/30/24	IG
Sample: 013 B4-20					Date & Time Sampled:		01/25/24 @	10:55
Sample Matrix: Soil								
[TPH Gasoline (C4-C12)]								
Closed System P&T TPHg Soil	Complete			EPA 5035	1.0		01/29/24	IG
C4-C12	<0.50		mg/Kg	EPA 8260B	1.0	0.50	01/29/24	IG
[Extractable Hydrocarbons]								
Extraction	Complete			EPA 3550B	1.0		01/30/24	IG
C13-C22	<10		mg/Kg	EPA 8015M	1.0	10	01/30/24	IG
C23-C40	<20		mg/Kg	EPA 8015M	1.0	20	01/30/24	IG
[Surrogate]								
Hexacosane	81		%REC	EPA 8015B		50-150	01/30/24	IG
Sample: 014 B4-30					Date & Time Sampled:		01/25/24 @	11:35
Sample Matrix: Soil								
[TPH Gasoline (C4-C12)]								
Closed System P&T TPHg Soil	Complete			EPA 5035	1.0		01/29/24	IG
C4-C12	<0.50		mg/Kg	EPA 8260B	1.0	0.50	01/29/24	IG
[Extractable Hydrocarbons]								
Extraction	Complete			EPA 3550B	1.0		01/30/24	IG
C13-C22	<10		mg/Kg	EPA 8015M	1.0	10	01/30/24	IG
C23-C40	<20		mg/Kg	EPA 8015M	1.0	20	01/30/24	IG
[Surrogate]								
Hexacosane	89		%REC	EPA 8015B		50-150	01/30/24	IG

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Project: 27 S-LA PATERA LANE, GOLETA CA 93117

Analysis	Result	Qual	Units	Method	DF	RL	Date	Tech
Sample: 015 B5-4							Date & Time Sampled: 01/25/24 @ 12:05	
Sample Matrix: Soil								
[TPH Gasoline (C4-C12)]								
Closed System P&T TPHg Soil	Complete			EPA 5035	1.0		01/29/24	IG
C4-C12	<0.50		mg/Kg	EPA 8260B	1.0	0.50	01/29/24	IG
[Extractable Hydrocarbons]								
Extraction	Complete			EPA 3550B	1.0		01/30/24	IG
C13-C22	<10		mg/Kg	EPA 8015M	1.0	10	01/30/24	IG
C23-C40	<20		mg/Kg	EPA 8015M	1.0	20	01/30/24	IG
[Surrogate]								
Hexacosane	83		%REC	EPA 8015B		50-150	01/30/24	IG
[Metals Title 22 no Hg]								
Metals Acid Digestion	Complete			EPA 3050B	1.0		01/29/24	TLB
Antimony	1.10		mg/Kg	EPA 6010B	1.0	1.0	01/29/24	TLB
Arsenic	3.52		mg/Kg	EPA 6010B	1.0	1.0	01/29/24	TLB
Barium	65.4		mg/Kg	EPA 6010B	1.0	0.50	01/29/24	TLB
Beryllium	1.24		mg/Kg	EPA 6010B	1.0	0.50	01/29/24	TLB
Cadmium	1.22		mg/Kg	EPA 6010B	1.0	0.50	01/29/24	TLB
Chromium	28.4		mg/Kg	EPA 6010B	1.0	0.50	01/29/24	TLB
Cobalt	9.00		mg/Kg	EPA 6010B	1.0	0.50	01/29/24	TLB
Copper	33.2		mg/Kg	EPA 6010B	1.0	0.50	01/29/24	TLB
Lead	4.07		mg/Kg	EPA 6010B	1.0	0.50	01/29/24	TLB
Molybdenum	0.595		mg/Kg	EPA 6010B	1.0	0.50	01/29/24	TLB
Nickel	29.4		mg/Kg	EPA 6010B	1.0	0.50	01/29/24	TLB
Selenium	<1.0		mg/Kg	EPA 6010B	1.0	1.0	01/29/24	TLB
Silver	<1.0		mg/Kg	EPA 6010B	1.0	1.0	01/29/24	TLB
Thallium	<1.0		mg/Kg	EPA 6010B	1.0	1.0	01/29/24	TLB
Vanadium	27.6		mg/Kg	EPA 6010B	1.0	0.50	01/29/24	TLB
Zinc	41.9		mg/Kg	EPA 6010B	1.0	5.0	01/29/24	TLB
[Mercury]								
Mercury Digestion	Complete			EPA 7471A	1.0		01/30/24	KZ
Mercury	<0.042		mg/Kg	EPA 7471A	1.0	0.042	01/30/24	KZ
[Pesticides]								

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Project: 27 S-LA PATERA LANE, GOLETA CA 93117

Analysis	Result	Qual	Units	Method	DF	RL	Date	Tech
Sample: 015 B5-4							Date & Time Sampled: 01/25/24 @ 12:05	
Sample Matrix: Soil								
.....continued								
Ultrasonic Extraction	Complete			EPA 3550	1.0		01/30/24	IG
Aldrin	<0.0050		mg/Kg	EPA 8081A	1.0	0.0050	01/30/24	IG
alpha-BHC	<0.0050		mg/Kg	EPA 8081A	1.0	0.0050	01/30/24	IG
beta-BHC	<0.0050		mg/Kg	EPA 8081A	1.0	0.0050	01/30/24	IG
delta-BHC	<0.0050		mg/Kg	EPA 8081A	1.0	0.0050	01/30/24	IG
gamma-BHC	<0.0050		mg/Kg	EPA 8081A	1.0	0.0050	01/30/24	IG
Technical Chlordane	<0.10		mg/Kg	EPA 8081A	1.0	0.10	01/30/24	IG
4,4'-DDD	<0.0050		mg/Kg	EPA 8081A	1.0	0.0050	01/30/24	IG
4,4'-DDE	<0.0050		mg/Kg	EPA 8081A	1.0	0.0050	01/30/24	IG
4,4'-DDT	<0.0050		mg/Kg	EPA 8081A	1.0	0.0050	01/30/24	IG
Dieldrin	<0.0050		mg/Kg	EPA 8081A	1.0	0.0050	01/30/24	IG
Endosulfan I	<0.0050		mg/Kg	EPA 8081A	1.0	0.0050	01/30/24	IG
Endosulfan II	<0.0050		mg/Kg	EPA 8081A	1.0	0.0050	01/30/24	IG
Endosulfan Sulfate	<0.0050		mg/Kg	EPA 8081A	1.0	0.0050	01/30/24	IG
Endrin	<0.0050		mg/Kg	EPA 8081A	1.0	0.0050	01/30/24	IG
Endrin Aldehyde	<0.0050		mg/Kg	EPA 8081A	1.0	0.0050	01/30/24	IG
Endrin ketone	<0.0050		mg/Kg	EPA 8081A	1.0	0.0050	01/30/24	IG
Heptachlor	<0.0050		mg/Kg	EPA 8081A	1.0	0.0050	01/30/24	IG
Heptachlor Epoxide	<0.0050		mg/Kg	EPA 8081A	1.0	0.0050	01/30/24	IG
Methoxychlor	<0.010		mg/Kg	EPA 8081A	1.0	0.010	01/30/24	IG
Toxaphene	<0.050		mg/Kg	EPA 8081A	1.0	0.050	01/30/24	IG
[Surrogates]								
Tetrachloro-m-xylene	110		%REC	EPA 8081A/8082		50-150	01/30/24	IG
Decachlorobiphenyl	75		%REC	EPA 8081A/8082		50-150	01/30/24	IG

Sample: 016 B6-4							Date & Time Sampled: 01/25/24 @ 12:25	
Sample Matrix: Soil								
[TPH Gasoline (C4-C12)]								
Closed System P&T TPHg Soil	Complete			EPA 5035	1.0		01/29/24	IG
C4-C12	<0.50		mg/Kg	EPA 8260B	1.0	0.50	01/29/24	IG
[Extractable Hydrocarbons]								

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Project: 27 S-LA PATERA LANE, GOLETA CA 93117

Analysis	Result	Qual	Units	Method	DF	RL	Date	Tech
Sample: 016 B6-4					Date & Time Sampled:		01/25/24 @	12:25
Sample Matrix: Soil								
.....continued								
Extraction	Complete			EPA 3550B	1.0		01/30/24	IG
C13-C22	<10		mg/Kg	EPA 8015M	1.0	10	01/30/24	IG
C23-C40	<20		mg/Kg	EPA 8015M	1.0	20	01/30/24	IG
[Surrogate]								
Hexacosane	82		%REC	EPA 8015B		50-150	01/30/24	IG
Sample: 017 B7-4					Date & Time Sampled:		01/25/24 @	12:50
Sample Matrix: Soil								
[TPH Gasoline (C4-C12)]								
Closed System P&T TPHg Soil	Complete			EPA 5035	1.0		01/29/24	IG
C4-C12	<0.50		mg/Kg	EPA 8260B	1.0	0.50	01/29/24	IG
[Extractable Hydrocarbons]								
Extraction	Complete			EPA 3550B	1.0		01/30/24	IG
C13-C22	<10		mg/Kg	EPA 8015M	1.0	10	01/30/24	IG
C23-C40	<20		mg/Kg	EPA 8015M	1.0	20	01/30/24	IG
[Surrogate]								
Hexacosane	89		%REC	EPA 8015B		50-150	01/30/24	IG
Sample: 018 B8-4					Date & Time Sampled:		01/25/24 @	13:25
Sample Matrix: Soil								
[TPH Gasoline (C4-C12)]								
Closed System P&T TPHg Soil	Complete			EPA 5035	1.0		01/29/24	IG
C4-C12	<0.50		mg/Kg	EPA 8260B	1.0	0.50	01/29/24	IG
[Extractable Hydrocarbons]								
Extraction	Complete			EPA 3550B	1.0		01/30/24	IG
C13-C22	<10		mg/Kg	EPA 8015M	1.0	10	01/30/24	IG
C23-C40	<20		mg/Kg	EPA 8015M	1.0	20	01/30/24	IG
[Surrogate]								
Hexacosane	86		%REC	EPA 8015B		50-150	01/30/24	IG
Sample: 019 B9-5					Date & Time Sampled:		01/25/24 @	14:00
Sample Matrix: Soil								

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Project: 27 S-LA PATERA LANE, GOLETA CA 93117

Analysis	Result	Qual	Units	Method	DF	RL	Date	Tech
Sample: 019 B9-5							Date & Time Sampled: 01/25/24 @ 14:00	
Sample Matrix: Soil								
[TPH Gasoline (C4-C12)]								
Closed System P&T TPHg Soil	Complete			EPA 5035	1.0		01/29/24	IG
C4-C12	<0.50		mg/Kg	EPA 8260B	1.0	0.50	01/29/24	IG
[Extractable Hydrocarbons]								
Extraction	Complete			EPA 3550B	1.0		01/30/24	IG
C13-C22	<10		mg/Kg	EPA 8015M	1.0	10	01/30/24	IG
C23-C40	<20		mg/Kg	EPA 8015M	1.0	20	01/30/24	IG
[Surrogate]								
Hexacosane	84		%REC	EPA 8015B		50-150	01/30/24	IG
[Metals Title 22 no Hg]								
Metals Acid Digestion	Complete			EPA 3050B	1.0		01/29/24	TLB
Antimony	<1.0		mg/Kg	EPA 6010B	1.0	1.0	01/29/24	TLB
Arsenic	2.66		mg/Kg	EPA 6010B	1.0	1.0	01/29/24	TLB
Barium	153		mg/Kg	EPA 6010B	1.0	0.50	01/29/24	TLB
Beryllium	1.05		mg/Kg	EPA 6010B	1.0	0.50	01/29/24	TLB
Cadmium	1.06		mg/Kg	EPA 6010B	1.0	0.50	01/29/24	TLB
Chromium	23.4		mg/Kg	EPA 6010B	1.0	0.50	01/29/24	TLB
Cobalt	8.02		mg/Kg	EPA 6010B	1.0	0.50	01/29/24	TLB
Copper	29.3		mg/Kg	EPA 6010B	1.0	0.50	01/29/24	TLB
Lead	5.07		mg/Kg	EPA 6010B	1.0	0.50	01/29/24	TLB
Molybdenum	0.699		mg/Kg	EPA 6010B	1.0	0.50	01/29/24	TLB
Nickel	27.4		mg/Kg	EPA 6010B	1.0	0.50	01/29/24	TLB
Selenium	<1.0		mg/Kg	EPA 6010B	1.0	1.0	01/29/24	TLB
Silver	<1.0		mg/Kg	EPA 6010B	1.0	1.0	01/29/24	TLB
Thallium	<1.0		mg/Kg	EPA 6010B	1.0	1.0	01/29/24	TLB
Vanadium	24.0		mg/Kg	EPA 6010B	1.0	0.50	01/29/24	TLB
Zinc	34.7		mg/Kg	EPA 6010B	1.0	5.0	01/29/24	TLB
[Mercury]								
Mercury Digestion	Complete			EPA 7471A	1.0		01/30/24	KZ
Mercury	<0.042		mg/Kg	EPA 7471A	1.0	0.042	01/30/24	KZ

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Analysis	Result	Qual	Units	Method	DF	RL	Date	Tech
Sample: 020 B10-5							Date & Time Sampled: 01/25/24 @ 15:00	
Sample Matrix: Soil								
[TPH Gasoline (C4-C12)]								
Closed System P&T TPHg Soil	Complete			EPA 5035	1.0		01/29/24	IG
C4-C12	<0.50		mg/Kg	EPA 8260B	1.0	0.50	01/29/24	IG
[Extractable Hydrocarbons]								
Extraction	Complete			EPA 3550B	1.0		01/30/24	IG
C13-C22	<10		mg/Kg	EPA 8015M	1.0	10	01/30/24	IG
C23-C40	<20		mg/Kg	EPA 8015M	1.0	20	01/30/24	IG
[Surrogate]								
Hexacosane	84		%REC	EPA 8015B		50-150	01/30/24	IG
[Metals Title 22 no Hg]								
Metals Acid Digestion	Complete			EPA 3050B	1.0		01/29/24	TLB
Antimony	<1.0		mg/Kg	EPA 6010B	1.0	1.0	01/29/24	TLB
Arsenic	4.05		mg/Kg	EPA 6010B	1.0	1.0	01/29/24	TLB
Barium	83.2		mg/Kg	EPA 6010B	1.0	0.50	01/29/24	TLB
Beryllium	1.10		mg/Kg	EPA 6010B	1.0	0.50	01/29/24	TLB
Cadmium	1.05		mg/Kg	EPA 6010B	1.0	0.50	01/29/24	TLB
Chromium	22.3		mg/Kg	EPA 6010B	1.0	0.50	01/29/24	TLB
Cobalt	3.92		mg/Kg	EPA 6010B	1.0	0.50	01/29/24	TLB
Copper	28.5		mg/Kg	EPA 6010B	1.0	0.50	01/29/24	TLB
Lead	5.37		mg/Kg	EPA 6010B	1.0	0.50	01/29/24	TLB
Molybdenum	0.560		mg/Kg	EPA 6010B	1.0	0.50	01/29/24	TLB
Nickel	16.7		mg/Kg	EPA 6010B	1.0	0.50	01/29/24	TLB
Selenium	<1.0		mg/Kg	EPA 6010B	1.0	1.0	01/29/24	TLB
Silver	<1.0		mg/Kg	EPA 6010B	1.0	1.0	01/29/24	TLB
Thallium	<1.0		mg/Kg	EPA 6010B	1.0	1.0	01/29/24	TLB
Vanadium	29.0		mg/Kg	EPA 6010B	1.0	0.50	01/29/24	TLB
Zinc	31.8		mg/Kg	EPA 6010B	1.0	5.0	01/29/24	TLB
[Mercury]								
Mercury Digestion	Complete			EPA 7471A	1.0		01/30/24	KZ
Mercury	<0.042		mg/Kg	EPA 7471A	1.0	0.042	01/30/24	KZ

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Respectfully Submitted:

Ken Zheng

Ken Zheng - Lab Director

QUALIFIERS

B = Detected in the associated Method Blank at a concentration above the routine RL.
 B1 = BOD dilution water is over specifications . The reported result may be biased high.
 D = Surrogate recoveries are not calculated due to sample dilution.
 E = Estimated value; Value exceeds calibration level of instrument.
 H = Analyte was prepared and/or analyzed outside of the analytical method holding time
 I = Matrix Interference.
 J = Analyte concentration detected between RL and MDL.
 Q = One or more quality control criteria did not meet specifications. See Comments for further explanation.
 S = Customer provided specification limit exceeded.

ABBREVIATIONS

DF = Dilution Factor
 RL = Reporting Limit, Adjusted by DF
 MDL = Method Detection Limit, Adjusted by DF
 Qual = Qualifier
 Tech = Technician

EXHIBIT "H" (LIMITED PH2 INVESTIGATION)

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USDA-EPA-NIOSH Testing Food Sanitation Consulting Chemical and Microbiological Analyses and Research



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QUALITY CONTROL DATA REPORT

ALL PHASE ENVIRONMENTAL, INC.
 DAN LOUKS
 8792 LAUDER CIRCLE, STE. 200
 HUNTINGTON BEACH, CA 92646

2401-00265

Date Reported 02/04/2024
 Date Received 01/26/2024
 Date Sampled 01/25/2024
 Invoice No. 471
 Customer # A022
 Customer P.O.

Project: 27 S-LA PATERA LANE, GOLETA CA 93117

Method # EPA 6010B

QC Reference # 113895 Date Analyzed: 1/29/2024 Technician: TLB

Samples 015 019 020

Results

	LCS %REC	LCS %DUP	LCS %RPD	SPIKE %REC	SPIKE %DUP	SPIKE %RPD
Antimony	95	95	0.9	80	79	1.2
Arsenic	103	102	0.6	86	85	0.5
Barium	101	101	0.8	67	67	0.0
Beryllium	100	99	0.4	86	86	0.3
Cadmium	99	97	1.5	80	80	1.0
Chromium	107	107	0.0	85	85	0.2
Cobalt	101	99	1.4	78	77	0.9
Copper	102	101	1.0	79	77	1.0
Lead	101	100	1.4	73	73	0.6
Molybdenum	101	100	0.8	80	79	1.3
Nickel	100	98	1.8	79	77	0.9
Selenium	99	97	2.2	82	82	0.1
Silver	105	105	0.3	85	85	0.6
Thallium	102	100	1.8	72	72	0.5
Vanadium	100	100	0.4	77	77	0.3
Zinc	96	94	2.0	89	88	0.2

Control Ranges

LCS %REC	LCS %RPD	SPIKE %RPD
75 - 125	0 - 20	0 - 20
75 - 125	0 - 20	0 - 20
75 - 125	0 - 20	0 - 20
75 - 125	0 - 20	0 - 20
75 - 125	0 - 20	0 - 20
75 - 125	0 - 20	0 - 20
75 - 125	0 - 20	0 - 20
75 - 125	0 - 20	0 - 20
75 - 125	0 - 20	0 - 20
75 - 125	0 - 20	0 - 20
75 - 125	0 - 20	0 - 20
75 - 125	0 - 20	0 - 20
75 - 125	0 - 20	0 - 20
75 - 125	0 - 20	0 - 20
75 - 125	0 - 20	0 - 20
75 - 125	0 - 20	0 - 20
75 - 125	0 - 20	0 - 20

Method # EPA 7471A

QC Reference # 113931 Date Analyzed: 1/30/2024 Technician: KZ

Samples 015 019 020

Results

	LCS %REC	LCS %DUP	LCS %RPD	SPIKE %REC	SPIKE %DUP	SPIKE %RPD
Mercury	92	94	2	88	89	1

Control Ranges

LCS %REC	LCS %RPD	SPIKE %RPD
75 - 125	0 - 25	0 - 25

Method # EPA 8015B

QC Reference # 113942 Date Analyzed: 1/30/2024 Technician: IG

Samples 001 002 003 004

Results

	BLKSRR%REC
Hexacosane	55

Control Ranges

BLKSRR%REC
50 - 150

Method # EPA 8015M

QC Reference # 113944 Date Analyzed: 1/30/2024 Technician: IG

Samples 005 006 007 008 009 010 011 012 013 014 015 016 017 018 019 020

Results

	BLKSRR%REC
Hexacosane	58

Control Ranges

BLKSRR%REC
50 - 150

EXHIBIT "H" (LIMITED PH2 INVESTIGATION)

Method # EPA 8015M



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QUALITY CONTROL DATA REPORT

ALL PHASE ENVIRONMENTAL, INC.
 DAN LOUKS

2401-00265

Date Reported 02/04/2024
 Date Received 01/26/2024
 Date Sampled 01/25/2024

Project: 27 S-LA PATERA LANE, GOLETA CA 93117

Method # EPA 8015M

QC Reference # 113942 Date Analyzed: 1/30/2024 Technician: IG

Samples 001 002 003 004

Results

	LCS %REC	SPIKE %REC	SPIKE %DUP	SPIKE %RPD
C13-C22	100	110	110	0

Control Ranges

LCS %REC	SPIKE %RPD
70 - 130	0 - 25

QC Reference # 113944 Date Analyzed: 1/30/2024 Technician: IG

Samples 005 006 007 008 009 010 011 012 013 014 015 016 017 018 019 020

Results

	LCS %REC	SPIKE %REC	SPIKE %DUP	SPIKE %RPD
C13-C22	110	110	110	0

Control Ranges

LCS %REC	SPIKE %RPD
70 - 130	0 - 25

Method # EPA 8081A

QC Reference # 113949 Date Analyzed: 1/30/2024 Technician: IG

Samples 015

Results

	LCS %REC	LCS %DUP	LCS %RPD
4,4'-DDT	84	87	3
Aldrin	95	95	0
Dieldrin	88	88	0
Endrin	81	81	0
gamma-BHC	96	96	0
Heptachlor	96	96	0

Control Ranges

LCS %REC	LCS %RPD
30 - 130	0 - 30
50 - 140	0 - 30
70 - 130	0 - 30
70 - 150	0 - 30
50 - 150	0 - 30
50 - 150	0 - 30

Method # EPA 8081A/8082

QC Reference # 113949 Date Analyzed: 1/30/2024 Technician: IG

Samples 015

Results

	BLKSRR%REC EC
Decachlorobiphenyl	75
Tetrachloro-m-xylene	120

Control Ranges

BLKSRR%REC
50 - 150
50 - 150

Method # EPA 8260B

QC Reference # 113922 Date Analyzed: 1/29/2024 Technician: IG

Samples 003 004 005 006 007 008 009 010 011 012 013 014 015 016 017 018 019 020

Results

	LCS %REC	LCS %DUP	LCS %RPD
C4-C12	100	120	20

Control Ranges

LCS %REC	LCS %RPD
70 - 130	0 - 25

QC Reference # 113951 Date Analyzed: 1/29/2024 Technician: IG

EXHIBIT "H" (LIMITED PH2 INVESTIGATION)



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QUALITY CONTROL DATA REPORT

ALL PHASE ENVIRONMENTAL, INC.
DAN LOUKS

2401-00265

Date Reported 02/04/2024
Date Received 01/26/2024
Date Sampled 01/25/2024

Project: 27 S-LA PATERA LANE, GOLETA CA 93117

Method #	EPA 8260B		
QC Reference #	113951	Date Analyzed: 1/29/2024	Technician: IG
Samples	001 002		
Results	LCS %REC	LCS %DUP	LCS %RPD
	C4-C12	93	100
		Control Ranges	
		LCS %REC	LCS %RPD
		70 - 130	0 - 25

No method blank results were above reporting limit

Respectfully Submitted:

Ken Zheng - President

EXHIBIT "H" (LIMITED PH2 INVESTIGATION)

**A & R Laboratories**

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 E-mail: office@arlaboratories.com

CHAIN OF CUSTODY

A & R Work Order #:

2401-265

Page 1 of 2

Client Name ALL PHASE ENVIRONMENTAL							<input checked="" type="checkbox"/> Chilled		Analyses Requested										Turn Around Time Requested			
E-mail dan@gsaengineers.com							<input checked="" type="checkbox"/> Intact												<input type="checkbox"/> Seal		<input type="checkbox"/> Rush 8 12 24 48 Hours <input checked="" type="checkbox"/> Normal	
Address 8792 LAUDER CIRCLE SUIT 200 HUNTINGTON BEACH							Report Attention DAN LOUHS		Phone # 1-800-567-7729		Sampled By DL		EPA8260B (VOCs & Oxygenates) EPA8260B(BTEX & Oxygenates) 8260B / 8015 (Gasoline) 8015 (Diesel) EPA8081A (Organochlorine Pesticides) EPA 8082 (PCBs) EPA 8015M (Carbon Chain C4-C40) EPA 6010B/7000 (CAM 17 Metals) Micro: Plate Cnt., Coliform, E-Coli									
Project No./ Name			Project Site 27 S-LA PATERA LANE GOLETA CA 93117																			
Lab # (Lab use)	Client Sample ID	Sample Collection		Matrix Type	Sample Preserve	No., type* & size of container											Remarks					
		Date	Time																			
1	B1-5	1-25-24	8:20	SOIL	ICE	1																
2	B1-10		8:25			1																
3	B1-15		8:30			1																
4	B1-20		8:40			1																
	B1-25		8:55			1											HOLD					
5	B1-30		9:20			1																
6	B2-5		9:40			1																
7	B2-10		9:45			1																
8	B3-5		10:00			1																
9	B3-10		10:10			1																
10	B4-5		10:30			1																
11	B4-10		10:35			1																
12	B4-15		10:45			1																
13	B4-20		10:55			1																
	B4-25		11:15			1											HOLD					
Relinquished By		Company	Date	Time	Received By		Company	Date	Time	Note: Samples are discarded 30 days after results are reported unless other arrangements are made.												
Relinquished By		Company	Date	Time	Received By		Company	Date	Time													
			1/26/24	11:30				1/26/24	11:30													
			1/26/24	13:25				1/26/24	13:21													
Matrix Code:		DW=Drinking Water	SL=Sludge	Preservative Code		IC=Ice	SH=NaOH		* Sample Container Types:				B= Brass Tube		E= EnCore							
		GW=Ground Water	SS=Soil/Sediment			HC=HCl	ST=Na2S2O3		T=Tedlar Air Bag				P=Plastic Bottle									
		WW=Waste Water	AR=Air			HN=HNO3	HS=H2SO4		G=Glass Container				V=VOA Vial									
		SD=Solid Waste	PP=Pure Product						ST= Steel Tube													



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 E-mail: office@arlaboratories.com

CHAIN OF CUSTODY

A & R Work Order #:

2401-205

Page 2 of 2

Client Name: ALL PHASE ENVIRONMENTAL				<input checked="" type="checkbox"/> Chilled		Analyses Requested										Turn Around Time Requested			
E-mail: dan@gsaengineers.com				<input checked="" type="checkbox"/> Intact												<input type="checkbox"/> Rush 8 12 24 48 Hours <input checked="" type="checkbox"/> Normal			
Address: 8792 LAVERCIRCLE SUIT 200 HUNTINGTON BEACH				<input type="checkbox"/> Seal														Remarks	
Report Attention: Dan Parks		Phone # 1-800-567-7729		Sampled By: DL															
Project No./ Name:		Project Site: 27 S. LA PATERA LANE GOLETA CA 93117																	
Lab # <small>(Lab use)</small>	Client Sample ID	Sample Collection		Matrix Type	Sample Preserve	No., type* & size of container	EPA8260B (VOCs & Oxygenates)	EPA8260B(BTEX & Oxygenates)	8260B / 8015 (Gasoline)	8015 (Diesel)	EPA8081A (Organochlorine Pesticides)	EPA 8082 (PCBs)	EPA 8015M (Carbon Chain C4-C40)	EPA 6010B/7000 (CAM 17 Metals)	Micro: Plate Cnt., Coliform, E-Coli				
		Date	Time																
14	B4-30	1-25-24	11:35	SOIL	ICE	1							X						
15	B5-4		12:05			1					X		X	X					
16	B6-4		12:25			1							X						
17	B7-4		12:50			1							X						
18	B8-4		13:25			1							X						
19	B9-5		14:00			1							X	X					
	B9-10		14:10			1										H O L D			
	B9-15		14:25			1										H O L D			
20	B10-5		15:00			1							X	X					
	B10-10		15:10			1										H O L D			
	B10-15	✓	15:25	✓	✓	1										H O L D			

Relinquished By:	Company: ARLPH	Date: 1/26/24	Time: 11:30	Received By:	Company:	Date: 1/26/24	Time: 11:30	Note: Samples are discarded 30 days after results are reported unless other arrangements are made.
Relinquished By:	Company:	Date: 1/26/24	Time: 17:21	Received By:	Company:	Date: 1/26/24	Time: 13:21	

Matrix Code:	DW=Drinking Water GW=Ground Water WW=Waste Water SD=Solid Waste	SL=Sludge SS=Soil/Sediment AR=Air PP=Pure Product	Preservative Code	IC=Ice HC=HCl HN=HNO3	SH=NaOH ST=Na2S2O3 HS=H2SO4	* Sample Container Types: T=Tedlar Air Bag G=Glass Container ST= Steel Tube	B= Brass Tube P=Plastic Bottle V=VOA Vial	E= EnCore
--------------	--	--	-------------------	-----------------------------	-----------------------------------	--	---	-----------



Sample Acceptance Checklist

CLIENT: All Phase Env. / GSA

WORK ORDER NUMBER: 2401-265

Temperature: (Criteria: 0.0°C-6.0°C)

Sample Temp. (°C) 5.9° ID#: 22-0030

- Sample(s) outside temperature criteria: PM contacted by: _____
- Sample(s) outside temperature criteria, but received on ice/chilled on same day of sampling.
- Sample(s) received at ambient temperature; placed on ice for transport by courier.

CUSTODY SEAL:

Cooler Present and Intact Present and Not Intact Not Present
 Sample(s) Present and Intact Present and Not Intact Not Present

Sample Condition:

	Yes	No	N/A
Was a COC received	X		
Were sample IDs present?	X		
Were sampling dates & times present?	X		
Was a relinquished signature present?	X		
Were the tests required clearly indicated?	X		
Were all samples sealed in plastic bags?	X		
Did all bottle labels agree with COC? (ID, dates and times)	X		
Were correct containers used for the tests required?	X		
Was a sufficient amount of samples sent for tests indicated?	X		
Was there headspace in VOA vials?			X
Were the containers labeled with correct preservatives?			X

Explanations/Comments:

Notification:

For discrepancies, how was the Project Manager notified?

Verbal: PM Initials: _____ Data/Time: _____

Email: Send to: _____ Data/Time: _____

Project Manager's response: _____

Completed By: QJO

Date: 1-26-24

AR Laboratories
 1650 S. Grove Ave., Suite C, Ontario, CA 91761
 PH: 909-781-6335

Email: office@arlaboratories.com

EXHIBIT "H" (LIMITED PH2 INVESTIGATION)

APPENDIX F

Photographs

EXHIBIT "H" (LIMITED PH2 INVESTIGATION)

All Phase Environmental, Inc.





Boring B1 looking south.



Boring B2 looking south.



Boring B3 looking southwest.



Boring B4 looking east.



Boring B5 looking northwest.



Boring B6 looking northwest.



Boring B7 looking north.



Boring B8 looking west.



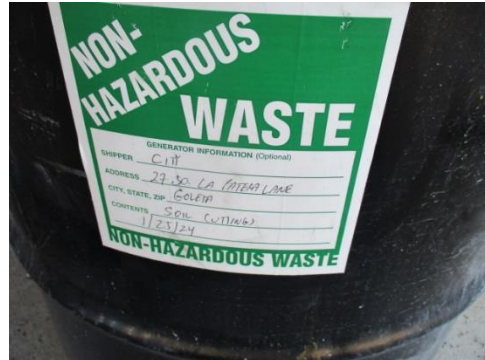
Boring locations B9.



Boring locations B10.



Drum of cuttings was left onsite in the southeast corner of the west subject property parking lot.



Drum label.



Nested vapor probes from boring B1.



PID was used to test ambient air for worker safety and to measure soil gasses for prior to soil vapor testing.

APPENDIX G

Soil Gas Sampling Data

SOIL GAS PURGING DATA FORM

PROJECT: Commercial Property
 LOCATION: 27 La Patera Lane, Goleta, CA
 DATE: January 28, 2024

	VAPOR PROBE INFO							
PROBE ID	SG1	SG1	SG2	SG2	SG3	SG3	SG4	SG4
PROBE DEPTH (ft)	10	30	5	10	5	10	10	30
	EXTRACTION DATA							
Applied Vacuum (in. WC)	<5	<5	<5	<5	<5	<5	<5	<5
FLOW (L/min)	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Pore Volumes (borehole - sand pack)	3	3	3	3	3	3	3	3
	MONITORING DATA							
OXYGEN (%)	13.2	10.9	16.5	18.2	15.2	13.4	9.3	19.0
CARBON DIOXIDE (%)	>5	>5	>5	1.11	3.6	1.0	1.0	1.0
VOC by PID (ppm)	0.0	1.8	0.0	0.0	0.2	2.5	0.0	0.0
Methane (% LEL)	0.0	25	79	18	74	54	100	17

	VAPOR PROBE INFO							
PROBE ID	SG5	SG6	SG7	SG8	SG9	SG9	SG10	SG10
PROBE DEPTH (ft)	5	5	5	5	5	15	5	15
	EXTRACTION DATA							
Applied Vacuum (in. WC)	<5	<5	<5	<5	<5	<5	<5	<5
FLOW (L/min)	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Pore Volumes (borehole - sand pack)	3	3	3	3	3	3	3	3
	MONITORING DATA							
OXYGEN (%)	19.1	12.6	13.7	17.5	18.4	17.4	17.9	16.2
CARBON DIOXIDE (%)	0.0	2.0	4.32	0.0	2.6	1.0	0.0	>5
VOC by PID (ppm)	0.0	0.0	0.0	3.0	0.0	0.0	0.0	0.0
Methane (% LEL)	0.0	0.0	0.0	42	0.0	0.0	0.0	0.0

SAMPLED BY: NH

EXHIBIT I

ASBESTOS SURVEY AND HAZARDOUS MATERIAL INSPECTION REPORT

PREPARED BY ALL PHASE ENVIRONMENTAL, INC.

DATED DECEMBER 6, 2023

All Phase Environmental, Inc.



Asbestos Survey and Hazardous Materials Inspection

**Goleta Train Depot
27 South La Patera Lane
Goleta, California, 93117**



December 6, 2023

Prepared for:

**City of Goleta
City Hall – 130 Cremona Drive, Suite B
Goleta, California 93117**

Prepared by:

**All Phase Environmental, Inc.
8792 Lauder Circle, Suite 200
Huntington Beach, California 92646
(800) 567-7729
www.PhaseOneESA.com**

APEI Project No. 14242.00

EXHIBIT "I" (Asbestos and HazMat Inspection)

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LIST OF APPENDIX SECTIONS

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- APPENDIX C Certifications
- APPENDIX D Analytical Laboratory Documentation & Chain of Custody

1.0 Summary

At the request of City of Goleta, All Phase Environmental, Inc. (APEI) performed a survey for asbestos-containing materials (ACM) and a visual inspection for hazardous materials and universal wastes in the industrial building located at 27 South La Patera Lane, Goleta, California, 93117, hereinafter referred to as the "Building" on November 16 and 28, 2023. Douglas B. Kochanowski, a State of California Certified Asbestos Consultant #99-2699 and APEI Project Manager, conducted the survey.

The following materials were identified as asbestos containing; black floor tile mastic, floor tile contaminated by floor tile mastic, carpeting contaminated by floor tile mastic, mirror mastic, a flue, and roof tar sealing bolts penetrating the roof.

Hazardous materials, petroleum products, and universal wastes identified included: a canister of fire retardant, florescent light ballasts and tubes, a hydraulic dock leveler, pole-mounted transformers, mercury vapor/sodium vapor/halogen lights, one 55 drum of unknown contents labeled as hazardous waste, smoke detectors, one 1,800 gallon diesel UST, three gallons of latex paint, HVAC chemicals, and batteries in exit signs, emergency lights, and soap/sanitizer dispensers.

None of the materials posed an immediate threat to the environmental integrity of the subject property or occupants but prior to the start of demolition they must be removed and disposed of or recycled.

2.0 Building Profile

General

The Building was a one-story office and industrial structure with a small mezzanine office and storage space in the southwest corner of the building. The building was approximately 30,000-square feet and was constructed in approximately 1967. The building has undergone several renovations since its original construction. At the time of the investigation, the Building was partially occupied by a tenant using it for intermittent classes, office space, and warehouse space.

Structural System and Building Envelope

The Building consisted of a steel frame structure with corrugated sheet metal on the exterior walls and the roof.

Interior Construction and Finishes

Interior construction consisted of gypsum board walls and exposed corrugated sheet metal. Ceilings were finished with gypsum board and drop ceiling tiles or exposed corrugated sheet metal. Floor finishes included floor tile, carpeting, linoleum, ceramic tile, and finished concrete slab.

Mechanical Systems

Gas and electrical HVAC units provided heating and cooling to the office areas of the building. The air ducts and pipe insulation observed during this project were visually identified as being insulated with fiberglass or rubber. Hot water was provided by local hot water heaters and domestic hot water piping was visually identified as being insulated with fiberglass or uninsulated.

3.0 Asbestos Findings

The asbestos survey was performed by APEI in preparation for the demolition of the Building. APEI Project Manager Doug Kochanowski, a California Certified Asbestos Consultant (99-2699), performed the survey on November 16 and 28, 2023. Bulk samples were taken of suspect ACM including both interior and exterior materials. Destructive sampling techniques were employed in order to assess all materials. This survey was performed in accordance with Asbestos and Hazard Emergency Response Act (AHERA) sampling protocol modified to include exterior and roofing materials and to meet the requirements for an asbestos survey required prior to demolition or renovation. Duplicate samples were taken where appropriate to ensure proper qualification of materials. Bulk samples of suspect ACM were collected, labeled, documented on a chain of custody form and delivered to an NVLAP certified analytical laboratory. This survey represents comprehensive pre-demolition survey that, while some well-hidden suspect ACM may have escaped evaluation, all layers of suspect building material (to joist- or frame-level) as well as materials above plenums, inside soffits, or other concealed spaces have been evaluated.

The analytical laboratory used for analysis of bulk asbestos samples was Patriot Lab and Analytical Services. Patriot Lab is located at 1041 South Placentia Avenue, Fullerton, California 92831. Patriot is a NIST/NVLAP certified laboratory (#20358-0) Standard laboratory quality control procedures were followed. Polarized Light Microscopy - Dispersion Staining (PLM-DS) by EPA Method 600/R-93/116 was used to analyze the samples.

A summary of materials found to contain detectable asbestos is provided below in Table I. Appendix A contains drawings illustrating the locations of the bulk samples and the locations of materials identified as asbestos containing. All quantities listed are approximate values and any contractor bidding on the removal of asbestos from the Building should use these numbers as a guideline only. Any contractor using these numbers to formulate a bid for removal does so at their own risk.

Table I						
Summary of Asbestos Containing Materials						
Sample #	Material	Friable	Condition	Material Location	Estimated Quantity	Asbestos Content
01-1, 10-1, 12-1, and 13-1	Black Floor Tile Mastic	No	Good	Throughout 1 st floor office area except bathrooms, northeast corner office, router room, and electrical space	7,975 Square Feet	3% to 5% Chrysotile
14-1 to 14-3	Mirror Mastic	No	Good	Glue adhering mirrors to the walls in the bathrooms	200 Square Feet	5% Chrysotile
19-1 to 19-3	Roof Tar Sealing Bolts Penetrating Roof	No	Good	Dollop of tar at each bolt penetrating the roof	Throughout	5% Chrysotile
22-1	Transite Flue	No	Good	Vertically pasting through the building and roof near the bathrooms	4" x 30'	13% Chrysotile

Within the State of California, the State of California Division of Occupational Safety and Health (DOSH) defines ACM (or Asbestos Containing Construction Material (ACCM), the nomenclature used by DOSH) as any manufactured material which contains greater than 1/10 of one percent (0.1%) asbestos by weight. The laboratory's Limit of Quantification (LOQ) for PLM-DS is 1% asbestos and greater. Therefore, the designation of "trace" indicates the presence of asbestos below the LOQ, that is, below 1%. Samples found to contain trace (less than 1%) asbestos, if any, were re-analyzed for asbestos content using 1,000-field point count analysis. Any ACM that contains trace asbestos, (less than 1% but more than 0.1%) must be treated as ACM if disturbed but its disposal is not regulated as an asbestos containing waste.

There were no materials tested that were found to contain trace amounts of asbestos. Table II below contains a summary of all of the samples taken and the laboratory analysis results.

Table II Asbestos Sample Results Summary					
Sample #	Material	Friable	Condition	Sample Location	Asbestos Content
01-1 Layer 1	Tan 12" Floor Tile	No	Good	Reception, southwest corner	None Detected
01-1 Layer 2	Tan 12" Floor Tile Mastic	No	Good	Reception, southwest corner	3% Chrysotile Asbestos
01-1 Layer 3	Carpet Glue On Top of Tan 12" Floor Tile	No	Good	Reception, southwest corner	None Detected
01-2 Layer 1	Tan 12" Floor Tile	No	Good	Reception, southeast corner	None Detected
01-2 Layer 2	Tan 12" Floor Tile Mastic	No	Good	Reception, southeast corner	Not Analyzed Positive Stop
01-2 Layer 3	Carpet Glue On Top of Tan 12" Floor Tile	No	Good	Reception, southeast corner	None Detected
01-3 Layer 1	Tan 12" Floor Tile	No	Good	Reception, northwest corner	None Detected
01-3 Layer 2	Tan 12" Floor Tile Mastic	No	Good	Reception, northwest corner	Not Analyzed Positive Stop
01-3 Layer 3	Carpet Glue On Top of Tan 12" Floor Tile	No	Good	Reception, northwest corner	None Detected
02-1	Drywall	No	Good	2 nd Floor, open office area, west wall, center	None Detected
02-2	Drywall	No	Good	Center open office area, south wall, center	None Detected
02-3	Drywall	No	Good	East office north of reception, north wall, center	None Detected
03-1	Drywall Joint Compound	No	Good	2 nd Floor open office area, northeast corner	None Detected
03-2	Drywall Joint Compound	No	Good	Center open office area, south wall, center, at window	None Detected

Table II Asbestos Sample Results Summary					
Sample #	Material	Friable	Condition	Sample Location	Asbestos Content
03-3	Drywall Joint Compound	No	Good	East office north of reception, southeast corner	None Detected
04-1 Layer 1	Black Covebase	No	Good	2nd Floor open office area, south wall, east end	None Detected
04-1 Layer 2	Black Covebase Mastic	No	Good	2nd Floor open office area, south wall, east end	None Detected
04-2 Layer 1	Black Covebase	No	Good	Center open office area, north wall, center, at corner for router room	None Detected
04-2 Layer 2	Black Covebase Mastic	No	Good	Center open office area, north wall, center, at corner for router room	None Detected
04-3 Layer 1	Black Covebase	No	Good	Office southwest of north conference room, south wall, center	None Detected
04-3 Layer 2	Black Covebase Mastic	No	Good	Office southwest of north conference room, south wall, center	None Detected
05-1	2'x4' Drop Ceiling Tile with 2'x2' Pattern	Yes	Good	Center open office area, northwest corner	None Detected
05-2	2'x4' Drop Ceiling Tile with 2'x2' Pattern	Yes	Good	North conference room, southwest corner	None Detected
05-3	2'x4' Drop Ceiling Tile with 2'x2' Pattern	Yes	Good	Hallway east of break room, southeast corner by exit door	None Detected
06-1 Layer 1	Brown Covebase	No	Good	West office north of reception, north wall, center	None Detected
06-1 Layer 2	Brown Covebase Mastic	No	Good	West office north of reception, north wall, center	None Detected
06-2 Layer 1	Brown Covebase	No	Good	West office north of reception, west wall, center	None Detected

**Table II
 Asbestos Sample Results Summary**

Sample #	Material	Friable	Condition	Sample Location	Asbestos Content
06-2 Layer 2	Brown Covebase Mastic	No	Good	West office north of reception, west wall, center	None Detected
06-3 Layer 1	Brown Covebase	No	Good	West office north of reception, south wall, north end	None Detected
06-3 Layer 2	Brown Covebase Mastic	No	Good	West office north of reception, south wall, north end	None Detected
07-1	2'x4' Drop Ceiling Tile Dot & Fissure Pattern	Yes	Good	2 nd Floor, open office area, southwest corner	None Detected
07-2	2'x4' Drop Ceiling Tile Dot & Fissure Pattern	Yes	Good	Fire control room, north wall, east end	None Detected
07-3	2'x4' Drop Ceiling Tile Dot & Fissure Pattern	Yes	Good	West office north of reception, southeast corner	None Detected
08-1 Layer 1	12" White With Blue Mottle Floor Tile	No	Good	Bathroom in the southwest corner of office area, southeast corner	None Detected
08-1 Layer 2	12" White With Blue Mottle Floor Tile Glue	No	Good	Bathroom in the southwest corner of office area, southeast corner	None Detected
08-2 Layer 1	12" White With Blue Mottle Floor Tile	No	Good	Men's bathroom, northwest corner	None Detected
08-2 Layer 2	12" White With Blue Mottle Floor Tile Glue	No	Good	Men's bathroom, northwest corner	None Detected

Table II Asbestos Sample Results Summary					
Sample #	Material	Friable	Condition	Sample Location	Asbestos Content
08-3 Layer 1	12" White With Blue Mottle Floor Tile	No	Good	Woman's bathroom, southwest corner	None Detected
08-3 Layer 2	12" White With Blue Mottle Floor Tile Glue	No	Good	Woman's bathroom, southwest corner	None Detected
09-1 Layer 1	12" Blue and Orange Floor Tile	No	Good	Bathroom in the southwest corner of office area, northwest corner	None Detected
09-1 Layer 2	12" Blue and Orange Floor Tile Glue	No	Good	Bathroom in the southwest corner of office area, northwest corner	None Detected
09-2 Layer 1	12" Blue and Orange Floor Tile	No	Good	Men's bathroom, northwest corner	None Detected
09-2 Layer 2	12" Blue and Orange Floor Tile Glue	No	Good	Men's bathroom, northwest corner	None Detected
09-3 Layer 1	12" Blue and Orange Floor Tile	No	Good	Woman's bathroom, southwest corner	None Detected
09-3 Layer 2	12" Blue and Orange Floor Tile Glue	No	Good	Woman's bathroom, southwest corner	None Detected
10-1	Black Floor Mastic	No	Good	Hallway east of break room, southwest corner by exit door	5% Chrysotile Asbestos
10-2	Black Floor Mastic	No	Good	Hallway, near east door to north conference room	Not Analyzed Positive Stop
10-3	Black Floor Mastic	No	Good	Hallway, near janitor closet, west wall, north end	Not Analyzed Positive Stop
11-1	Sink Sound Damper	No	Good	Break room, below sink along north wall	None Detected

Table II Asbestos Sample Results Summary					
Sample #	Material	Friable	Condition	Sample Location	Asbestos Content
12-1 Layer 1	Brown Mottled 12" Floor Tile	No	Good	Break room, southwest corner	None Detected
12-1 Layer 2	Brown Mottled 12" Floor Tile Mastic	No	Good	Break room, southwest corner	5% Chrysotile Asbestos
12-1 Layer 3	Carpet Glue on Brown Mottled 12" Floor Tile	No	Good	Break room, southwest corner	None Detected
12-2 Layer 1	Brown Mottled 12" Floor Tile	No	Good	Break room, southeast corner	None Detected
12-2 Layer 2	Brown Mottled 12" Floor Tile Mastic	No	Good	Break room, southeast corner	Not Analyzed Positive Stop
12-2 Layer 3	Carpet Glue on Brown Mottled 12" Floor Tile	No	Good	Break room, southeast corner	None Detected
12-3 Layer 1	Brown Mottled 12" Floor Tile	No	Good	Break room, northeast corner	None Detected
12-3 Layer 2	Brown Mottled 12" Floor Tile Mastic	No	Good	Break room, northeast corner	Not Analyzed Positive Stop
12-3 Layer 3	Carpet Glue on Brown Mottled 12" Floor Tile	No	Good	Break room, northeast corner	None Detected
13-1 Layer 1	Tan 12" Floor Tile	No	Good	West end open office area, southwest corner	None Detected
13-1 Layer 2	Tan 12" Floor Tile Mastic	No	Good	West end open office area, southwest corner	5% Chrysotile Asbestos

Table II Asbestos Sample Results Summary					
Sample #	Material	Friable	Condition	Sample Location	Asbestos Content
13-1 Layer 3	Carpet Glue on Tan 12" Floor Tile	No	Good	West end open office area, southwest corner	None Detected
13-2 Layer 1	Tan 12" Floor Tile	No	Good	Center open office area, northwest corner	None Detected
13-2 Layer 2	Tan 12" Floor Tile Mastic	No	Good	Center open office area, northwest corner	Not Analyzed Positive Stop
13-2 Layer 3	Carpet Glue on Tan 12" Floor Tile	No	Good	Center open office area, northwest corner	None Detected
13-3 Layer 1	Tan 12" Floor Tile	No	Good	Office northwest of north conference room, southwest corner	None Detected
13-3 Layer 2	Tan 12" Floor Tile Mastic	No	Good	Office northwest of north conference room, southwest corner	Not Analyzed Positive Stop
13-3 Layer 3	Carpet Glue on Tan 12" Floor Tile	No	Good	Office northwest of north conference room, southwest corner	None Detected
14-1	Mirror Mastic	No	Good	Bathroom in the southwest corner of office area, north mirror, top left corner of mirror	5% Chrysotile Asbestos
14-2	Mirror Mastic	No	Good	Bathroom in the southwest corner of office area, north mirror, top right corner of mirror	Not Analyzed Positive Stop
14-3	Mirror Mastic	No	Good	Bathroom in the southwest corner of office area, north mirror, bottom left corner of mirror	Not Analyzed Positive Stop
15-1 Layer 1	Beige Covebase	No	Good	Bathroom in the southwest corner of office area, south wall, center	None Detected

**Table II
 Asbestos Sample Results Summary**

Sample #	Material	Friable	Condition	Sample Location	Asbestos Content
15-1 Layer 2	Beige Covebase Mastic	No	Good	Bathroom in the southwest corner of office area, south wall, center	None Detected
15-2 Layer 1	Beige Covebase	No	Good	Break room, west wall, center	None Detected
15-2 Layer 2	Beige Covebase Mastic	No	Good	Break room, west wall, center	None Detected
15-3 Layer 1	Beige Covebase	No	Good	Break room, east wall, center	None Detected
15-3 Layer 2	Beige Covebase Mastic	No	Good	Break room, east wall, center	None Detected
16-1 Layer 1	Beige Diamond Pattern Linoleum	Yes	Good	Bathroom in west end warehouse space, southwest corner	None Detected
16-1 Layer 2	Beige Diamond Pattern Linoleum Glue	Yes	Good	Bathroom in west end warehouse space, southwest corner	None Detected
16-2 Layer 1	Beige Diamond Pattern Linoleum	Yes	Good	Bathroom in west end warehouse space, northwest corner	None Detected
16-2 Layer 2	Beige Diamond Pattern Linoleum Glue	Yes	Good	Bathroom in west end warehouse space, northwest corner	None Detected
16-3 Layer 1	Beige Diamond Pattern Linoleum	Yes	Good	Bathroom in west end warehouse space, northeast corner	None Detected

Table II Asbestos Sample Results Summary					
Sample #	Material	Friable	Condition	Sample Location	Asbestos Content
16-3 Layer 2	Beige Diamond Pattern Linoleum Glue	Yes	Good	Bathroom in west end warehouse space, northeast corner	None Detected
17-1	Air Duct Sealant	No	Good	Exterior west side of building, air duct north of south roll up door, south side	None Detected
17-2	Air Duct Sealant	No	Good	Exterior west side of building, air duct north of south roll up door, north side	None Detected
17-3	Air Duct Sealant	No	Good	Exterior west side of building, air duct south of north roll up door, north side	None Detected
18-1 Layer 1	Grey Roofing over Foam	No	Good	Lower west roof, northwest area, next to skylight	None Detected
18-1 Layer 2	Foam Below Grey Roofing	No	Good	Lower west roof, northwest area, next to skylight	None Detected
18-2 Layer 1	Grey Roofing over Foam	No	Good	Upper roof, center, west end	None Detected
18-2 Layer 2	Foam Below Grey Roofing	No	Good	Upper roof, center, west end	None Detected
18-3 Layer 1	Grey Roofing over Foam	No	Good	Upper roof, center, east end	None Detected
18-3 Layer 2	Foam Below Grey Roofing	No	Good	Upper roof, center, east end	None Detected
19-1	Roof Tar Sealing Bolts Penetrating Roof	No	Good	Upper roof, near northwest corner	5% Chrysotile Asbestos
19-2	Roof Tar Sealing Bolts Penetrating Roof	No	Good	Upper roof, center, 20 feet south of center line	Not Analyzed Positive Stop

Table II Asbestos Sample Results Summary					
Sample #	Material	Friable	Condition	Sample Location	Asbestos Content
19-3	Roof Tar Sealing Bolts Penetrating Roof	No	Good	Upper roof, near southeast corner	Not Analyzed Positive Stop
20-1	White Sealant Around Fiberglass Pannels	No	Good	Upper roof, west end, north of center, next to fiberglass panel	None Detected
20-2	White Sealant Around Fiberglass Pannels	No	Good	Upper roof, west end, center, 20 feet south of center line, next to fiberglass panel	None Detected
20-3	White Sealant Around Fiberglass Pannels	No	Good	Upper roof, west end, near northeast corner, next to fiberglass panel	None Detected
21-1	Roof Penetration Tar	No	Good	Upper roof, near southeast corner, at vent	None Detected
21-2	Roof Penetration Tar	No	Good	Upper roof, center along south side, at vent	None Detected
21-3	Roof Penetration Tar	No	Good	Upper roof, near southwest corner, at skylight	None Detected
22-1	Transite Flue	No	Good	Upper roof, south of center, near the area over the office area bathrooms	13% Chrysotile Asbestos

The following is a discussion of the ACMs identified at the Building.

Black Floor Tile Mastic

Asbestos was detected in black floor tile mastic in samples 01-1, 10-1, 12-1, and 13-1. Because these were found to contain asbestos, the subsequent black mastic layers from these homogeneous groups were not analyzed (01-2, 01-3, 10-2, 10-3, 12-2, 12-3, 13-2, and 13-3). The mastic was found to contain between three and five percent (3%-5%) chrysotile asbestos. This material was non-friable and was in good condition. There were approximately 7,975 square feet of asbestos containing black mastic in the subject property building.

It appears that when the subject property building was constructed, most of the first floor office area had been finished with floor tile that was adhered to the floor with black asbestos containing mastic. Over the years, some of the floor tiles have been removed and replaced with carpeting. None of the floor tiles sampled were found to be asbestos containing. Therefore, in areas with floor tile, either the floor tile installed did not contain asbestos or the asbestos containing floor tile had been replaced with the existing newer tile that does not contain asbestos.

Because the black asbestos containing mastic remains adhered to the floor tile, even though the floor tile itself does not contain asbestos, it must be treated as asbestos containing during removal.

In addition, when peeling back the carpeting to sample the flooring, it was noted that in areas where there was no floor tile below the carpeting and the carpet was placed directly over the black floor tile mastic, the black mastic adhered to the carpeting in some areas. In these instances, the carpet would be contaminated with the asbestos containing mastic and must therefore be removed and disposed of as asbestos containing.

Mirror Mastic

The mastic adhering the mirrors to the walls in the bathrooms (samples 14-1, 14-2, and 14-3) contains five percent (5%) chrysotile asbestos. Because sample 14-1 was found to contain asbestos, samples 14-2 and 14-3 were not analyzed. This material is non-friable and was found to be in good condition. There are an estimated 120 square feet of this material.

Roof Tar Sealing Bolts Penetrating Roof

The bolts on the roof that are holding down the sheet metal roof had been sealed with a roof tar (samples 19-1, 19-2 and 19-3) that contains five percent (5%) chrysotile asbestos. Because the first sample of this tar was found to contain asbestos, the subsequent samples were not analyzed. This material is located throughout the roof where there is a small dollop of tar sealing each bolt. This material is non-friable and was found to be in good condition.

Transite Flue

A flue that runs through the building and through the roof (sample 22-1) contains thirteen percent (13%) chrysotile asbestos. This material is located near the office bathrooms and is presumed to run from the floor through the roof of the building. This material is non-friable and was found to be in good condition. There is an estimated thirty feet of this four inch diameter flue.

Recommendations

In their current condition, the identified ACMs are not a threat to the health of tenants in the building.

Because the subject property building is to be demolished, a California licensed asbestos abatement contractor must first remove and properly dispose of these materials prior to disturbance or demolition.

It is recommended that a consultant such as All Phase Environmental, Inc. be retained to develop asbestos abatement specifications for the asbestos removal and direct a pre-bid job walk to familiarize the contractors with the abatement conditions and expectations. It is also recommended that the consultant be retained to perform construction observation, area air monitoring during the abatement, and post removal area air clearance.

4.0 Hazardous Fire Extinguishing Systems

APEI surveyed the subject building for the presence of hazardous fire extinguishing systems. Hazardous fire extinguishing systems include the use of halon to displace oxygen or extinguishing systems containing N,N- Didecyl-N,N-Dimethylammonium Chloride or N-Alkyl dimethyl-N-benzylammonium chloride. APEI did not note any evidence of these types of hazardous fire extinguishing systems in the Building.

In the large open warehouse area one canister of fire retardant was noted along the south wall north of the open office areas. The disposal requirements for this material was not identified. It is advised that the fire department be consulted for disposal restrictions.

5.0 Polychlorinated Biphenyls (PCB)

APEI surveyed the subject building for the presence of electrical components that are suspected of containing polychlorinated biphenyls (PCBs). In 1977, the EPA made it illegal to use PCBs as an additive in cooling oils.

Florescent Light Ballasts

Where feasible, it is advised that all fluorescent light fixtures be reused. Fluorescent light ballasts contain cooling oils that require these items to be segregated from solid waste and be disposed of properly. Ballasts manufacturing prior to 1977 may contain PCBs. Ballasts manufactured without PCBs will be labeled, "Non PCB." Because some of the light fixtures may have been replaced, even though the subject property building was constructed in 1967, they may be free of PCBs but will still contain cooling oils and must be segregated for proper disposal. The label from each fixture must be inspected and the ballasts sorted accordingly.

Approximately 244 florescent light ballasts were identified in the subject property building.

Hydraulic Oil

Where feasible, it is advised that all hydraulic equipment be reused. Hydraulic fluids prior to 1977 may contain PCBs. If hydraulic components must be demolished, the hydraulic fluids must first be drained and either tested for PCBs or treated as PCB containing.

There was one (1) hydraulic dock leveler located in the northwest receiving dock. Evidence of leaks from the dock leveler was not observed.

Transformers

Six pole-mounted electrical transformers were observed along the south subject property border. PCBs were typically removed from transformers in the southern California area in the late 1970s and early 1980s. The units appeared in good condition and evidence of leaks was not observed. These transformers are the property of the Southern California Edison (SCE), the electrical utility. It is the responsibility of SCE to remove these from the subject property and properly handle or dispose of the hydraulic fluids.

Electrical Equipment

Switch boxes and capacitors may contain PCBs. This equipment was not observed but it is still recommended that an electrical contractor be consulted prior to disposing of any hydraulic or electrical equipment fluids.

6.0 Mercury and Sodium Containing Components

APEI surveyed the subject building for the presence of mercury vapor containing components.

Fluorescent Light Tubes

Where feasible, it is advised that all fluorescent light tubes be reused. Fluorescent light tubes suspected of containing mercury vapor were found throughout the building. The presence of fluorescent light tubes in the building is not a threat to the health of the tenants or the environmental integrity of the Property. Their disposal, however, is regulated.

In California, the California Environmental Protection Agency Department of Toxic Substances Control (DTSC) is the agency, that, in general, regulates the management of spent fluorescent light tubes and spent mercury vapor lamps destined for disposal as hazardous wastes, because mercury is listed as a hazardous waste under Title 22, California Code of Regulations, Section 66261.126, and because the spent tubes and lamps typically contain enough mercury to qualify as toxic hazardous wastes under Title 22, CCR, Section 66699. It is recommended that these tubes be maintained in place unless they are scheduled to be removed. If they are to be removed, it is recommended that the tubes be placed, unbroken, into protective packaging for off-site disposal or recycling.

Approximately 573 fluorescent light tubes were identified in the subject property building.

Mercury Vapor Lights

Where feasible, it is advised that all mercury lights be reused. Mercury vapor lights were observed in the warehouse areas of the Building. The presence of mercury vapor lights in the Building is not a threat to the health of the tenants or the environmental integrity of the Property. Their disposal, however, is regulated.

Approximately 60 mercury vapor lights were identified in the subject property building.

Mercury, Sodium, or Halogen Lights

Where feasible, it is advised that all mercury, sodium, or halogen lights be reused. These types of lights were observed mounted on the exterior walls of the Building. The presence of these lights is not a threat to the health of the tenants or the environmental integrity of the Property. Their disposal, however, is regulated.

Approximately 20 mercury, sodium, or halogen lights were identified outside the subject property building.

Smoke Detectors

A quantity of smoke detectors was not obtained. Photoelectric smoke detectors generally can be disposed of as solid waste. Ionizing types of detectors require appropriate recycling. It is advised that the smoke detectors be collected and the local waste disposal department be consulted for disposal requirements.

Unidentified Light Fixtures

There were approximately 15 smaller wall-mounted or can lights in the Building that could not be identified. It is advised that these be collected and segregated for proper disposal.

7.0 Batteries

APEI surveyed the subject building for the presence of batteries. Where feasible, it is advised that any components containing batteries be reused. Battery powered exit signs, emergency lights, and soap/sanitizer dispensers were observed in the subject property building.

Approximately 3 emergency light fixtures were observed.

Approximately 7 exit signs with emergency lights were observed.

Approximately 5 exit signs were observed.

Approximately 5 battery powered soap or hand sanitizer dispensers were observed.

Approximately 6 exterior unidentified lights on poles were observed.

8.0 Hazardous Materials

APEI surveyed the subject building for the presence of hazardous materials.

Drums

One 55 gallon drum labeled, "Hazardous Waste" was observed next to the emergency generator on the west side of the subject property building. The specific contents were not identified on the container. There were no signs of spills or releases from this drum. If the contents of this drum were not a result of work performed by, or for, the City of Goleta, then it is advised that the subject property tenant be asked to define its contents and remove the drum. If the drum is not the responsibility of the tenant, then its contents must be tested by the City and the material be properly removed and disposed of.

USTs

One approximately 1,800 gallon diesel UST remains outside the southwest corner of the Building next to the emergency generator. Prior to demolition, a permit must be obtained for the proper decommissioning and removal of the tank and all associated piping.

Miscellaneous Chemicals

One gallon of latex paint was observed in the main large warehouse, along the south wall, near the east end, east of the entrance to the offices.

Two one gallon containers of paint were observed in the storage room north of the main reception room.

It is advised that these containers of paint be removed from the subject property and properly disposed of.

HVAC Chemicals

The quantity and condition of the HVAC chemicals could not be determined. It is advised that an HVAC qualified engineer be consulted for the proper capture and recycling or disposal of all HVAC chemicals.

9.0 Compressed Gasses

Other than HVAC and fire retardant chemicals discussed above, there were no compressed gasses identified in the Building.

10.0 Environmental Professionals Signatures

The undersigned certifies that the professional services have been conducted, our findings obtained, and our recommendations have been prepared in accordance with customary principles and practices in the field of environmental science and engineering. APEI has acted in good faith and has no relationship with sellers, buyers or agents of the subject property. There have been no conflicts of interest involved in the drawing of conclusions, which have been based solely on materials reviewed and visual inspections conducted by APEI.

Prepared by:



Douglas B. Kochanowski, CHMM, CAC
Environmental Professional,
Senior Environmental Scientist, and Biologist



Reviewed by:



Jeffrey B. Fleming
Senior Environmental Scientist

11.0 Qualifications Of Environmental Professionals

Doug Kochanowski
Environmental Professional, Senior Environmental Scientist, and Biologist
CHMM (#9970), CAC (#99-2699)

Professional Experience:

Mr. Kochanowski has been performing Phase I Environmental Site Assessments (ESAs) since 1988 and is considered an industry expert. The environmental consulting profession was in its infancy when he performed his first ESA. Over the past three decades, Mr. Kochanowski has performed ESAs on almost every type of real property in over ten different states and in Europe. This includes military bases, medical facilities, high-rise office buildings, learning institutions, factories, shopping malls and plazas, gasoline stations, industrial parks, manufacturing facilities, vacant land, agricultural land, housing tracks, multifamily developments, and government facilities. His wide array of experience has made him a key component for conducting complex

All Phase Environmental, Inc.

EXHIBIT "I" (Asbestos and HazMat Inspection)

ESAs and his expertise is sought after by a wide variety of clients and other consulting firms. His practical approach and comprehensive knowledge of the ASTM standards result in ESAs that are accurate, comprehensive, and address environmental issues with a common-sense approach.

Mr. Kochanowski's environmental portfolio also includes experience conducting a variety of additional services that include soil, groundwater, and soil vapor testing, modeling, landfill leachate testing, indoor air sampling, and conducting human health risk assessments. He has managed several large IDT contracts for the European District Corps of Engineers, working at over twenty bases in Germany and Spain. Projects included remediation design, soil and groundwater sampling, landfill leachate testing, asbestos surveys, air monitoring, and radon testing.

For as long as Mr. Kochanowski has been writing ESAs he has also been performing asbestos testing and consulting. He is a California Certified Asbestos Consultant and is NIOSH 582 Certified to analyze Polarized Light Microscopy (PLM) samples. Mr. Kochanowski performs asbestos surveys, develops removal specifications and drawings, writes Operations and Management (O&M) Plans, and conducts contractor observation and air monitoring during abatement projects. His asbestos experience includes schools, nuclear facilities, universities, airports, hospitals, military bases, shopping malls, high-rise office buildings, industrial complexes, port facilities, apartments and single-family homes. Mr. Kochanowski was the Manager and Facility Security Officer (FSO) for a high-profile asbestos survey, air monitoring and abatement project of the White House, Washington D.C. His AHERA survey experience includes inspecting over eight million square feet of building space for school districts in California, Kansas, New Mexico and Tennessee.

Mr. Kochanowski has teaching experience including conducting OSHA 1910.120 HAZWOPR, Confined Space Entry, and asbestos awareness classes.

He has served as Secretary on the Board of Directors and was a founding father for the SoCal ACHMM chapter. In the past, he has served on the technical committee for a Local Emergency Planning Commission (LEPC) and was elected Secretary on the Board of Directors for the Rhine-Main Post of the Society of American Military Engineers (SAME).

Education:

Bachelor of Science, Biology, San Diego State University, 1987.
Continuing Education; Strategies for Conducting Meaningful Microbial IAQ
Investigations/American Indoor Air Quality Council

Registrations and Certifications:

CHMM, Master Level; Secretary of the SoCal ACHMM Chapter
California Certified Asbestos Consultant (#09-2699)
NIOSH 582 Accredited Sampling and Evaluation Airborne Asbestos
Certified, OSHA 40Hr Trained 1910.120/Site Supervisor

Certified TRGS 519 Under German Hazardous Materials Regulations
AHERA Certified Asbestos Inspector, Management Planner, Designer, and Abatement Supervisor
Certified Radiation Worker
Confined Space Entry Certified

Jeffrey B. Fleming
Senior Environmental Scientist

Education: University of Washington, B.S./1988/Physics
San Diego State University, M.A./1990/Physical Geography
Certifications: AHERA Accredited Building Inspector Certification Number: #298BIR3867
Years in Environmental Practice: 34

12.0 List Of Appendix Sections

- APPENDIX A Drawings
- APPENDIX B Photographs
- APPENDIX C Certifications
- APPENDIX D Analytical Laboratory Documentation & Chain of Custody

APPENDIX A

Drawings

01-1 =Bulk Sample Location, No Asbestos Detected

01-1 =Bulk Sample Location, Asbestos Containing

01-1 =Bulk Sample Location, Not Analyzed, First Positive Stop,
Samples With Multiple Layers, the Other Layers Found
No Detectable Asbestos

Figure 1: Legend For Bulk Sample Location
Drawings

Date: September 21, 2023

Scale: None

Project: 3190 Carlin Avenue ACM Survey

Project Number: 14164.00

All Phase Environmental, Inc.



EXHIBIT "I" (Asbestos and HazMat Inspection)

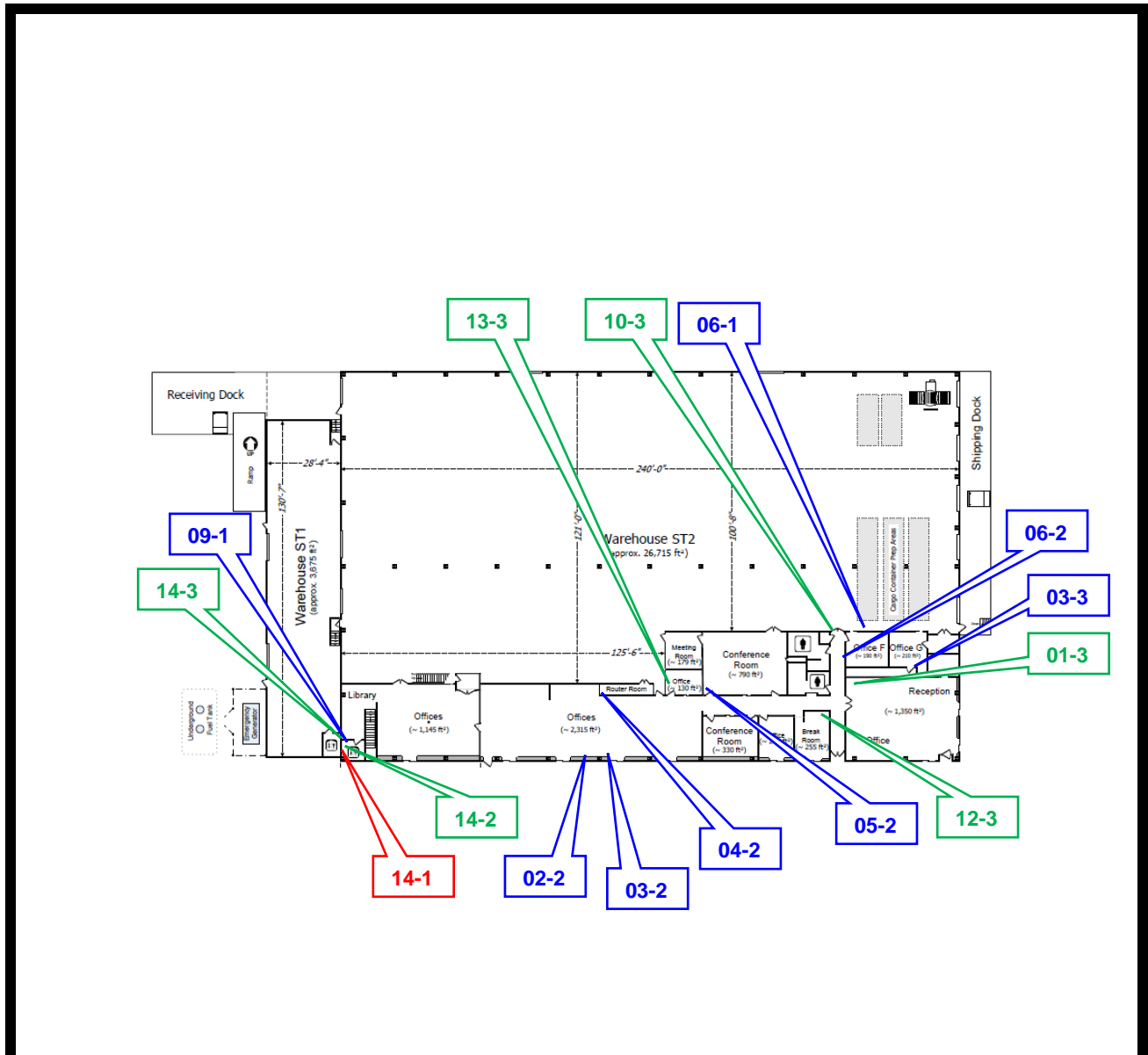


Figure 2: ACM Bulk Sample Locations 1st Floor
 Date: November 16 and 28, 2023
 Scale: None
 Project: 27 South La Patera Lane ACM Survey
 Project Number: 14242.00

All Phase Environmental, Inc.



EXHIBIT "I" (Asbestos and HazMat Inspection)

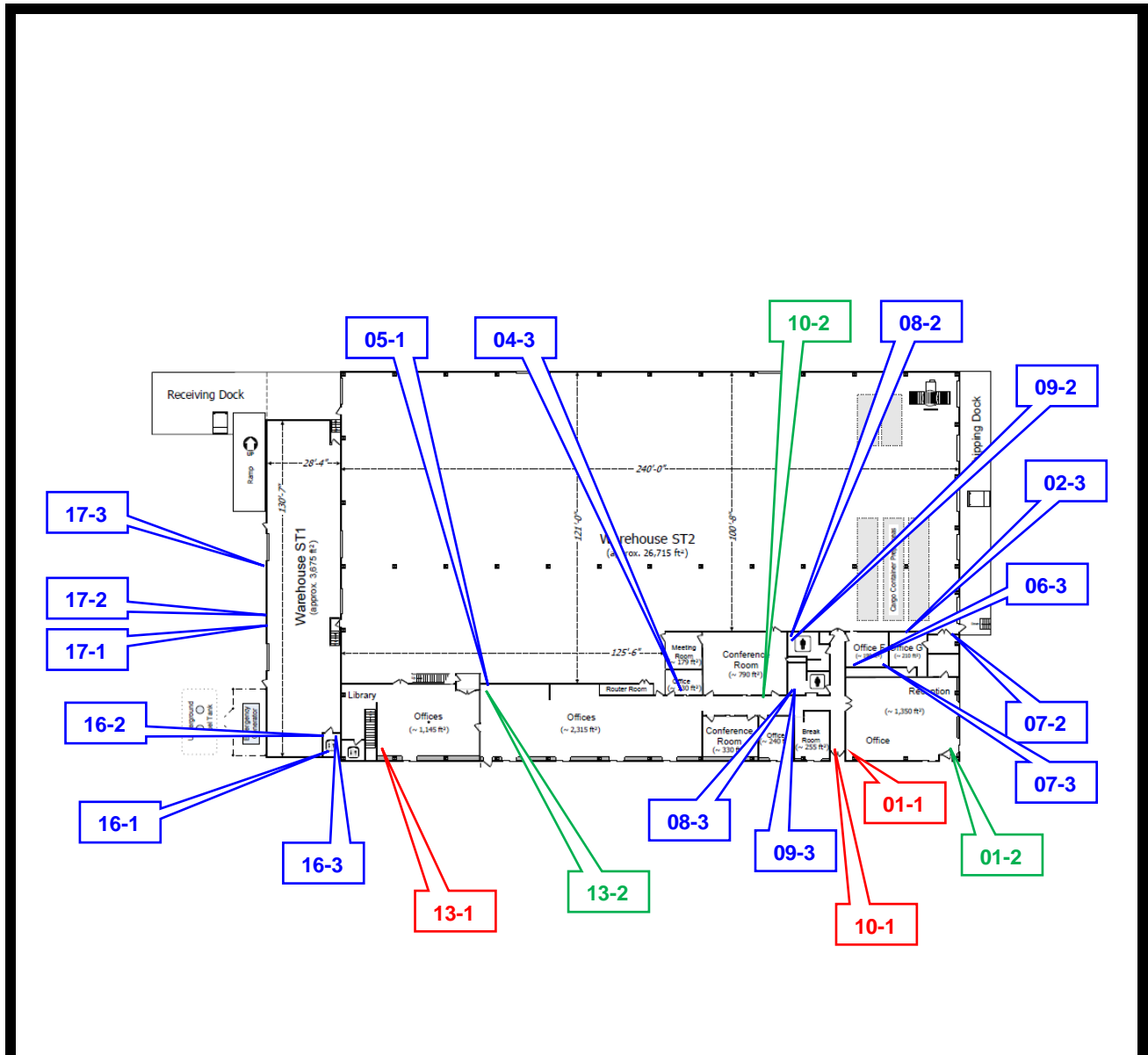


Figure 3: ACM Bulk Sample Locations 1st Floor
 Date: November 16 and 28, 2023
 Scale: None
 Project: 27 South La Patera Lane ACM Survey
 Project Number: 14242.00

All Phase Environmental, Inc.

EXHIBIT "I" (Asbestos and HazMat Inspection)

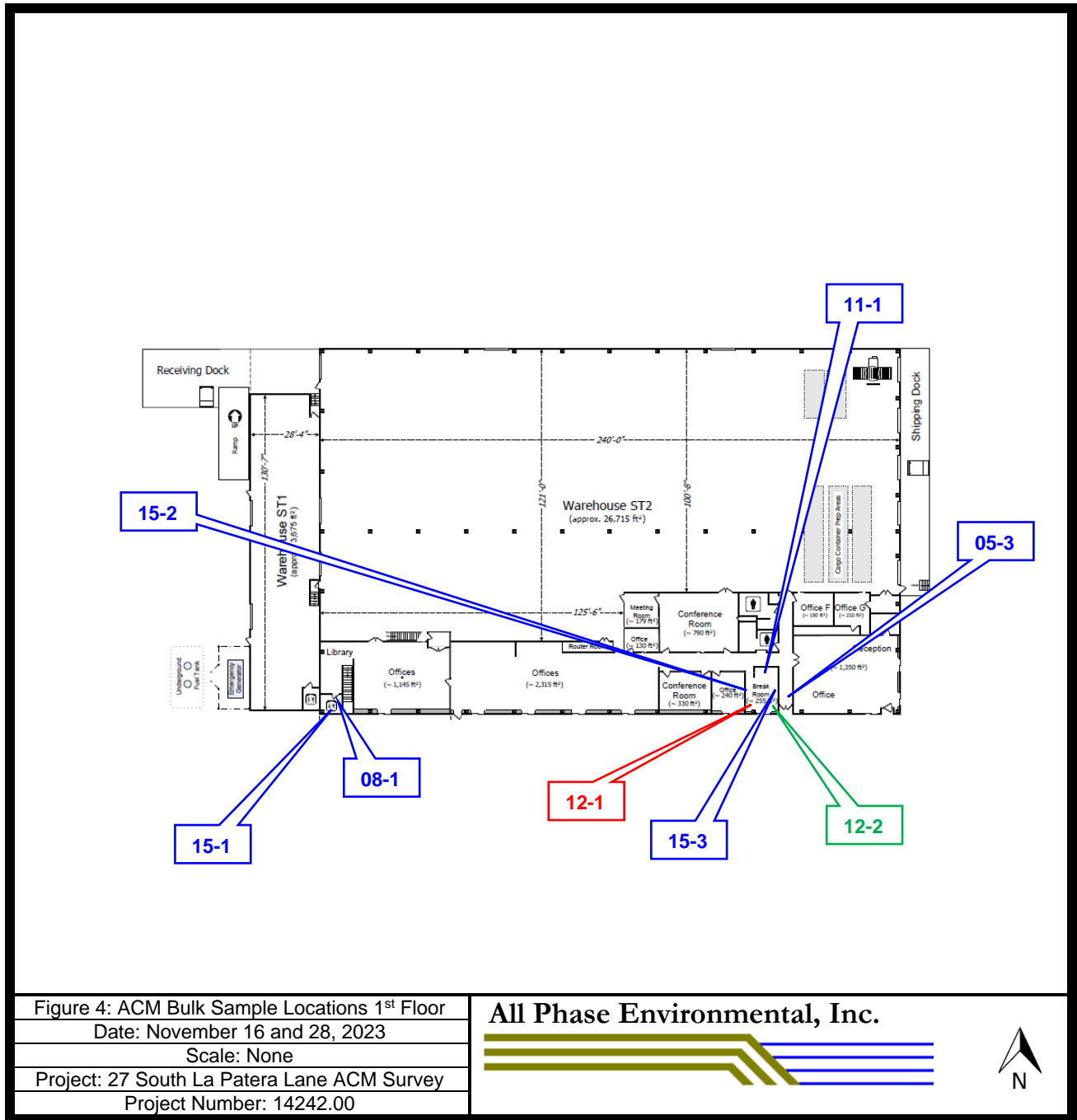


EXHIBIT "I" (Asbestos and HazMat Inspection)

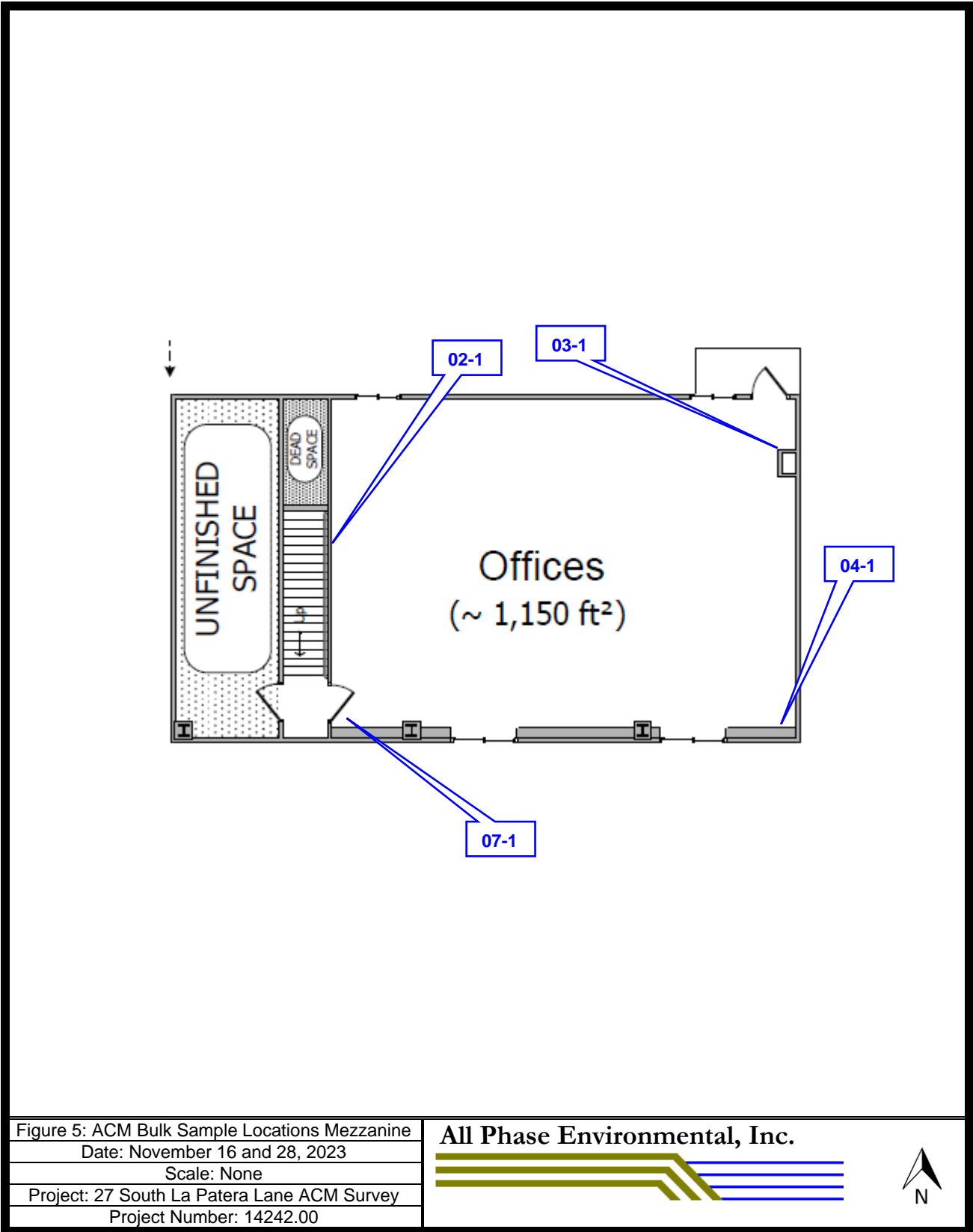


EXHIBIT "I" (Asbestos and HazMat Inspection)

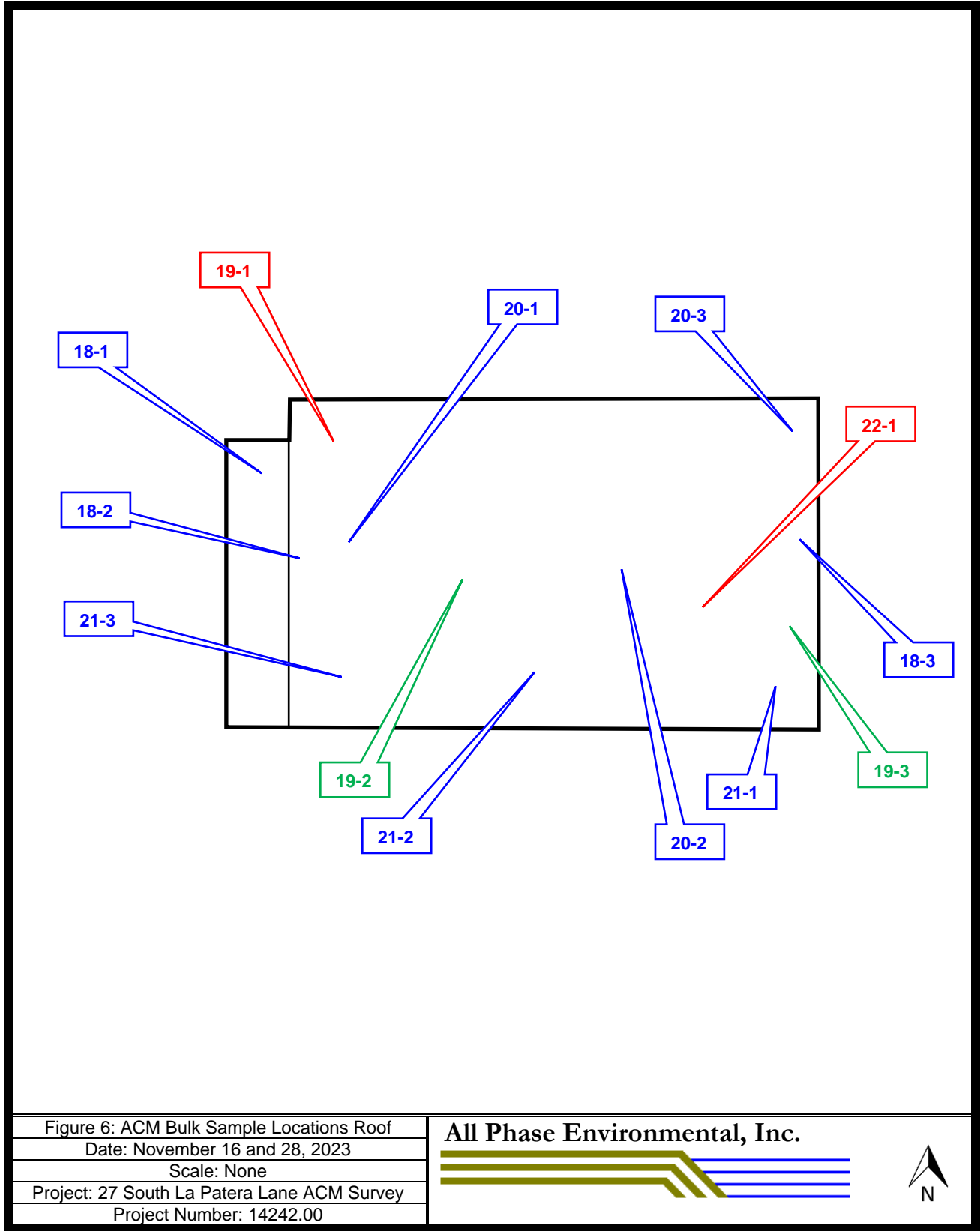


EXHIBIT "I" (Asbestos and HazMat Inspection)

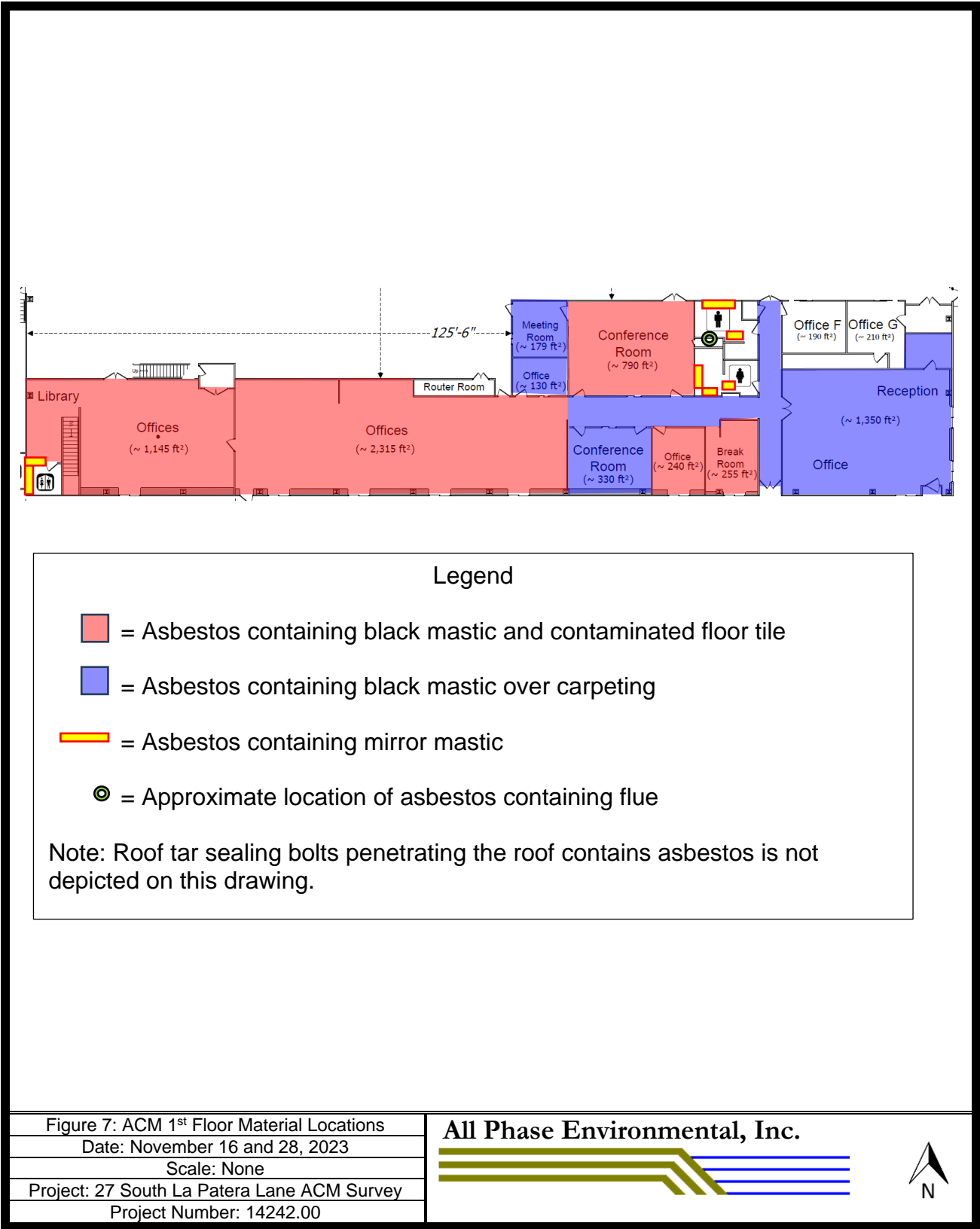
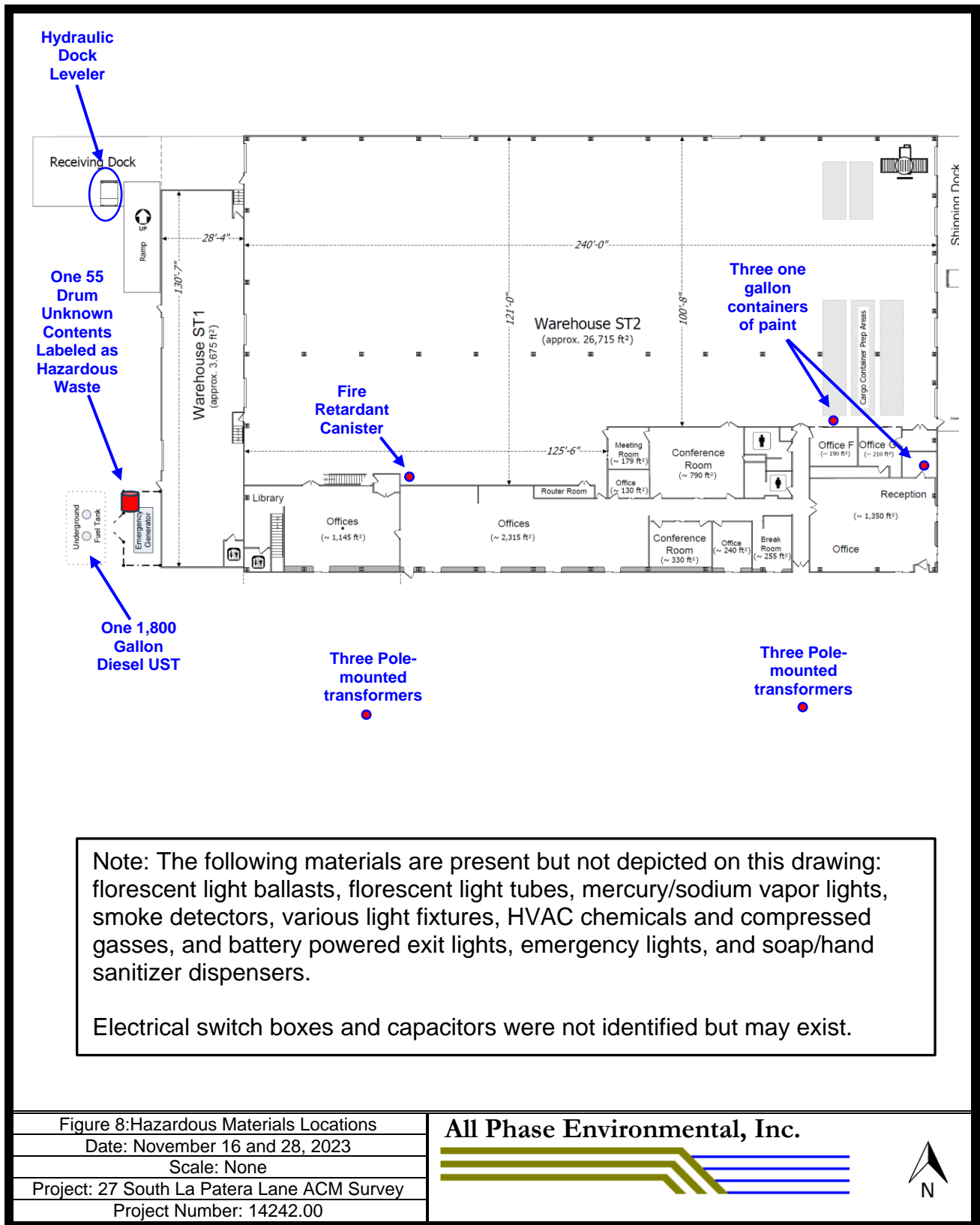


EXHIBIT "I" (Asbestos and HazMat Inspection)



Note: The following materials are present but not depicted on this drawing: florescent light ballasts, florescent light tubes, mercury/sodium vapor lights, smoke detectors, various light fixtures, HVAC chemicals and compressed gasses, and battery powered exit lights, emergency lights, and soap/hand sanitizer dispensers.

Electrical switch boxes and capacitors were not identified but may exist.

Figure 8: Hazardous Materials Locations
 Date: November 16 and 28, 2023
 Scale: None
 Project: 27 South La Patera Lane ACM Survey
 Project Number: 14242.00

All Phase Environmental, Inc.



EXHIBIT "I" (Asbestos and HazMat Inspection)

APPENDIX B

Photographs

Photographs



Asbestos containing black floor mastic and floor tile contaminated with the mastic.



Asbestos containing black floor mastic and carpeting contaminated with the mastic.



Asbestos containing mirror mastic.



Asbestos containing roof tar sealing bolts penetrating the roof.



Asbestos containing transite flue on roof.



1,800 gallon diesel UST.



55 gallon drum of unknown contents labeled as hazardous waste.



Pole-mounted transformers along the south subject property border.



Photographs



Typical battery powered exit sign and emergency lights.



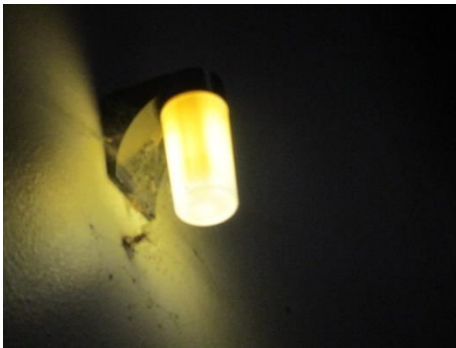
Mercury vapor light in the warehouse.



Mercury, sodium, or halogen light on exterior of building.



Unidentified exterior light type on pole.



Unidentified light type inside the subject property building.



Unidentified light type inside the subject property building.




APPENDIX C

Certifications

State of California
Division of Occupational Safety and Health
Certified Asbestos Consultant

Douglas Bernard Kochanowski
Name



Certification No. 09-2699

Expires on 02/04/24

This certification was issued by the Division of Occupational Safety and Health as authorized by Sections 7180 et seq. of the Business and Professions Code.

San Diego State University

The Trustees of The California State University
upon recommendation of the Faculty
have conferred upon

Douglas Bernard Kochanowski

the Degree of

**Bachelor of Science in Applied Arts and Sciences
Biology**

with all rights, privileges and honors thereto appertaining.

Given at San Diego State University this
nineteenth day of December, nineteen hundred eighty-seven




David A. Clark
Chancellor
The California State University




George Andruszinski
Governor
President of the Board of Trustees


Thomas B. Day
President
San Diego State University

Institute of Hazardous Materials Management

This certifies that

Douglas B. Kochanowski

*has successfully met all the requirements of education,
experience and examination, and is hereby designated a*

Certified Hazardous Materials Manager®



November, 1999
Date of Certification

November 30, 2014
Certification Expires

09970
Credential Number


Executive Director

Valid so long as this credential is renewed according to schedule and is not otherwise revoked.

APPENDIX D

Analytical Laboratory Documentation & Chain of Custody

Certificate of Analysis
PLM Asbestos Identification

tel - 714-607-5227
 free - 855-968-7522
 OCLab@patriotlab.com
 1041 S. Placentia Avenue, Fullerton, CA 92831



All Phase Environmental, Inc.
 8792 Lauder Circle Ste 200
 Huntington Beach, CA 92646

Report Number: 1004483
 Project Number: 14242.00
 Project Name: Goleta Tran Depo
 Project Location: 27 S La Panera Gouta

Date Collected: 11/16/2023
 Date Received: 11/17/2023
 Date Analyzed: 11/27/2023
 Date Reported: 11/27/2023

Collected By: Douglas B Kochanowski
 Claim Number:
 PO Number:
 Number of Samples: 75

Lab/Client ID/Layer	Location	Material Description	Color	Composition (%)
1004483-001A 01-1	NA	Floor Tile	Beige	100% Non-Fibrous Material
Total Asbestos	None Detected			
1004483-001B 01-1	NA	Mastic	Black	97% Non-Fibrous Material
Chrysotile	3 %			
Total Asbestos	3 %			
1004483-001C 01-1	NA	Carpet Glue	Yellow	100% Non-Fibrous Material
Total Asbestos	None Detected			
1004483-002A 01-2	NA	Floor Tile	Beige	100% Non-Fibrous Material
Total Asbestos	None Detected			
1004483-002C 01-2	NA	Carpet Glue	Yellow	100% Non-Fibrous Material
Total Asbestos	None Detected			
1004483-003A 01-3	NA	Floor Tile	Beige	100% Non-Fibrous Material
Total Asbestos	None Detected			

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Lab/Client ID/Layer	Location	Material Description	Color	Composition (%)
1004483-003C 01-3	NA	Carpet Glue	Yellow	100% Non-Fibrous Material
Total Asbestos	None Detected			
1004483-004 02-1	NA	Drywall	White	85% Non-Fibrous Material 15% Cellulose
Total Asbestos	None Detected			
1004483-005 02-2	NA	Drywall	White	85% Non-Fibrous Material 15% Cellulose
Total Asbestos	None Detected			
1004483-006 02-3	NA	Drywall	White	85% Non-Fibrous Material 15% Cellulose
Total Asbestos	None Detected			
1004483-007 03-1	NA	Joint Compound	White	100% Non-Fibrous Material
Total Asbestos	None Detected			
1004483-008 03-2	NA	Joint Compound	White	100% Non-Fibrous Material
Total Asbestos	None Detected			

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Lab/Client ID/Layer	Location	Material Description	Color	Composition (%)
1004483-009 03-3	NA	Joint Compound	White	100% Non-Fibrous Material
Total Asbestos	None Detected			
1004483-010A 04-1	NA	Covebase	Black	100% Non-Fibrous Material
Total Asbestos	None Detected			
1004483-010B 04-1	NA	Mastic	White	100% Non-Fibrous Material
Total Asbestos	None Detected			
1004483-011A 04-2	NA	Covebase	Black	100% Non-Fibrous Material
Total Asbestos	None Detected			
1004483-011B 04-2	NA	Mastic	White	100% Non-Fibrous Material
Total Asbestos	None Detected			
1004483-012A 04-3	NA	Covebase	Black	100% Non-Fibrous Material
Total Asbestos	None Detected			

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Lab/Client ID/Layer	Location	Material Description	Color	Composition (%)
1004483-012B 04-3	NA	Mastic	White	100% Non-Fibrous Material
Total Asbestos	None Detected			
1004483-013 05-1	NA	Ceiling Tile	Beige	65% Non-Fibrous Material 15% Cellulose 20% Glass Fibers
Total Asbestos	None Detected			
1004483-014 05-2	NA	Ceiling Tile	Beige	65% Non-Fibrous Material 15% Cellulose 20% Glass Fibers
Total Asbestos	None Detected			
1004483-015 05-3	NA	Ceiling Tile	Beige	65% Non-Fibrous Material 15% Cellulose 20% Glass Fibers
Total Asbestos	None Detected			
1004483-016A 06-1	NA	Covebase	Brown	100% Non-Fibrous Material
Total Asbestos	None Detected			

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Lab/Client ID/Layer	Location	Material Description	Color	Composition (%)
1004483-016B 06-1	NA	Mastic	White	100% Non-Fibrous Material
Total Asbestos	None Detected			
1004483-017A 06-2	NA	Covebase	Brown	100% Non-Fibrous Material
Total Asbestos	None Detected			
1004483-017B 06-2	NA	Mastic	White	100% Non-Fibrous Material
Total Asbestos	None Detected			
1004483-018A 06-3	NA	Covebase	Brown	100% Non-Fibrous Material
Total Asbestos	None Detected			
1004483-018B 06-3	NA	Mastic	White	100% Non-Fibrous Material
Total Asbestos	None Detected			
1004483-019 07-1	NA	Ceiling Tile	Beige	65% Non-Fibrous Material 15% Cellulose 20% Glass Fibers
Total Asbestos	None Detected			

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Lab/Client ID/Layer	Location	Material Description	Color	Composition (%)
1004483-020 07-2	NA	Ceiling Tile	Beige	65% Non-Fibrous Material 15% Cellulose 20% Glass Fibers
Total Asbestos	None Detected			
1004483-021 07-3	NA	Ceiling Tile	Beige	65% Non-Fibrous Material 15% Cellulose 20% Glass Fibers
Total Asbestos	None Detected			
1004483-022A 08-1	NA	Floor Tile	White	100% Non-Fibrous Material
Total Asbestos	None Detected			
1004483-022B 08-1	NA	Glue	Yellow	100% Non-Fibrous Material
Total Asbestos	None Detected			
1004483-023A 08-2	NA	Floor Tile	White	100% Non-Fibrous Material
Total Asbestos	None Detected			

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 PO Number:
 Number of Samples: 75

Lab/Client ID/Layer	Location	Material Description	Color	Composition (%)
1004483-023B 08-2	NA	Glue	Yellow	100% Non-Fibrous Material
Total Asbestos	None Detected			
1004483-024A 08-3	NA	Floor Tile	White	100% Non-Fibrous Material
Total Asbestos	None Detected			
1004483-024B 08-3	NA	Glue	Yellow	100% Non-Fibrous Material
Total Asbestos	None Detected			
1004483-025A 09-1	NA	Floor Tile	Blue	100% Non-Fibrous Material
Total Asbestos	None Detected			
1004483-025B 09-1	NA	Glue	Yellow	100% Non-Fibrous Material
Total Asbestos	None Detected			
1004483-026A 09-2	NA	Floor Tile	Red	100% Non-Fibrous Material
Total Asbestos	None Detected			

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Lab/Client ID/Layer	Location	Material Description	Color	Composition (%)
1004483-026B 09-2	NA	Glue	Yellow	100% Non-Fibrous Material
Total Asbestos	None Detected			
1004483-027A 09-3	NA	Floor Tile	Red	100% Non-Fibrous Material
Total Asbestos	None Detected			
1004483-027B 09-3	NA	Glue	Yellow	100% Non-Fibrous Material
Total Asbestos	None Detected			
1004483-028 10-1	NA	Mastic	Black	95% Non-Fibrous Material
Chrysotile	5 %			
Total Asbestos	5 %			
1004483-031 11-1	NA	Sink Sound Damper	Black	100% Non-Fibrous Material
Total Asbestos	None Detected			
1004483-032A 12-1	NA	Floor Tile	Tan	100% Non-Fibrous Material
Total Asbestos	None Detected			

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Lab/Client ID/Layer	Location	Material Description	Color	Composition (%)
1004483-032B 12-1	NA	Mastic	Black	95% Non-Fibrous Material
Chrysotile	5 %			
Total Asbestos	5 %			
1004483-032C 12-1	NA	Glue	Yellow	100% Non-Fibrous Material
Total Asbestos	None Detected			
1004483-033A 12-2	NA	Floor Tile	Tan	100% Non-Fibrous Material
Total Asbestos	None Detected			
1004483-033C 12-2	NA	Glue	Yellow	100% Non-Fibrous Material
Total Asbestos	None Detected			
1004483-034A 12-3	NA	Floor Tile	Tan	100% Non-Fibrous Material
Total Asbestos	None Detected			
1004483-034C 12-3	NA	Glue	Yellow	100% Non-Fibrous Material
Total Asbestos	None Detected			

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Collected By: Douglas B Kochanowski
 Claim Number:
 PO Number:
 Number of Samples: 75

Lab/Client ID/Layer	Location	Material Description	Color	Composition (%)
1004483-035A 13-1	NA	Floor Tile	Tan	100% Non-Fibrous Material
Total Asbestos	None Detected			
1004483-035B 13-1	NA	Mastic	Black	95% Non-Fibrous Material
Chrysotile	5 %			
Total Asbestos	5 %			
1004483-035C 13-1	NA	Glue	Yellow	100% Non-Fibrous Material
Total Asbestos	None Detected			
1004483-036A 13-2	NA	Floor Tile	Tan	100% Non-Fibrous Material
Total Asbestos	None Detected			
1004483-036C 13-2	NA	Glue	Yellow	100% Non-Fibrous Material
Total Asbestos	None Detected			
1004483-037A 13-3	NA	Floor Tile	Tan	100% Non-Fibrous Material
Total Asbestos	None Detected			

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 Claim Number:
 PO Number:
 Number of Samples: 75

Lab/Client ID/Layer	Location	Material Description	Color	Composition (%)
1004483-037C 13-3	NA	Glue	Yellow	100% Non-Fibrous Material
Total Asbestos	None Detected			
1004483-038 14-1	NA	Mirror Mastic	Black	95% Non-Fibrous Material
Chrysotile	5 %			
Total Asbestos	5 %			
1004483-041A 15-1	NA	Covebase	Beige	100% Non-Fibrous Material
Total Asbestos	None Detected			
1004483-041B 15-1	NA	Mastic	White	100% Non-Fibrous Material
Total Asbestos	None Detected			
1004483-042A 15-2	NA	Covebase	Beige	100% Non-Fibrous Material
Total Asbestos	None Detected			
1004483-042B 15-2	NA	Mastic	White	100% Non-Fibrous Material
Total Asbestos	None Detected			

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Lab/Client ID/Layer	Location	Material Description	Color	Composition (%)
1004483-043A 15-3	NA	Covebase	Beige	100% Non-Fibrous Material
Total Asbestos	None Detected			
1004483-043B 15-3	NA	Mastic	White	100% Non-Fibrous Material
Total Asbestos	None Detected			
1004483-044A 16-1	NA	Linoleum	Beige	70% Non-Fibrous Material 25% Cellulose 5% Glass Fibers
Total Asbestos	None Detected			
1004483-044B 16-1	NA	Glue	Yellow	100% Non-Fibrous Material
Total Asbestos	None Detected			
1004483-045A 16-2	NA	Linoleum	Beige	70% Non-Fibrous Material 25% Cellulose 5% Glass Fibers
Total Asbestos	None Detected			
1004483-045B 16-2	NA	Glue	Yellow	100% Non-Fibrous Material
Total Asbestos	None Detected			

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Lab/Client ID/Layer	Location	Material Description	Color	Composition (%)
1004483-046A 16-3	NA	Linoleum	Beige	70% Non-Fibrous Material 25% Cellulose 5% Glass Fibers
Total Asbestos	None Detected			
1004483-046B 16-3	NA	Glue	Yellow	100% Non-Fibrous Material
Total Asbestos	None Detected			
1004483-047 17-1	NA	Air Duct Sealant	Grey	100% Non-Fibrous Material
Total Asbestos	None Detected			
1004483-048 17-2	NA	Air Duct Sealant	Grey	100% Non-Fibrous Material
Total Asbestos	None Detected			
1004483-049 17-3	NA	Air Duct Sealant	Grey	100% Non-Fibrous Material
Total Asbestos	None Detected			

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Lab/Client ID/Layer	Location	Material Description	Color	Composition (%)
1004483-001B	Stopped at first positive.			
1004483-028	Stopped at first positive.			
1004483-032B	Stopped at first positive.			
1004483-035B	Stopped at first positive.			
1004483-038	Stopped at first positive.			

Jorge Castillo - Analyst

Kwin Sheena Legaspi - Lab Manager - Approved By

Bulk sample(s) submitted was (were) analyzed in accordance with the procedure outlined in the US Federal Register 40 CFR Appendix E to Subpart E of Part 763; EPA-600/R-93/116 (Method for Determination of Asbestos in Building Materials), and EPA-600/M4-82-020 (US EPA Interim Method for the Determination of Asbestos in Bulk Insulation Samples). Samples were analyzed using Calibrated Visual Estimations (CVES); therefore, results may not be reliable for samples of low asbestos concentration levels. Samples of wall systems containing discrete and separable layers are analyzed separately and reported as composite unless specifically requested by the customer to report analytical results for individual layers. This report applies only to the items tested. Results are representative of the samples submitted and may not represent the entire material from which the samples were collected. "None Detected" means that no asbestos was observed in the sample. "<1%" (less than one percent) or Trace means that asbestos was observed in the sample but the concentration is below the quantifiable level of 1%. This report was issued by a NIST/NVLAP (Lab Code 200358-0) and CA Water Board ELAP (Cert. No. 2540) accredited laboratory and may not be reproduced, except in full without the expressed written consent of Patriot Environmental Laboratory Services, Inc. This report may not be used to claim product certification, approval or endorsement by NIST, NVLAP, CA-ELAP or any government agency.

ASB_Rep_8.23

EXHIBIT "I" (Asbestos and HazMat Inspection)

Lab Use Only

Report Number: 1004483

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1041 S. Placentia Avenue, Fullerton, CA 92831

PATRIOT LAB

Referral Source: _____

CHAIN OF CUSTODY

Client: All Phase Environmental, Inc.		Project No.: 14242.00			
Contact Person: Doug Kochanowski		Project Name: GOLETA TRAIN DEPO			
Client Address: 8792 Lauder Circle, #200 Huntington Beach, CA 92646		Project Location: 27. S. LA PALMERA, GOLETA			
Contact Phone: 714-719-0714		Sample(s) Collected By: D. Kochanowski			
Contact Fax: 714-593-0012		Authorized by: _____ Claim #: _____ PO #: _____			
How do you want your report? (Circle) <input checked="" type="radio"/> Max <input type="radio"/> Fax <input type="radio"/> Web <input type="radio"/> E-mail: Doug@PhaseOneESA.com					
Special Instructions: Stop at first positive.					
Analysis Requested					
Turnaround Time (business hours/days) 1 HR <input type="checkbox"/> 3 HR <input type="checkbox"/> 6 HR <input type="checkbox"/> 24 HR <input type="checkbox"/> 48 HR <input type="checkbox"/> 72 HR <input type="checkbox"/> 5 DAY <input checked="" type="checkbox"/> Other (specify) _____					
<small>Notes: 3HR TAT available until 2PM. Viable fungi samples require 5-7 days turnaround minimum. Bacterial cultures require minimum 30hr TAT. STLC/CAL-WET and TCLP minimum TAT are 72hr.</small>					
Asbestos PLM (bulk asbestos) EPA 600/M4-82-020 / EPA 800/R-93/116 <input checked="" type="checkbox"/> Point Count 400 <input type="checkbox"/> Point Count 1000 <input type="checkbox"/> CARB 435 <input type="checkbox"/> Gravimetric Reduction (Gravimetric Reduction Requires Minimum 10hr TAT) <input type="checkbox"/>					
Microbiology					
Fungi Viable (Colony ID & Enumeration) Swab/Bulk <input type="checkbox"/> Non-Viable Surface Tap/Lift/Swab/Bulk, SOP IV.4.3m/4m <input type="checkbox"/>					
Bacteria (Samples must be received by the laboratory within 24hrs of collection or results may be invalid)					
Total Coliform and E. coli - Surfaces, Swabs, and Bulk Solids, Liquids (non-potable, non-wastewater) - Presence / Absence <input type="checkbox"/>					
Chemistry					
Lead by Flame AA - EPA 3050B/7420mod, NIOSH 7082mod: Paint <input type="checkbox"/> Dust Wipe <input type="checkbox"/> Water (non-potable) <input type="checkbox"/> Soils/Solids <input type="checkbox"/>					
Lead by Waste Profile (by Flame AA) 1: TTLC Total Threshold by EPA 3050B mod <input type="checkbox"/> 2: STLC/CAL WET Title 22 CCR Ch11 Article 5, App 2 <input type="checkbox"/> 3: TCLP EPA 1311 <input type="checkbox"/> Note: Please provide at approx. 200 grams (approx. 1/2 lb.) of sample for complete profile. Check here to perform all test necessary for disposal <input type="checkbox"/>					
Rotometer Calibration <input type="checkbox"/>		pH testing (soils, misc. solids, & liquids) EPA 9045 <input type="checkbox"/>			
Client Sample ID	Sample Type	Date Sampled	Location Sampled	Description of Sample (Material type, dimensions, etc.)	
01-1	BULK	11/16/23	FLOOR TILE, MASTIC, CARPET GLUE		
01-2	↓	↓	↓		
01-3	↓	↓	↓		
02-1	↓	↓	DAYWALL		
02-2	↓	↓	↓		
02-3	↓	↓	↓		
Relinquished By: (Print) Douglas B. Kochanowski		Sign: [Signature]		Date: 11/17/23	Time: 1:00
Received By: (Print) Malia Pelgado		Sign: [Signature]		Date: 11-17-23	Time: 1:00pm
Relinquished By: (Print)		Sign:		Date:	Time:
Received By: (Print)		Sign:		Date:	Time:
Method of Shipment / Preservation During Shipment: Hand FedEx 2295-3109-3			Condition of Samples: Acceptable: YES / NO		
Comments:					

11/25 @ 12:30pm

Note: Patriot's holding time for all samples submitted is 30 days for solid samples, 7 days for digests, and immediate for lead in air after analytical results are reported. Unless customer provides written instructions to extend holding time, samples will be disposed of in accordance with local, state and federal laws.

Lab Use Only
 Report Number: 1004483

tel: 714-607-5227
 free: 855-968-7522
 OCLab@patriotlab.com
 10415 Placenda Avenue, Fullerton, CA 92831

PATRIOT LAB

Referral Source: _____

Project Name: _____

Project Number: _____

Client Sample ID	Sample Type	Date Sampled	Location Sampled	Description of Sample (Material type, dimensions, etc.)
03-1	BULK	11/16/23	JOINT COMPOUND	
03-2			↓	
03-3			↓	
04-1			COVERBASE + MASTIC	
04-2			↓	
04-3			↓	
05-1			CEILING TILE	
05-2			↓	
05-3			↓	
06-1			COVERBASE + MASTIC	
06-2			↓	
06-3			↓	
07-1			CEILING TILE	
07-2			↓	
07-3			↓	
08-1			FLOOR TILE + GWF	
08-2			↓	
08-3			↓	

Relinquished By: (Print) Douglas B. Kochanowski	Sign:	Date: 11/17/23	Time: 1:10
Received By: (Print) Malia Delgado	Sign:	Date: 11.17.23	Time: 1:00 pm
Relinquished By: (Print)	Sign:	Date:	Time:
Received By: (Print)	Sign:	Date:	Time:

Note: Patriot's holding time for all samples submitted is 30 days for solid samples, 7 days for digests, and immediate for lead in air after analytical results are reported. Unless customer provides written instructions to extend holding time, samples will be disposed of in accordance with local, state and federal laws.

Lab Use Only
 Report Number: 1004483

tel: 714-607-5227
 free: 855-968-7522
 OCLab@patriotlab.com
 1041 S. Placentia Avenue, Fullerton, CA 92831



Referral Source: _____

Project Name: _____

Project Number: _____

Client Sample ID	Sample Type	Date Sampled	Location Sampled	Description of Sample (Material type, dimensions, etc.)
09-1	Bulk	11/16/23	FLOOR TILE + GLUE	
09-2			↓	
09-3			↓	
10-1			BLACK MASTIC	
10-2			↓	
10-3			↓	
11-1			SINK SOUND DAMPER	
12-1			FLOOR TILE + MASTIC	
12-2			↓	
12-3			↓	
13-1			FLOOR TILE + MASTIC	
13-2			↓	
13-3			↓	
14-1			MIRROR MASTIC	
14-2			↓	
14-3			↓	
15-1			COVERBASE + MASTIC	
15-2			↓	

Relinquished By: (Print) Douglas B. Kochanowski Sign: *[Signature]* Date: 11/17/23 Time: 1:00
 Received By: (Print) Malia Delgado Sign: *[Signature]* Date: 11.17.23 Time: 1:00pm
 Relinquished By: (Print) Sign: Date: Time:
 Received By: (Print) Sign: Date: Time:

Note: Patriot's holding time for all samples submitted is 30 days for solid samples, 7 days for digests, and immediate for lead in air after analytical results are reported. Unless customer provides written instructions to extend holding time, samples will be disposed of in accordance with local, state and federal laws.

Lab Use Only
Report Number: 1004483

tel - 714-607-5227
free - 855-968-7522
OC Lab@patriotlab.com
1041 S. Placentia Ave, Fullerton, CA 92833

PATRIOT LAB

Referral Source: _____

Project Name: _____

Project Number: _____

Client Sample ID	Sample Type	Date Sampled	Location Sampled	Description of Sample (Material type, dimensions, etc.)
15-3	BULK	11/16/23	COVERBASE + MASTIC	
16-1	↓	↓	LINOLEUM + GLUE	
16-2				
16-3			↓	
17-1	↓	↓	AIR DUCT SEALANT	
17-2				
17-3			↓	

Relinquished By: (Print) Douglas B. Kochanowski Sign: _____ Date: 11/17/23 Time: 1:00
 Received By: (Print) Malia Delgado Sign: MD Date: 11-17-23 Time: 1:00 pm
 Relinquished By: (Print) Sign: Date: Time:
 Received By: (Print) Sign: Date: Time:

Note: Patriot's holding time for all samples submitted is 30 days for solid samples, 7 days for digests, and immediate for lead in air after analytical results are reported. Unless customer provides written instructions to extend holding time, samples will be disposed of in accordance with local, state and federal laws.

Certificate of Analysis
PLM Asbestos Identification

tel - 714-607-5227
 free - 855-968-7522
 OCLab@patriotlab.com
 1041 S. Placentia Avenue, Fullerton, CA 92831



All Phase Environmental, Inc.
 8792 Lauder Circle Ste 200
 Huntington Beach, CA 92646

Report Number: 1006592
 Project Number: 14242.00
 Project Name: Colita Train Dept
 Project Location: 27 S Patera Lane

Date Collected:
 Date Received: 12/5/2023
 Date Analyzed: 12/6/2023
 Date Reported: 12/6/2023

Collected By:
 Claim Number:
 PO Number:
 Number of Samples: 11

Lab/Client ID/Layer	Location	Material Description	Color	Composition (%)
1006592-001 18-1	NA	Roofing	White Yellow	100% Non-Fibrous Material
Total Asbestos	None Detected			
1006592-002 18-2	NA	Roofing	White Yellow	100% Non-Fibrous Material
Total Asbestos	None Detected			
1006592-003 18-3	NA	Roofing	White Yellow	100% Non-Fibrous Material
Total Asbestos	None Detected			
1006592-004 19-1	NA	Roof Tar	Grey Black	95% Non-Fibrous Material
Chrysotile	5 %			
Total Asbestos	5 %			
1006592-007 20-1	NA	Roof Sealant at Fiberglass	White	90% Non-Fibrous Material 10% Glass Fibers
Total Asbestos	None Detected			

EXHIBIT "I" (Asbestos and HazMat Inspection)

Certificate of Analysis
PLM Asbestos Identification

tel - 714-607-5227
 free - 855-968-7522
 OCLab@patriotlab.com
 1041 S. Placentia Avenue, Fullerton, CA 92831



All Phase Environmental, Inc.
 8792 Lauder Circle Ste 200
 Huntington Beach, CA 92646

Report Number: 1006592
 Project Number: 14242.00
 Project Name: Colita Train Dept
 Project Location: 27 S Patera Lane

Date Collected:
 Date Received: 12/5/2023
 Date Analyzed: 12/6/2023
 Date Reported: 12/6/2023

Collected By:
 Claim Number:
 PO Number:
 Number of Samples: 11

Lab/Client ID/Layer	Location	Material Description	Color	Composition (%)
1006592-008 20-2	NA	Roof Sealant at Fiberglass	White Black	85% Non- Fibrous Material 10% Glass Fibers 5% Cellulose
Total Asbestos	None Detected			
1006592-009 20-3	NA	Roof Sealant at Fiberglass	White	90% Non- Fibrous Material 10% Glass Fibers
Total Asbestos	None Detected			
1006592-010 21-1	NA	Roof Tar	Black	95% Non- Fibrous Material 5% Cellulose
Total Asbestos	None Detected			
1006592-011 21-2	NA	Roof Tar	White Black	95% Non- Fibrous Material 5% Cellulose
Total Asbestos	None Detected			
1006592-012 21-3	NA	Roof Tar	White Black	95% Non- Fibrous Material 5% Cellulose
Total Asbestos	None Detected			

EXHIBIT "I" (Asbestos and HazMat Inspection)

Certificate of Analysis
PLM Asbestos Identification

tel - 714-607-5227
 free - 855-968-7522
 OCLab@patriotlab.com
 1041 S. Placentia Avenue, Fullerton, CA 92831



All Phase Environmental, Inc.
 8792 Lauder Circle Ste 200
 Huntington Beach, CA 92646

Report Number: 1006592
 Project Number: 14242.00
 Project Name: Colita Train Dept
 Project Location: 27 S Patera Lane

Date Collected:
 Date Received: 12/5/2023
 Date Analyzed: 12/6/2023
 Date Reported: 12/6/2023

Collected By:
 Claim Number:
 PO Number:
 Number of Samples: 11

Lab/Client ID/Layer	Location	Material Description	Color	Composition (%)
1006592-013 22-1	NA	Transite Vent / Flue	Blue Beige Grey	87% Non-Fibrous Material
Chrysotile	10 %			
Crocidolite	3 %			
Total Asbestos	13 %			

1006592-004 Stopped at first positive.

Jose Quinones - Analyst

Kwin Sheena Legaspi - Lab Manager - Approved By

Bulk sample(s) submitted was (were) analyzed in accordance with the procedure outlined in the US Federal Register 40 CFR Appendix E to Subpart E of Part 763; EPA-600/R-93/116 (Method for Determination of Asbestos in Building Materials), and EPA-600/M4-82-020 (US EPA Interim Method for the Determination of Asbestos in Bulk Insulation Samples). Samples were analyzed using Calibrated Visual Estimations (CVES); therefore, results may not be reliable for samples of low asbestos concentration levels. Samples of wall systems containing discrete and separable layers are analyzed separately and reported as composite unless specifically requested by the customer to report analytical results for individual layers. This report applies only to the items tested. Results are representative of the samples submitted and may not represent the entire material from which the samples were collected. "None Detected" means that no asbestos was observed in the sample. "<1%" (less than one percent) or Trace means that asbestos was observed in the sample but the concentration is below the quantifiable level of 1%. This report was issued by a NIST/NVLAP (Lab Code 200358-0) and CA Water Board ELAP (Cert. No. 2540) accredited laboratory and may not be reproduced, except in full without the expressed written consent of Patriot Environmental Laboratory Services, Inc. This report may not be used to claim product certification, approval or endorsement by NIST, NVLAP, CA-ELAP or any government agency.

ASB_Rep_8.23

EXHIBIT "I" (Asbestos and HazMat Inspection)

REFERRAL SOURCE

REPORT NUMBER (Lab Use Only)
1006592

PATRIOT LAB

FULLERTON | LOS ANGELES | SAN DIEGO | SAN JOSE
 Tel: (888)743-0998 Email: laboratory@patriotlab.com

12/6 @ 1:10

PATRIOT LAB - CHAIN OF CUSTODY

COMPANY INFORMATION		PROJECT INFORMATION	
Company Name:	ALL PHASE ENVIRONMENTAL	Project No.:	14242.00 PO#:
Contact Person:	DOUG HOCHMANOWSKI	Project Name:	COLITA TRAIN DEPOT
Company Address:	2792 LAUREL CIR. H.B. CA 92646	Project Location:	27. S. POTERA LANE
Contact Phone:	714-719-0714	Sample(s) Collected By:	D. Hochmanowski Date: 11/29/23
Email(s) For Report:	DOUG@PHASEONEESA.COM	Special Instructions:	STOP AT 1ST POSITIVE
Turnaround Time (Business Hours/Days)	<input type="checkbox"/> 1 HR <input type="checkbox"/> 3 HR <input type="checkbox"/> 6 HR <input type="checkbox"/> 24 HR <input type="checkbox"/> 48 HR <input type="checkbox"/> 72 HR <input checked="" type="checkbox"/> 5 DAY		

ANALYSIS REQUESTED			
ASBESTOS	<input checked="" type="checkbox"/> PLM (Bulk Asbestos) EPA 600/M4-82-020 EPA 600 / R-93 / 116	<input type="checkbox"/> PLM POINT COUNT 400	MICROBIOLOGY
	<input type="checkbox"/> PCM (Fiber Count) NIOSH 7400	<input type="checkbox"/> PLM POINT COUNT 1000 <input type="checkbox"/> GRAVIMETRIC REDUCTION	
			FUNGI <input type="checkbox"/> Viable (Colony ID & Enumeration) <input type="checkbox"/> SWAB/BULK Non-Viable Surface <input type="checkbox"/> TAPE LIFT/SWAB/BULK <input type="checkbox"/> AIR SPORE TRAP
			BACTERIA <input type="checkbox"/> PRESENCE/ABSENCE Total Coliform & E.coli - Surfaces, Swabs, and Bulk Solids, Liquids (non-potable, non-wastewater)

CHEMISTRY

LEAD BY FLAME AA - EPA 3050B/7420mod, NIOSH 7082mod

PAINT DUST WIPE SOILS/SOLIDS AIR WATER (non-potable)

LEAD WASTE PROFILE (by Flame AA) Check here to perform ALL THREE tests necessary for disposal (5-7 Days TAT)

TTLC ONLY (Total Threshold by EPA 3050B mod) STLC/CAL WET ONLY (CCR Ch11, Article 5, App II) TCLP ONLY (EPA 1331)

(NOTE: Please provide approx. 200 grams (approx. 1/8 lb.) of sample for complete profile)

ROTOMETER CALIBRATION Total Rotometers: pH TESTING (Soils, solids, liquids, misc.) EPA 9045

Sample ID	Sample Type	Location Sampled	Description of Sample (Material Type, Dimensions, etc.)	(FOR AIR SAMPLES ONLY!)				
				Start Time	Stop Time	Total Min.	Avg. Flow Rate	Total Vol.
01/1 18-1	Bulk		ROOFING					
01/2 18-2			↓					
01/3 18-3			↓					
02/1 19-1			ROOF TAR					
02/2 19-2			↓					
02/3 19-3			↓					

Relinquished By:	(Print) D. Hochmanowski (Sign) <i>[Signature]</i> (Date) 11/29/23 (Time) 12:10	Relinquished By:	(Print) _____ (Sign) _____ (Date) _____ (Time) _____
Received By:	(Print) Kathryn Medina KM (Sign) <i>[Signature]</i> (Date) 12/29/23 (Time) 12:10	Received By:	(Print) _____ (Sign) _____ (Date) _____ (Time) _____
Method of Shipment / Preservation During Shipment: None		Condition of Samples: Acceptable - YES <input checked="" type="radio"/> / NO <input type="radio"/> Comments:	

Lab Use Only
 Report Number: 1006592

tel - 714-607-5227
 free - 855-968-7522
 OCLab@patriotlab.com
 1041 S. Placentia Avenue, Fullerton, CA 92831

PATRIOT LAB

Referral Source: _____

Project Name: GOLITA TRAIN STATION

Project Number: 14242.00

Client Sample ID	Sample Type	Date Sampled	Location Sampled	Description of Sample (Material type, dimensions, etc.)
20-1	BULK	11/28/23		ROOF SEALANT AT FIBERGLASS
20-2				↓
20-3				
21-1				
21-2				ROOF TOR
21-3				↓
22-1				

Relinquished By: (Print) Douglas B. Kochanowski	Sign: <u>[Signature]</u>	Date: <u>11/29/23</u>	Time: <u>12:10</u>
Received By: (Print) <u>Kathryn Medina</u>	Sign: <u>[Signature]</u>	Date: <u>11/29/23</u>	Time: <u>12:10</u>
Relinquished By: (Print)	Sign:	Date:	Time:
Received By: (Print)	Sign:	Date:	Time:

Note: Patriot's holding time for all samples submitted is 30 days for solid samples, 7 days for digests, and immediate for lead in air after analytical results are reported. Unless customer provides written instructions to extend holding time, samples will be disposed of in accordance with local, state and federal laws.

EXHIBIT J

LEAD-BASED PAINT SURVEY REPORT

PREPARED BY ALL PHASE ENVIRONMENTAL, INC.

DATED DECEMBER 11, 2023

All Phase Environmental, Inc.



Lead-Based Paint Survey

**Goleta Train Depot
27 South La Patera Lane
Goleta, California, 93117**



November 30, 2023

Prepared for:

**City of Goleta
City Hall - 130 Cremona Drive, Suite Building
Goleta, California 93117**

Prepared by:

**All Phase Environmental, Inc.
8792 Lauder Circle, Suite 200
Huntington Beach, California 92646
(800) 567-7729**

www.PhaseOneESA.com

EXHIBIT "J" (Lead-Based Paint Survey)
APEI Project No. 14242.00

INDEX

1.0	SUMMARY	1
2.0	BUILDING DESCRIPTION	1
3.0	LEAD CONTAINING XRF RESULTS	2
4.0	SUMMARY AND RECOMMENDATIONS.....	2
5.0	ENVIRONMENTAL PROFESSIONALS' SIGNATURES	3
6.0	QUALIFICATIONS OF ENVIRONMENTAL PROFESSIONALS	4
7.0	LIST OF APPENDIX SECTIONS.....	6

LIST OF APPENDIX SECTIONS

- APPENDIX A Certifications**
- APPENDIX B XRF Reading Results**
- APPENDIX C Drawings**
- APPENDIX D Photographs**

1.0 SUMMARY

At the request of the City of Goleta, All Phase Environmental, Inc. (APEI) performed a survey for lead-based paint (LBP) of the industrial building located at 27 South La Patera Lane, Goleta, California 93117, hereinafter referred to as the "Building." Dr. Zainul Abedin, an accredited lead inspector, conducted the testing on November 16, 2023, using a RMD XRF instrument under EPA guidelines for a lead inspection.

As defined in U.S. Department of Housing and Urban Development (HUD) regulation 24 CFR 965.706@ (53FR 20803, June 6, 1988), the action level is a lead concentration at or above 0.7 mg/cm² measured by the XRF instrument in Santa Barbara County. The XRF instrument displays the lead concentration in mg/cm² when its scanner was opened against the paint surfaces by pressing the shutter. Shot number, sample location, component, substrate, condition, and test results are recorded for each XRF sample taken.

In general, the interior building components and paint surfaces observed during the inspection showed no deterioration, missing components, or moisture damage. All interior and exterior doors, windows, closets, cabinets, walls, and other miscellaneous components had intact paint surfaces.

Based on XRF measurements, lead-based paint above the regulatory action level was not detected on painted interior walls, doors and windows and other components in the office rooms and warehouse, and in all exterior paint components.

Based on XRF measurements, lead-based paint above the regulatory action level was detected only in the interior ceramic wall trim in the men's and women's bathrooms in the office area. There was approximately 120 square feet of this material. Appendix C contains a drawing of the location of this material and Appendix D contains photographs of the material.

2.0 BUILDING DESCRIPTION

At the time of the asbestos survey on October 17, 2023, the subject property was developed with an office and warehouse building. The building was constructed in approximately 1967 and was approximately 30,000 square feet. The building has undergone several renovations since its original construction. The building is a one-story structure with a small mezzanine office and storage space in the northwest corner of the building. The building was subdivided into offices, bathrooms, common areas, meeting rooms, open office spaces, storage rooms, break room, and a large open warehouse area with a smaller warehouse area on the north end. Finishing materials included: drywall, drop-ceiling tiles, finished concrete slab, floor tile, linoleum, and carpeting. The building consisted of a steel frame structure with corrugated sheet metal walls and roof. Gas and electrical HVAC units provided heating and cooling to the office areas of the building.

3.0 LEAD CONTAINING XRF RESULTS

The LBP survey was performed in preparation for the demolition of the Building. Dr. Zainul Abedin, an accredited lead inspector, conducted the testing on November 16, 2023, using a RMD XRF instrument under EPA guidelines for a lead inspection.

As defined in U.S. Department of Housing and Urban Development (HUD) regulation 24 CFR 965.706@ (53FR 20803, June 6, 1988), the action level is a lead concentration at or above 0.7 mg/cm² measured by the XRF instrument in Santa Barbara County. The XRF instrument displays the lead concentration in mg/cm² when its scanner was opened against the paint surfaces by pressing the shutter. Shot number, sample location, component, substrate, condition, and test results are recorded for each XRF sample taken.

Lead-based paint above the regulatory action level was detected only in the interior ceramic wall trim in the men's and women's bathrooms in the office area. There is approximately 120 square feet of this material. Appendix C contains a drawing of the location of this material and Appendix D contains photographs of the material. The following lists detail the XRF readings that were identified as lead containing. Appendix B contains the complete list of all XRF results both positive and negative.

LEAD CONTAINING XRF RESULTS

Shot	Location	Component	Substrate	Condition	Results mg/cm²
120	North	Wall Trim	Ceramic Tiles	Intact	>9.9
124	East	Wall Trim	Ceramic Tiles	Intact	>9.9
131	South	Wall Trim	Ceramic Tiles	Intact	>9.9
147	South	Wall Trim	Ceramic Tiles	Intact	>9.9
152	West	Wall Trim	Ceramic Tiles	Intact	>9.9

4.0 SUMMARY AND RECOMMENDATIONS

We recommend the following actions at the Building based on our findings and observation.

- The only identified lead based paint component was the lead-laden ceramic wall trim in the office area men's and women's bathrooms. There was approximately 120 square feet of this material on several of the walls in these rooms.
- The lead-laden ceramic wall trim in bathrooms were non-friction surfaces and warrant no immediate removal in its current intact condition. Occupants should be advised of the presence of lead in this material. This component should be removed by a California licensed lead abatement contractor prior to the planned demolition of the Building. It is advised that the removal of the lead-laden ceramic tile be added to the scope of work for the asbestos abatement since most contractors who remove asbestos also remove lead-based paint components.

- Until the lead-laden ceramic wall trim is removed, it is advised that it be maintained in good condition. Never sand, dry scrape, power wash, or sandblast any painted surfaces unless they have been tested and have no lead. Lead dust from the paint can spread and poison your family, workers, and neighbors. In the human body, low levels of lead damage the brain and nerves in fetuses and young children, resulting in learning deficits and lower IQ.
- Because of the scattered testing protocol and the consistent and definable nature of the results, untested components are assumed to follow the same pattern.

APEI believed that all areas had been assessed. However, it is possible that there had been hidden inaccessible areas that were not accessed. The conclusions and recommendations describe only the conditions present at the time of our survey in areas that were observed. This survey was performed following the standards of care and diligence usually practiced by recognized consulting firms in performing services of a similar nature.

5.0 ENVIRONMENTAL PROFESSIONALS' SIGNATURES

The undersigned certifies that the professional services have been conducted, our findings obtained, and our recommendations have been prepared in accordance with customary principles and practices in the field of environmental science and engineering. APEI has acted in good faith and has no relationship with sellers, buyers or agents of the subject property. There have been no conflicts of interest involved in the drawing of conclusions, which have been based solely on materials reviewed and visual inspections conducted by APEI.

Prepared by:



Zainul Abedin, PhD, REA, I/M -1151
Project Manager

Reviewed by:



Douglas B. Kochanowski, CHMM, CAC
Environmental Professional,
Senior Environmental Scientist, and Biologist

6.0 QUALIFICATIONS OF ENVIRONMENTAL PROFESSIONALS

Mr. Zainul Abedin
Senior Project Manager

Summary

Mr. Abedin is a California Department of Public Health (CDPH) certified Lead Inspector/Assessor who will be performing the lead-based paint inspection. He is proficient and licensed to use an X-ray fluorescence (XRF) detector which will be used to perform the lead-based paint survey for the City.

Education

Ph.D. Civil Engineering, Kensington University, Glendale, CA. 1993
M.S. Environmental Engineering, Washington State University, Pullman, WA. 1988
M.Sc. Water Resources, University of Alberta, Edmonton, Canada, 1980
M.Eng. Civil, Memorial University of Newfoundland, St. John, Nfld., Canada, 1978
B.Eng. Ag. Engineering, Punjab Agricultural University, Ludhiana, India, 1976

Specific Qualification For This Project

Mr. Abedin is a 40 plus years veteran in the environmental site assessment & remediation business with an emphasis on lead-based paint inspections. He also has extensive experience with lead management monitoring, and remediation.

Current Certifications and Registrations

California Department of Public Health (CDPH) certified Lead Project Manager, Inspector/Assessor, and Supervisor.

Work Experience

Mr. Abedin has provided lead-based testing throughout California at hundreds of locations including shopping plazas, residences, industrial sites, and office buildings.

Doug Kochanowski
Environmental Professional, Senior Environmental Scientist, and Biologist
CHMM (#9970), CAC (#99-2699)

Professional Experience:

Mr. Kochanowski has been performing Phase I Environmental Site Assessments (ESAs) since 1988 and is considered an industry expert. The environmental consulting profession was in its infancy when he performed his first ESA. Over the past three decades, Mr. Kochanowski has performed ESAs on almost every type of real property in over ten different states and in Europe. This includes military bases, medical facilities, high-rise office buildings, learning institutions, factories, shopping malls and plazas, gasoline stations, industrial parks, manufacturing facilities, vacant land, agricultural land, housing tracts, multifamily developments, and government facilities. His wide array of experience has made him a key component for conducting complex ESAs and his expertise is sought after by a wide variety of clients and other consulting firms. His practical approach and comprehensive knowledge of the ASTM standards result in ESAs that are accurate, comprehensive, and address environmental issues with a common-sense approach.

Mr. Kochanowski's environmental portfolio also includes experience conducting a variety of additional services that include soil, groundwater, and soil vapor testing, modeling, landfill leachate testing, indoor air sampling, lead-based paint sampling, and conducting human health risk assessments. He has managed several large IDT contracts for the European District Corps of Engineers, working at over twenty bases in Germany and Spain. Projects included remediation design, soil and groundwater sampling, landfill leachate testing, asbestos surveys, air monitoring, and radon testing.

For as long as Mr. Kochanowski has been writing ESAs he has also been performing asbestos testing and consulting. He is a California Certified Asbestos Consultant and is NIOSH 582 Certified to analyze Polarized Light Microscopy (PLM) samples. Mr. Kochanowski performs asbestos surveys, develops removal specifications and drawings, writes Operations and Management (O&M) Plans, and conducts contractor observation and air monitoring during abatement projects. His asbestos experience includes schools, nuclear facilities, universities, airports, hospitals, military bases, shopping malls, high-rise office buildings, industrial complexes, port facilities, apartments and single-family homes. Mr. Kochanowski was the Manager and Facility Security Officer (FSO) for a high-profile asbestos survey, air monitoring and abatement project of the White House, Washington D.C. His AHERA survey experience includes inspecting over eight million square feet of building space for school districts in California, Kansas, New Mexico and Tennessee.

Mr. Kochanowski has teaching experience including conducting OSHA 1910.120 HAZWOPR, Confined Space Entry, and asbestos awareness classes.

He has served as Secretary on the Board of Directors and was a founding father for the SoCal ACHMM chapter. In the past, he has served on the technical committee for a Local Emergency Planning Commission (LEPC) and was elected Secretary on the Board of Directors for the Rhine-Main Post of the Society of American Military Engineers (SAME).

Education:

Bachelor of Science, Biology, San Diego State University, 1987.
Continuing Education; Strategies for Conducting Meaningful Microbial IAQ Investigations/American Indoor Air Quality Council

Registrations and Certifications:

CHMM, Master Level; Secretary of the SoCal ACHMM Chapter
California Certified Asbestos Consultant (#09-2699)
NIOSH 582 Accredited Sampling and Evaluation Airborne Asbestos
Certified, OSHA 40Hr Trained 1910.120/Site Supervisor
Certified TRGS 519 Under German Hazardous Materials Regulations
ASHERA Certified Asbestos Inspector, Management Planner, Designer, and Abatement Supervisor
Certified Radiation Worker
Confined Space Entry Certified

7.0 LIST OF APPENDIX SECTIONS

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APPENDIX A
Certifications



STATE OF CALIFORNIA
DEPARTMENT OF PUBLIC HEALTH



LEAD-RELATED CONSTRUCTION CERTIFICATE

INDIVIDUAL:



Zainul Abedin

CERTIFICATE TYPE:

- Lead Project Monitor
- Lead Inspector/Assessor
- Lead Supervisor

NUMBER:

- LRC-00004480
- LRC-00004479
- LRC-00004478

EXPIRATION DATE:

- 12/15/2023
- 12/15/2023
- 12/15/2023

Disclaimer: This document alone should not be relied upon to confirm certification status. Compare the individual's photo and name to another valid form of government issued photo identification. Verify the individual's certification status by searching for Lead-Related Construction Professionals at www.cdph.ca.gov/programs/clppb or calling (800) 597-LEAD



EXHIBIT "J" (Lead-Based Paint Survey)



APPENDIX B

All XRF Reading Results

Date: November 16, 2023

Interior XRF Lead Results

<u>Shot</u>	<u>Location</u>	<u>Component</u>	<u>Substrate</u>	<u>Condition</u>	<u>Results</u> <u>mg/cm²</u>	<u>Lead Content</u>	<u>Remarks</u>
Reception Office							
1	North	Wall	Drywall	Intact	-0.2	Negative	Westside
2	North	Wall	Drywall	Intact	-0.2	Negative	Middle
3	North	Wall	Drywall	Intact	-0.1	Negative	Eastside
4	North	Closet Door	Wood	Intact	-0.1	Negative	
5	North	Cl. Door Casing	Wood	Intact	-0.1	Negative	
6	North	Cl. Door Jamb	Wood	Intact	-0.2	Negative	
7	North	Closet Wall	Drywall	Intact	-0.2	Negative	Westside
8	North	Closet Wall	Drywall	Intact	-0.2	Negative	
	Northside						
9	North	Closet Wall	Drywall	Intact	-0.1	Negative	Eastside
10	North	Closet Shelf	Wood	Intact	0.1	Negative	
11	North	Baseboard	Vinyl Coving	Intact	0.1	Negative	
12	North	Reception Dest	Wood	Intact	0.2	Negative	
13	East	Wall	Drywall	Intact	-0.2	Negative	
	Northside						
14	East	Wall	Drywall	Intact	-0.1	Negative	Middle
15	East	Wall	Drywall	Intact	-0.1	Negative	
	Southside						
16	East	Baseboard	Vinyl Coving	Intact	0.1	Negative	
17	East	Window Casing	Plastic	Intact	-0.1	Negative	
	Northside						
18	East	Window Sash	Plastic	Intact	-0.1	Negative	
	Northside						
19	East	Windowsill	Drywall	Intact	-0.2	Negative	
	Northside						
20	East	Window Casing	Plastic	Intact	-0.1	Negative	
	Southside						
21	East	Window Sash	Plastic	Intact	-0.1	Negative	
	Southside						
22	East	Windowsill	Drywall	Intact	-0.2	Negative	
	Southside						
23	East	Post	Metal	Intact	0.1	Negative	
	Northside						
24	East	Post	Metal	Intact	0.1	Negative	
	Southside						
25	South	Wall	Drywall	Intact	-0.2	Negative	Eastside
26	South	Wall	Drywall	Intact	-0.1	Negative	Middle
27	South	Wall	Drywall	Intact	-0.1	Negative	Westside
28	South	Baseboard	Vinyl Coving	Intact	0.1	Negative	
29	South	Entrance Door	Metal	Intact	-0.1	Negative	
30	South	En. Door Casing	Metal	Intact	-0.1	Negative	
31	South	En. Door Jamb	Metal	Intact	-0.2	Negative	
32	West	Wall	Drywall	Intact	-0.2	Negative	
	Northside						
33	West	Wall	Drywall	Intact	-0.1	Negative	Middle
34	West	Wall	Drywall	Intact	-0.1	Negative	
	Southside						
35	West	Baseboard	Vinyl Coving	Intact	0.1	Negative	
36	West	Door	Metal	Intact	-0.1	Negative	
37	West	Door Casing	Metal	Intact	-0.1	Negative	
38	West	Door Jamb	Metal	Intact	-0.2	Negative	

EXHIBIT "J" (Lead-Based Paint Survey)



Breakroom

39	North	Wall	Drywall	Intact	0.2	Negative	
40	North	Door Casing	Wood	Intact	-0.1	Negative	
41	North	Door Jamb	Wood	Intact	-0.2	Negative	
42	North	Cabinet Door	Wood	Intact	-0.2	Negative	Top
43	North	Cabinet Shelf	Wood	Intact	-0.2	Negative	Top
44	North	Cabinet Door	Wood	Intact	-0.2	Negative	Bottom
45	North	Cabinet Shelf	Wood	Intact	-0.2	Negative	Bottom
46	North	Counter	Wood	Intact	0.1	Negative	
47	North	Baseboard	Vinyl Coving	Intact	0.1	Negative	
48	East	Wall	Drywall	Intact	0.2	Negative	
49	East	Baseboard	Vinyl Coving	Intact	0.1	Negative	
50	South	Wall	Drywall	Intact	0.2	Negative	
51	South	Window Casing	Plastic	Intact	-0.1	Negative	
52	South	Window Sash	Plastic	Intact	-0.1	Negative	
53	South	Windowsill	Drywall	Intact	-0.2	Negative	
54	South	Baseboard	Vinyl Coving	Intact	0.1	Negative	
55	West	Wall	Drywall	Intact	0.2	Negative	
56	West	Baseboard	Vinyl Coving	Intact	0.1	Negative	

Conference Room (Southside, 330 ft²)

57	North	Wall	Drywall	Intact	0.2	Negative	
58	North	Door	Wood	Intact	-0.2	Negative	Westside
59	North	Door Casing	Wood	Intact	-0.1	Negative	Westside
60	North	Door Jamb	Wood	Intact	-0.2	Negative	Westside
61	North	Window Casing	Plastic	Intact	-0.1	Negative	
62	North	Window Sash	Plastic	Intact	-0.1	Negative	
63	North	Windowsill	Drywall	Intact	-0.2	Negative	
64	North	Door	Wood	Intact	-0.2	Negative	Eastside
65	North	Door Casing	Wood	Intact	-0.1	Negative	Eastside
66	North	Door Jamb	Wood	Intact	-0.2	Negative	Eastside
67	North	Baseboard	Vinyl Coving	Intact	0.1	Negative	
68	East	Wall	Drywall	Intact	-0.2	Negative	
69	East	Baseboard	Vinyl Coving	Intact	0.1	Negative	
70	South	Wall	Drywall	Intact	0.2	Negative	
71	West	Wall	Drywall	Intact	0.2	Negative	
72	West	Baseboard	Vinyl Coving	Intact	0.1	Negative	

Conference Room (Northside, 790 ft²)

73	North	Wall	Drywall	Intact	0.2	Negative	
74	North	Baseboard	Vinyl Coving	Intact	0.1	Negative	
75	North	Double Door	Wood	Intact	-0.2	Negative	
76	North	D. Door Casing	Wood	Intact	-0.1	Negative	
77	North	D. Door Jamb	Wood	Intact	-0.2	Negative	
78	East	Wall	Drywall	Intact	-0.2	Negative	
79	East	Baseboard	Vinyl Coving	Intact	0.1	Negative	
80	South	Door	Wood	Intact	-0.2	Negative	Westside
81	South	Door Casing	Wood	Intact	-0.1	Negative	Westside
82	South	Door Jamb	Wood	Intact	-0.2	Negative	Westside
83	South	Door	Wood	Intact	-0.2	Negative	Eastside
84	South	Door Casing	Wood	Intact	-0.1	Negative	Eastside
85	South	Door Jamb	Wood	Intact	-0.2	Negative	Eastside
86	South	Wall	Drywall	Intact	-0.2	Negative	
87	West	Wall	Drywall	Intact	0.2	Negative	
88	West	Baseboard	Vinyl Coving	Intact	0.1	Negative	
89	West	Door	Wood	Intact	-0.1	Negative	
90	West	Door Casing	Wood	Intact	-0.1	Negative	
91	West	Door Jamb	Wood	Intact	-0.2	Negative	

EXHIBIT "J" (Lead-Based Paint Survey)

All Phase Environmental, Inc.

Meeting Room (179 ft²)

92	North	Wall	Drywall	Intact	0.2	Negative
93	North	Baseboard	Vinyl Coving	Intact	0.1	Negative
94	East	Wall	Drywall	Intact	-0.2	Negative
95	East	Baseboard	Vinyl Coving	Intact	0.1	Negative
96	East	Door	Metal	Intact	0.1	Negative
97	East	Door Casing	Wood	Intact	-0.2	Negative
98	East	Door Jamb	Wood	Intact	-0.2	Negative
99	South	Wall	Drywall	Intact	-0.2	Negative
100	South	Baseboard	Vinyl Coving	Intact	0.2	Negative
101	West	Wall	Drywall	Intact	0.2	Negative
102	West	Baseboard	Vinyl Coving	Intact	-0.1	Negative
103	West	Door	Metal	Intact	0.2	Negative
104	West	Door Casing	Metal	Intact	0.1	Negative
105	West	Door Jamb	Metal	Intact	0.1	Negative

Office (130 ft²)

106	North	Wall	Drywall	Intact	0.2	Negative
107	North	Baseboard	Vinyl Coving	Intact	0.1	Negative
108	East	Wall	Drywall	Intact	-0.2	Negative
109	East	Baseboard	Vinyl Coving	Intact	0.1	Negative
110	South	Wall	Drywall	Intact	-0.2	Negative
111	South	Baseboard	Vinyl Coving	Intact	0.2	Negative
112	South	Door	Metal	Intact	0.2	Negative
113	South	Door Casing	Metal	Intact	0.1	Negative
114	South	Door Jamb	Metal	Intact	0.1	Negative
115	South	Window Casing	Metal	Intact	-0.1	Negative
116	West	Wall	Drywall	Intact	0.2	Negative
117	West	Baseboard	Vinyl Coving	Intact	-0.1	Negative

Men's Bathroom

118	North	Wall	Drywall	Intact	-0.2	Negative
119	North	Baseboard	Vinyl Coving	Intact	-0.1	Negative
120	North	Wall Trim	Ceramic Tiles	Intact	>9.9	Positive
121	North	Partition Wall	Metal	Intact	0.1	Negative
122	East	Wall	Drywall	Intact	-0.2	Negative
123	East	Baseboard	Vinyl Coving	Intact	-0.1	Negative
124	East	Wall Trim	Ceramic Tiles	Intact	>9.9	Positive
125	East	Partition Wall	Metal	Intact	-0.1	Negative
126	East	Door	Metal	Intact	0.1	Negative
127	East	Door Casing	Wood	Intact	-0.2	Negative
128	East	Door Jamb	Wood	Intact	-0.2	Negative
129	South	Wall	Drywall	Intact	-0.1	Negative
130	South	Baseboard	Vinyl Coving	Intact	-0.1	Negative
131	South	Wall Trim	Ceramic Tiles	Intact	>9.9	Positive
132	South	Partition Wall	Metal	Intact	0.2	Negative
133	West	Wall	Drywall	Intact	-0.2	Negative
134	West	Baseboard	Vinyl Coving	Intact	-0.1	Negative
135	West	Partition Wall	Metal	Intact	0.1	Negative

Women's Bathroom

136	North	Wall	Drywall	Intact	-0.2	Negative
137	North	Baseboard	Vinyl Coving	Intact	-0.1	Negative
138	North	Partition Wall	Metal	Intact	0.1	Negative
139	East	Wall	Drywall	Intact	-0.2	Negative
140	East	Baseboard	Vinyl Coving	Intact	-0.1	Negative
141	East	Partition Wall	Metal	Intact	-0.1	Negative
142	East	Door	Metal	Intact	0.1	Negative
143	East	Door Casing	Wood	Intact	-0.2	Negative
144	East	Door Jamb	Wood	Intact	-0.2	Negative

EXHIBIT "J" (Lead-Based Paint Survey)

145	South	Wall	Drywall	Intact	-0.1	Negative
146	South	Baseboard	Vinyl Coving	Intact	-0.1	Negative
147	South	Wall Trim	Ceramic Tiles	Intact	>9.9	Positive
148	South	Partition Wall	Metal	Intact	0.2	Negative
149	West	Wall	Drywall	Intact	-0.2	Negative
150	West	Baseboard	Vinyl Coving	Intact	-0.1	Negative
151	West	Partition Wall	Metal	Intact	0.1	Negative
152	West	Wall Trim	Ceramic Tiles	Intact	>9.9	Positive

Closet Adjacent to Bathroom

153	North	Wall	Drywall	Intact	-0.2	Negative
154	East	Wall	Drywall	Intact	-0.2	Negative
155	East	Door	Metal	Intact	0.1	Negative
156	East	Door Casing	Wood	Intact	-0.2	Negative
157	East	Door Jamb	Wood	Intact	-0.2	Negative
158	South	Wall	Drywall	Intact	-0.1	Negative
159	South	Shelf	Wood	Intact	0.2	Negative
160	West	Wall	Drywall	Intact	-0.2	Negative
161	West	Baseboard	Vinyl Coving	Intact	-0.1	Negative
162	West	Shelf	Wood	Intact	0.2	Negative

Office (2315 ft²)

163	North	Wall	Drywall	Intact	0.2	Negative	
164	North	Baseboard	Vinyl Coving	Intact	0.1	Negative	
165	North	Door	Metal	Intact	0.2	Negative	Eastside
166	North	Door Casing	Metal	Intact	0.1	Negative	Eastside
167	North	Door Jamb	Metal	Intact	0.1	Negative	Eastside
168	North	Door	Metal	Intact	0.2	Negative	Westside
169	North	Door Casing	Metal	Intact	0.1	Negative	Westside
170	North	Door Jamb	Metal	Intact	0.1	Negative	Westside
171	North	Window Casing	Plastic	Intact	-0.1	Negative	
172	North	Window Sash	Plastic	Intact	-0.1	Negative	
173	North	Windowsill	Drywall	Intact	-0.2	Negative	
174	East	Wall	Drywall	Intact	-0.2	Negative	
175	East	Baseboard	Vinyl Coving	Intact	0.1	Negative	
176	South	Wall	Drywall	Intact	-0.2	Negative	
177	South	Baseboard	Vinyl Coving	Intact	0.2	Negative	
178	South	Door	Metal	Intact	0.2	Negative	
179	South	Door Casing	Metal	Intact	0.1	Negative	
180	South	Door Jamb	Metal	Intact	0.1	Negative	
181	West	Wall	Drywall	Intact	0.2	Negative	
182	West	Baseboard	Vinyl Coving	Intact	-0.1	Negative	
183	West	Door Casing	Metal	Intact	-0.1	Negative	
184	West	Door Jamb	Metal	Intact	-0.1	Negative	

Office (1145 ft²)

185	North	Wall	Drywall	Intact	0.2	Negative	
186	North	Baseboard	Vinyl Coving	Intact	0.1	Negative	
187	North	Double Door	Metal	Intact	0.2	Negative	Eastside
188	North	D. Door Casing	Metal	Intact	0.1	Negative	Eastside
189	North	D. Door Jamb	Metal	Intact	0.1	Negative	Eastside
190	North	Double Door	Metal	Intact	0.2	Negative	Westside
191	North	D. Door Casing	Metal	Intact	0.1	Negative	Westside
192	North	D. Door Jamb	Metal	Intact	0.1	Negative	Westside
193	East	Wall	Drywall	Intact	-0.2	Negative	
194	East	Baseboard	Vinyl Coving	Intact	0.1	Negative	
195	East	Door Casing	Wood	Intact	-0.1	Negative	
196	East	Door Jamb	Wood	Intact	-0.1	Negative	
197	South	Wall	Drywall	Intact	-0.2	Negative	
198	South	Baseboard	Vinyl Coving	Intact	0.2	Negative	

EXHIBIT "J" (Lead-Based Paint Survey)



199	South	Window Casing	Plastic	Intact	-0.1	Negative	Eastside
200	South	Window Sash	Plastic	Intact	-0.1	Negative	Eastside
201	South	Window Casing	Plastic	Intact	-0.1	Negative	Westside
202	South	Window Sash	Plastic	Intact	-0.1	Negative	Westside
203	West	Wall	Drywall	Intact	-0.2	Negative	
204	West	Baseboard	Vinyl Coving	Intact	-0.1	Negative	

Restroom Adjacent to Library

205	North	Wall	Drywall	Intact	-0.2	Negative	
206	North	Baseboard	Vinyl Coving	Intact	0.1	Negative	
207	North	Door	Wood	Intact	-0.2	Negative	
208	North	Door Casing	Wood	Intact	-0.1	Negative	
209	North	Door Jamb	Wood	Intact	-0.2	Negative	
210	East	Wall	Drywall	Intact	-0.2	Negative	
211	East	Baseboard	Vinyl Coving	Intact	0.1	Negative	
212	South	Wall	Drywall	Intact	-0.2	Negative	
213	South	Baseboard	Vinyl Coving	Intact	0.1	Negative	
214	West	Wall	Drywall	Intact	-0.2	Negative	
215	West	Baseboard	Vinyl Coving	Intact	0.1	Negative	
216	West	Basin	Ceramic	Intact	0.1	Negative	

Library

217	North	Wall	Drywall	Intact	0.2	Negative	
218	North	Baseboard	Vinyl Coving	Intact	0.1	Negative	
219	East	Wall	Drywall	Intact	-0.2	Negative	
220	East	Baseboard	Vinyl Coving	Intact	0.1	Negative	
221	South	Wall	Drywall	Intact	-0.2	Negative	
222	South	Baseboard	Vinyl Coving	Intact	0.1	Negative	
223	South	Stair Handrail	Wood	Intact	0.2	Negative	
224	South	Stair Stringer	Wood	Intact	0.2	Negative	
225	West	Wall	Drywall	Intact	0.2	Negative	
226	West	Baseboard	Vinyl Coving	Intact	0.1	Negative	

Office - 2nd Floor (2315 ft²)

227	North	Wall	Drywall	Intact	-0.2	Negative	
228	North	Baseboard	Vinyl Coving	Intact	-0.1	Negative	
229	North	Door	Metal	Intact	0.2	Negative	
230	North	Door Casing	Metal	Intact	0.1	Negative	
231	North	Door Jamb	Metal	Intact	0.1	Negative	
232	North	Window Casing	Plastic	Intact	-0.1	Negative	Eastside
233	North	Window Sash	Plastic	Intact	-0.1	Negative	Eastside
234	North	Windowsill	Drywall	Intact	-0.2	Negative	Eastside
235	North	Window Casing	Plastic	Intact	-0.1	Negative	Westside
236	North	Window Sash	Plastic	Intact	-0.1	Negative	Westside
237	North	Windowsill	Drywall	Intact	-0.2	Negative	Westside
238	East	Wall	Drywall	Intact	-0.2	Negative	
239	East	Baseboard	Vinyl Coving	Intact	-0.1	Negative	
240	South	Wall	Drywall	Intact	-0.2	Negative	
241	South	Baseboard	Vinyl Coving	Intact	0.2	Negative	
242	South	Window Sash	Plastic	Intact	-0.1	Negative	Eastside
243	South	Windowsill	Drywall	Intact	-0.2	Negative	Eastside
244	South	Window Sash	Plastic	Intact	-0.1	Negative	Westside
245	South	Windowsill	Drywall	Intact	-0.2	Negative	Westside
246	West	Door	Metal	Intact	0.2	Negative	
247	West	Window Sash	Plastic	Intact	-0.1	Negative	
248	West	Windowsill	Drywall	Intact	-0.2	Negative	
249	West	Wall	Drywall	Intact	0.2	Negative	
250	West	Baseboard	Vinyl Coving	Intact	-0.1	Negative	

Unfinished Area 2nd Floor

251	East	Door	Metal	Intact	-0.2	Negative	
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252	East	Door Casing	Metal	Intact	-0.1	Negative	
253	East	Door Jamb	Metal	Intact	-0.2	Negative	
254	South	Wall	Metal Siding	Intact	0.2	Negative	
255	South	Beam	Metal	Intact	-0.1	Negative	
256	West	Wall	Metal Siding	Intact	0.2	Negative	
257	West	Beam	Metal	Intact	-0.2	Negative	

Warehouse Cargo container preparation area

258	North	Wall	Metal Siding	Intact	0.2	Negative	
259	North	Post	Metal	Intact	0.1	Negative	Eastside
260	North	Post	Metal	Intact	0.1	Negative	Westside
261	North	Beam	Metal	Intact	0.1	Negative	Eastside
262	North	Beam	Metal	Intact	0.1	Negative	Westside
263	North	Shelf	Metal	Intact	0.2	Negative	
264	East	Wall	Metal Siding	Intact	0.2	Negative	
265	East Northside	Post	Metal	Intact	0.1	Negative	
266	East Northside	Post	Metal	Intact	0.1	Negative	
267	East Southside	Beam	Metal	Intact	0.1	Negative	
268	East Southside	Beam	Metal	Intact	0.1	Negative	
269	East Northside	Roller gate Door	Metal	Intact	0.2	Negative	
270	East Northside	RG. Door Casing	Metal	Intact	0.1	Negative	
271	East Northside	RG. Door Jamb	Metal	Intact	0.1	Negative	
272	East	Roller gate Door	Metal	Intact	0.2	Negative	Middle
273	East	RG. Door Casing	Metal	Intact	0.2	Negative	Middle
274	East	RG. Door Jamb	Metal	Intact	0.1	Negative	Middle
275	East Southside	Roller gate Door	Metal	Intact	0.2	Negative	
276	East Southside	RG. Door Casing	Metal	Intact	0.2	Negative	
277	East Southside	RG. Door Jamb	Metal	Intact	0.1	Negative	
278	East	Shelf	Metal	Intact	0.2	Negative	
279	South	Wall	Drywall	Intact	0.2	Negative	
280	South	Double Door	Metal	Intact	-0.1	Negative	Eastside
281	South	D. Door Casing	Metal	Intact	-0.1	Negative	Eastside
282	South	D. Door Jamb	Metal	Intact	-0.2	Negative	Eastside
283	South	Double Door	Metal	Intact	-0.1	Negative	Westside
284	South	D. Door Casing	Metal	Intact	-0.1	Negative	Westside
285	South	D. Door Jamb	Metal	Intact	-0.2	Negative	Westside
286	South	Shelf	Metal	Intact	0.2	Negative	
287	West	Shelf	Metal	Intact	0.2	Negative	

Warehouse ST2

288	North	Wall	Metal Siding	Intact	0.2	Negative	
289	North	Post	Metal	Intact	0.1	Negative	
290	North	Beam	Metal	Intact	0.1	Negative	
291	North	Shelf	Metal	Intact	0.2	Negative	
292	South	Wall	Drywall	Intact	-0.2	Negative	
293	South	Shelf	Metal	Intact	0.2	Negative	Shelf A
294	South	Shelf	Metal	Intact	0.2	Negative	Shelf B
295	South	Shelf	Metal	Intact	0.2	Negative	Shelf C
296	South	Double Door	Metal	Intact	-0.1	Negative	
297	South	D. Door Casing	Metal	Intact	-0.1	Negative	

298	South	D. Door Jamb	Metal	Intact	-0.2	Negative
-----	-------	--------------	-------	--------	------	----------

Warehouse Westside

299	North	Wall	Metal Siding	Intact	0.2	Negative	
300	North	Post	Metal	Intact	0.1	Negative	Eastside
301	North	Post	Metal	Intact	0.1	Negative	Westside
302	North	Beam	Metal	Intact	0.1	Negative	Eastside
303	North	Beam	Metal	Intact	0.1	Negative	Westside
304	North	Shelf	Metal	Intact	0.2	Negative	
305	North	Roller gate Door	Metal	Intact	0.2	Negative	
306	North	RG. Door Casing	Metal	Intact	0.2	Negative	
307	North	RG. Door Jamb	Metal	Intact	0.1	Negative	
308	South	Wall	Drywall	Intact	-0.2	Negative	
309	South	Shelf	Metal	Intact	0.2	Negative	
310	South	Door	Metal	Intact	-0.1	Negative	
311	South	Door Casing	Metal	Intact	-0.1	Negative	
312	South	Door Jamb	Metal	Intact	-0.2	Negative	
313	South	Stair Handrail	Wood	Intact	0.2	Negative	
314	South	Stair Stringer	Wood	Intact	0.2	Negative	
315	West	Wall	Metal Siding	Intact	0.2	Negative	
316	West	Post	Metal	Intact	0.1	Negative	
	Northside						
317	West	Post	Metal	Intact	0.1	Negative	
	Southside						
318	West	Beam	Metal	Intact	0.1	Negative	
	Northside						
319	West	Beam	Metal	Intact	0.1	Negative	
	Southside						
320	West	Shelf	Metal	Intact	0.2	Negative	

Warehouse ST1

321	North	Wall	Drywall	Intact	-0.2	Negative
322	East	Wall	Drywall	Intact	-0.2	Negative
323	East	Roller gate Door	Metal	Intact	0.2	Negative
	Northside					
324	East	RG. Door Casing	Metal	Intact	0.1	Negative
	Northside					
325	East	RG. Door Jamb	Metal	Intact	0.1	Negative
	Northside					
326	East	Roller gate Door	Metal	Intact	0.2	Negative
	Southside					
327	East	RG. Door Casing	Metal	Intact	0.2	Negative
	Southside					
328	East	RG. Door Jamb	Metal	Intact	0.1	Negative
	Southside					
329	East	Door	Metal	Intact	-0.1	Negative
330	East	Door Casing	Metal	Intact	-0.1	Negative
331	East	Door Jamb	Metal	Intact	-0.2	Negative
332	East	Stair Handrail	Metal	Intact	-0.2	Negative
333	East	Stair Stringer	Metal	Intact	-0.2	Negative
334	South	Wall	Drywall	Intact	-0.2	Negative
335	West	Wall	Drywall	Intact	-0.2	Negative
336	West	Double Door	Metal	Intact	-0.1	Negative
	Northside					
337	West	D. Door Casing	Metal	Intact	-0.1	Negative
	Northside					
338	West	D. Door Jamb	Metal	Intact	-0.2	Negative
	Northside					
339	West	Double Door	Metal	Intact	-0.1	Negative
	Southside					

340	West Southside	D. Door Casing	Metal	Intact	-0.1	Negative
341	West Southside	D. Door Jamb	Metal	Intact	-0.2	Negative

Office F

342	North	Wall	Drywall	Intact	-0.2	Negative
343	North	Door	Metal	Intact	-0.1	Negative
344	North	Door Casing	Wood	Intact	0.2	Negative
345	North	Baseboard	Vinyl Coving	Intact	0.1	Negative
346	East	Wall	Drywall	Intact	-0.2	Negative
347	East	Baseboard	Vinyl Coving	Intact	-0.2	Negative
348	South	Wall	Drywall	Intact	-0.2	Negative
349	South	Baseboard	Vinyl Coving	Intact	-0.2	Negative
350	West	Wall	Drywall	Intact	-0.2	Negative
351	West	Baseboard	Vinyl Coving	Intact	-0.1	Negative
352	West	Door	Wood	Intact	0.1	Negative
353	West	Door Casing	Wood	Intact	0.1	Negative
353	West	Door Jamb	Wood	Intact	0.2	Negative

Office G

354	North	Wall	Drywall	Intact	-0.2	Negative
355	North	Door	Metal	Intact	-0.1	Negative
356	North	Door Casing	Wood	Intact	0.2	Negative
357	North	Baseboard	Vinyl Coving	Intact	0.1	Negative
358	East	Wall	Drywall	Intact	-0.2	Negative
359	East	Baseboard	Vinyl Coving	Intact	-0.2	Negative
360	South	Wall	Drywall	Intact	-0.2	Negative
361	South	Baseboard	Vinyl Coving	Intact	-0.2	Negative
362	South	Door	Wood	Intact	0.1	Negative
363	South	Door Casing	Wood	Intact	0.1	Negative
364	South	Door Jamb	Wood	Intact	0.2	Negative
365	West	Wall	Drywall	Intact	-0.2	Negative
366	West	Baseboard	Vinyl Coving	Intact	-0.1	Negative

Building Exterior XRF Lead Results

367	North Corner	Wall	Metal Siding	Intact	-0.2	Negative	NE
368	North	Wall	Metal Siding	Intact	-0.3	Negative	Middle
369	North Corner	Wall	Metal Siding	Intact	-0.3	Negative	NW
370	North	Rain gutter	Metal	Damaged	-0.1	Negative	NE
371	North	Rain gutter	Metal	Damaged	-0.1	Negative	Middle
372	North	Rain gutter	Metal	Intact	-0.1	Negative	NW
373	North	Lamp post	Metal	Intact	0.1	Negative	NE
374	North	Lamp post	Metal	Intact	0.1	Negative	Middle
375	North	Lamp post	Metal	Intact	0.1	Negative	NW
376	North	Roller gate Door	Metal	Intact	0.2	Negative	Eastside
377	North	RG. Door Casing	Metal	Intact	0.2	Negative	Eastside
378	North	RG. Door Jamb	Metal	Intact	0.1	Negative	Eastside
379	North	Roller gate Door	Metal	Intact	0.2	Negative	Westside
380	North	RG. Door Casing	Metal	Intact	0.2	Negative	Westside
381	North	RG. Door Jamb	Metal	Intact	0.1	Negative	Westside
382	East Corner	Wall	Metal Siding	Intact	-0.2	Negative	SE
383	East	Wall	Metal Siding	Intact	-0.2	Negative	Middle
384	East Corner	Wall	Metal Siding	Intact	-0.2	Negative	NE
385	East Northside	Roller gate Door	Metal	Intact	0.2	Negative	

EXHIBIT "J" (Lead-Based Paint Survey)



386	East Northside	RG. Door Casing	Metal	Intact	0.2	Negative	
387	East Northside	RG. Door Jamb	Metal	Intact	0.1	Negative	
388	East	Roller gate Door	Metal	Intact	0.1	Negative	Middle
389	East	RG. Door Casing	Metal	Intact	0.2	Negative	Middle
390	East	RG. Door Jamb	Metal	Intact	0.2	Negative	Middle
391	East Southside	Roller gate Door	Metal	Intact	0.2	Negative	
392	East Southside	RG. Door Casing	Metal	Intact	0.1	Negative	
393	East Southside	RG. Door Jamb	Metal	Intact	0.1	Negative	
394	East	Door	Wood	Intact	0.1	Negative	
395	East	Door Casing	Wood	Intact	-0.1	Negative	
396	East	Door Jamb	Wood	Intact	-0.2	Negative	
397	East Northside	Window Apron	Plastic	Intact	-0.1	Negative	
398	East Northside	Window Sash	Plastic	Intact	-0.1	Negative	
399	East Northside	Windowsill	Drywall	Intact	-0.2	Negative	
400	East Southside	Window Apron	Plastic	Intact	-0.1	Negative	
401	East Southside	Window Sash	Plastic	Intact	-0.1	Negative	
402	East Southside	Windowsill	Drywall	Intact	-0.2	Negative	
403	East	Parapet Ceiling	Metal Siding	Intact	-0.1	Negative	NE Side
404	East	Parapet Ceiling	Metal Siding	Intact	-0.1	Negative	Middle
405	East	Parapet Ceiling	Metal Siding	Intact	-0.1	Negative	SE Side
406	East	Safety Railing	Metal	Intact	-0.2	Negative	NE Side
407	East	Safety Railing	Metal	Intact	-0.2	Negative	Middle
408	East	Safety Railing	Metal	Intact	-0.2	Negative	SE Side
409	East	Stair Handrail	Metal	Intact	-0.1	Negative	Right side
410	East	Stair Handrail	Metal	Intact	-0.1	Negative	Left side
411	East	Safety Fence	Metal	Intact	0.5	Negative	
412	East	Parapet Beam	Metal	Intact	-0.1	Negative	NE Side
413	East	Parapet Beam	Metal	Intact	-0.1	Negative	Middle
414	East	Parapet Beam	Metal	Intact	-0.1	Negative	SE Side
415	South Corner	Wall	Metal Siding	Intact	-0.2	Negative	NE
416	South	Wall	Metal Siding	Intact	-0.3	Negative	Middle
417	South Corner	Wall	Metal Siding	Intact	-0.3	Negative	NW
418	South	Rain gutter	Metal	Intact	-0.1	Negative	NE
419	South	Rain gutter	Metal	Intact	-0.1	Negative	NW
420	South	Entrance Door	Metal	Intact	-0.1	Negative	
421	South	En. Door Casing	Metal	Intact	-0.1	Negative	
422	South	En. Door Jamb	Metal	Intact	-0.2	Negative	
423	South	Door	Metal	Intact	-0.1	Negative	Middle
424	South	Door Casing	Metal	Intact	-0.1	Negative	Middle
425	South	Door Jamb	Metal	Intact	-0.2	Negative	Middle
426	South	Door	Metal	Intact	-0.1	Negative	Westside
427	South	Door Casing	Metal	Intact	-0.1	Negative	Westside
428	South	Door Jamb	Metal	Intact	-0.2	Negative	Westside
429	South	Parapet Beam	Metal	Intact	-0.1	Negative	
430	South	Parapet Ceiling	Metal Siding	Intact	-0.1	Negative	Eastside
431	South Southside	Parapet Ceiling	Metal Siding	Intact	-0.1	Negative	

EXHIBIT "J" (Lead-Based Paint Survey)



432	South	Parapet Ceiling	Metal Siding	Intact	-0.1	Negative	Westside
433	South	Stair Handrail	Metal	Intact	0.2	Negative	Right
434	South	Stair Handrail	Metal	Intact	0.2	Negative	Left side
435	South	Safety Fence	Metal	Intact	0.2	Negative	Eastside
436	South	Safety Fence	Metal	Intact	0.2	Negative	Middle
437	South	Safety Fence	Metal	Intact	0.2	Negative	Westside
438	South	Window Apron	Plastic	Intact	-0.1	Negative	Eastside
439	South	Window Sash	Plastic	Intact	-0.1	Negative	Eastside
440	South	Windowsill	Drywall	Intact	-0.2	Negative	Eastside
441	South	Window Apron	Plastic	Intact	-0.1	Negative	Middle
442	South	Window Sash	Plastic	Intact	-0.1	Negative	Middle
443	South	Windowsill	Drywall	Intact	-0.2	Negative	Middle
444	South	Window Apron	Plastic	Intact	-0.1	Negative	Westside
445	South	Window Sash	Plastic	Intact	-0.1	Negative	Westside
446	South	Windowsill	Drywall	Intact	-0.2	Negative	Westside
447	West	Wall	Metal Siding	Intact	-0.2	Negative	SE
448	West	Wall	Metal Siding	Intact	-0.2	Negative	Middle
449	West	Wall	Metal Siding	Intact	-0.2	Negative	NE
450	West	Roller gate Door	Metal	Intact	-0.2	Negative	
	Northside						
451	West	RG. Door Casing	Metal	Intact	-0.2	Negative	
	Northside						
452	West	RG. Door Jamb	Metal	Intact	0.1	Negative	
	Northside						
453	West	Roller gate Door	Metal	Intact	-0.2	Negative	
	Southside						
454	West	RG. Door Casing	Metal	Intact	-0.1	Negative	
	Southside						
455	West	RG. Door Jamb	Metal	Intact	0.1	Negative	
	Southside						
456	West	Double Door	Wood	Intact	0.1	Negative	Northside
456	West	D. Door Casing	Wood	Intact	-0.1	Negative	Northside
457	West	D. Door Jamb	Wood	Intact	-0.2	Negative	Northside
458	West	Double Door	Wood	Intact	0.1	Negative	Southside
459	West	D. Door Casing	Wood	Intact	-0.1	Negative	Southside
460	West	D. Door Jamb	Wood	Intact	-0.2	Negative	Southside
461	West	Rain gutter	Metal	Intact	-0.1	Negative	
	Southside						
462	West	Rain gutter	Metal	Intact	-0.1	Negative	
	Northside						
463	East	Safety Post	Metal	Intact	-0.2	Negative	NE Side
564	East	Safety Post	Metal	Intact	-0.2	Negative	Middle
465	East	Stair Handrail	Metal	Intact	-0.1	Negative	Right
466	East	Stair Handrail	Metal	Intact	-0.1	Negative	Left side
467	East	Safety Fence	Metal	Intact	0.5	Negative	

EXHIBIT "J" (Lead-Based Paint Survey)



APPENDIX C

Drawings

EXHIBIT "J" (Lead-Based Paint Survey)

All Phase Environmental, Inc.



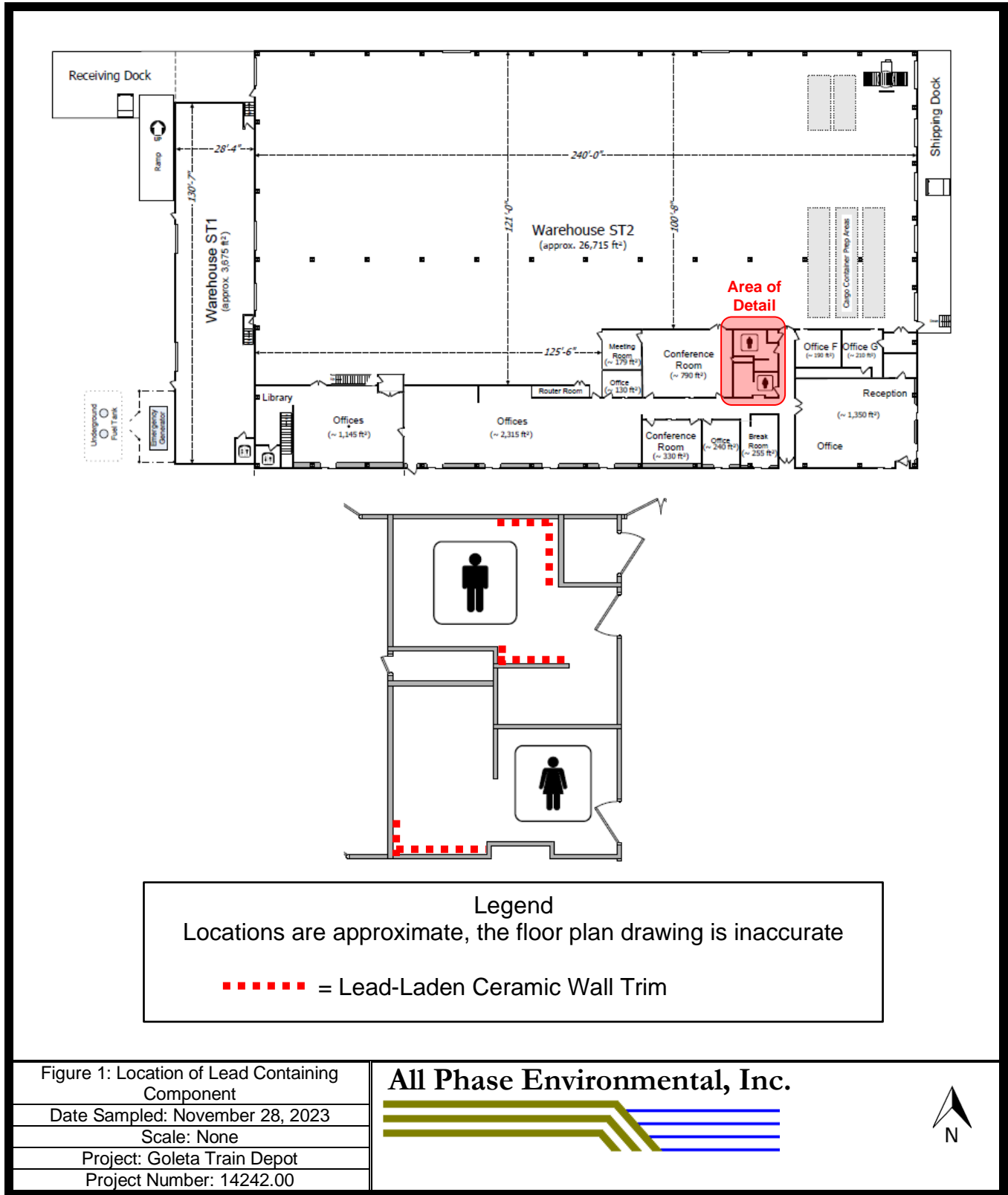


EXHIBIT "J" (Lead-Based Paint Survey)

All Phase Environmental, Inc.



APPENDIX D

Photographs



Photographs



Lead-laden ceramic wall trim in the men's bathroom behind and next to sinks.



Lead-laden ceramic wall trim in the men's bathroom behind and next to urinals



Lead-laden ceramic wall trim in the woman's bathroom behind and next to sinks.

EXHIBIT K

AMTRAK ENCROACHMENT EXHIBIT

PREPARED BY RAILPROS, INC.

DATED JANUARY, 2024

EXHIBIT I

ASBESTOS SURVEY AND HAZARDOUS MATERIAL INSPECTION REPORT

PREPARED BY ALL PHASE ENVIRONMENTAL, INC.

DATED DECEMBER 6, 2023

EXHIBIT K

AMTRAK ENCROACHMENT EXHIBIT

PREPARED BY RAILPROS, INC.

DATED JANUARY, 2024

EXHIBIT "K" (Amtrak Encroachment Exhibit)

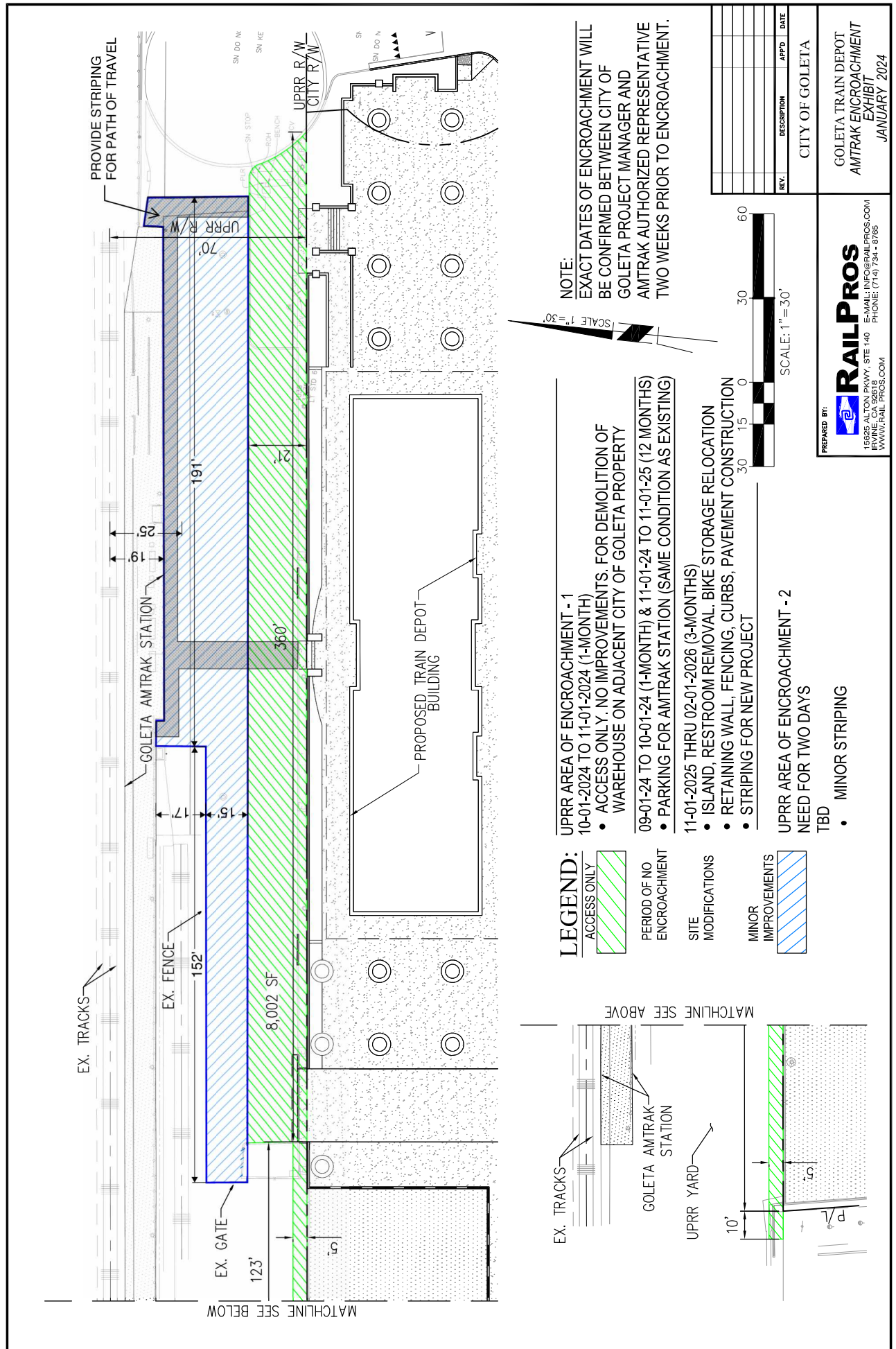


EXHIBIT L

ENVIRONMENTAL IMPACT REPORT (EIR) FOR TRAIN DEPOT

(See Posting on City of Goleta Website via Link below:

<https://www.cityofgoleta.org/your-city/neighborhood-services/goleta-train-depot-project/approved-final-eir>)

AND

CATEGORICAL EXEMPTION (CE) FOR SOUTH LA PATERA LANE IMPROVEMENTS

(Attached)

PREPARED BY RINCON CONSULTANTS, INC.



Goleta Train Depot Project

Final Environmental Impact Report

prepared by

City of Goleta

Neighborhood Services

130 Cremona Drive, Suite B

Goleta, California 93117

Contact: Jaime A. Valdez, Interim Neighborhood Services Director

prepared with the assistance of

Rincon Consultants, Inc.

209 East Victoria Street

Santa Barbara, California 93101

October 2021



RINCON CONSULTANTS, INC.

Environmental Scientists | Planners | Engineers

rinconconsultants.com

EXHIBIT "L" (GTD Final Environmental Impact Report)

Goleta Train Depot Project

Final Environmental Impact Report

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EXHIBIT "L" (GTD Final Environmental Impact Report)

This report prepared on 50 percent recycled paper with 50 percent post-consumer content

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Goleta Train Depot Project

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Executive Summary

This document is an Environmental Impact Report (EIR) analyzing the environmental effects of the proposed Goleta Train Depot Project (proposed project). This section summarizes the characteristics of the proposed project, alternatives to the proposed project, and the environmental impacts and mitigation measures associated with the proposed project.

Project Synopsis

Project Applicant

City of Goleta
Neighborhood Services
130 Cremona Drive, Suite B
Goleta, California 93117

Lead Agency Contact Person

Jaime A. Valdez, Interim Neighborhood Services Director
City of Goleta
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Project Description

This EIR has been prepared to examine the potential environmental effects of the Goleta Train Depot Project. The following is a summary of the full project description, which can be found in Section 2.0, *Project Description*.

The proposed project is located within Santa Barbara County, California, in the City of Goleta. The site is addressed as 27 South La Patera Lane, which is located at the northern terminus of the cul-de-sac, adjacent to the existing Goleta Rail Station. The project site is approximately a 2.5-acre, relatively flat, and rectangular lot. The site is currently developed with a 39,800 square-foot vacant warehouse structure, with an associated parking lot, outdoor storage area, and vehicle yard. The project site is currently zoned for light industrial and business park uses. The existing setting and surrounding land uses include the Goleta Rail Station, as well as the Union Pacific Railroad and US Route 101, which are both located to the north of the project site.

Project Characteristics

The proposed project would demolish and remove the existing industrial warehouse structure in order to develop a new Goleta Train Depot (Depot) on the City-owned property adjacent to the existing Goleta Rail Station. New pedestrian connections would be provided to the Goleta Rail Station's existing platform and platform canopy. No improvements to the existing platform or platform canopy are proposed as part of this project as they are both located on Union Pacific Railroad owned property.

After demolition, a new Goleta Train Depot building and required associated amenities for the Depot would be constructed. The proposed Depot structure would be approximately 9,000 square

feet in size and would provide a permanent, enclosed, and safe structure for Amtrak passengers to use as they wait to board or after they disembark from trains. The architecture of the structure would be a traditional depot design with modern elements. The structure would have large windows and columns to support a roof overhang to create protected outdoor areas around the building.

The proposed project would also include a number of on-site amenities that are intended to increase train ridership and improve upon the overall enjoyment and convenience of rail travel. These amenities include a lobby, vending machines, a café and kitchen area for riders to purchase beverages and food, restroom facilities, multiple indoor waiting areas, a meeting room, an on-site ticketing area, as well as adequate luggage and storage space for the public to use. In addition to amenities located inside the proposed Depot building, the project would also provide adequate vehicle parking within an adjacent surface parking lot. Historical displays both inside and outside of the proposed Depot building would provide riders and visitors with a chance to learn more about the railroad history of Goleta and the South Coast area

Parking and Site Access

Access to the site would be reconfigured from its existing single two-way ingress/egress located at the southeast corner of the project site to two one-way entrance and exit driveways located off South La Patera Lane at the northeastern and southeastern corners of the site. The driveways would also be connected by an internal, U-shaped accessway, which would be located to the south of the proposed Depot building. An additional turnaround would be located at the entry of the site and would be designed to allow buses and shuttles to provide easy drop-off and pick-up passengers. Approximately 111 parking spaces would be provided for passengers to leave their vehicles for various lengths of time. Additionally, electric vehicle charging stations would be provided on site, pursuant to Chapter 17.38 of the Goleta Municipal Code.

Off-Site Improvements

Project implementation proposes to include incorporating several existing off-site activities and improvements. These include use of an existing turnaround located at the northern terminus of S. La Patera Lane, which serves as the stopping point and turnaround for Santa Barbara Metropolitan Transit District (MTD) and Amtrak buses accessing the existing Goleta Rail Station. The project proposes to relocate the existing turnaround southward in order to move the portion of the existing turnaround that is partially located within UPRR right-of-way. The relocated turnaround would also allow space for new amenities and services for passengers on the east side of the Train Depot. A new bus stop would also be located at the turnaround area, which would provide an additional stop for the Santa Barbara Metropolitan Transit District (MTD) peak hour and bus services and future expanded shuttle services.

Construction and Grading

Construction of the proposed project is expected to occur over approximately 24 months and would occur in the following five phases:

1. The first phase of construction would involve demolition and removal of all debris and waste materials associated with the existing 39,800 square foot warehouse structure;
2. The second phase would include initial site preparation to remove any remnant concrete foundations and any remaining miscellaneous debris and vegetation within the development area to prepare for rough grading of the site;

3. The third phase would include rough grading to prepare it for construction activities;
4. The fourth phase would involve construction and painting of the new Depot, as well as any associated finish grading around the site; and
5. The fifth phase would involve paving and striping of the parking lot and ingress/egress areas, as well as the installation of site landscaping, lighting, and signage.

Green Building Features

The project would be constructed to California Building Code (CBC) Title 24, which requires implementation of energy-efficient light fixtures and building materials, newly constructed buildings to meet energy performance standards, and the installation of low-flow water features. Electric vehicle charging stations would be provided on site, pursuant to Chapter 17.38 of the Goleta Municipal Code. Bicycle locks and on-site bicycle storage facilities would also be provided to support alternative modes of transportation. Also, approximately half of the roof would contain solar panels to capture solar energy. In addition, City Resolution No. 12-65 states, “all new building construction for City owned and operated buildings of 2,000 square feet or greater of conditioned space must achieve the United States Green Building Council's (USGBC) Leadership in Energy and Environmental Design (LEED) rating system Silver certification,” unless the project meets certain exceptions. The proposed Depot would be designed and constructed consistent with City Resolution No. 12-65.

Project Objectives

- Construct a full-service, multi-modal train depot that provides high-demand, modern, user-friendly amenities for train riders.
- Develop civic pride and identity through a traditional depot design and community education at the Depot.
- Increase train ridership along the Pacific Surfliner train corridor, especially during peak rail service, to help implement State and regional transit plans.
- Reduce regional greenhouse gas emissions from transportation sources by improving transit use and reducing vehicle miles travelled by single-occupancy vehicles.
- Improve overall connectivity with the local transit system and the Depot to connect passengers with their destinations and create a regional transit hub.

Alternatives

As required by the California Environmental Quality Act (CEQA), this EIR examines alternatives to the proposed project. Studied alternatives include the following two alternatives. Based on the alternatives analysis, Alternative 2 was determined to be the environmentally superior alternative.

- Alternative 1: No Project/Existing Warehouse
- Alternative 2: Reduced Depot Footprint and On-Site Amenities

Alternative 1 (No Project/Existing Warehouse) assumes that the proposed depot building with indoor waiting areas, café, and restroom facilities, parking lot area, and City and Amtrak signage are not constructed. Current uses on the project site consist of a mostly vacant warehouse structure, with only a portion occupied by a local food bank, a parking lot, and an outdoor storage area. The existing site and uses would remain under this alternative. However, the No Project Alternative would not fulfill any Project Objectives because the existing warehouse would not provide a train

depot to improve train ridership or City identity, improve transit connectivity, or reduce greenhouse gas emissions.

Alternative 2 (Reduced Depot Footprint and On-Site Amenities) would involve demolition of the existing warehouse to develop the site with a train depot which would support the adjacent Amtrak passenger train platform. However, the depot under this alternative would be reduced in size to approximately 2,000 square feet and would not include a café or kitchen area, meeting room, or formal lobby. The alternative would still provide on-site parking, passenger drop-off areas, bicycle parking, and landscaping. Alternative 2 would meet most of the project objective, except for providing a full-service train depot since the amenities on site would be reduced and limited under this alternative.

Refer to Section 6.0, *Alternatives*, for the complete alternatives analysis.

Areas of Known Controversy

The EIR scoping process did not identify any areas of known controversy for the proposed project. Responses to the Notice of Preparation of a Draft EIR and input received at the EIR scoping meeting held by the City are summarized in Table 1-1 in Section 1.0, *Introduction*.

Issues to be Resolved

The proposed project would require a demolition and building permit. The project is recommended for Advisory Review, but not required to be reviewed by the Design Review Board and Public Trees Committee for recommendations. In addition, City Council approval would be required.

Issues Not Studied in Detail in the EIR

Table 1-2 in Section 1 summarizes issues from the environmental checklist that were addressed in the Initial Study (Appendix A).

Summary of Impacts and Mitigation Measures

Table ES-1 summarizes the environmental impacts of the proposed project, proposed mitigation measures, and residual impacts (the impact after application of mitigation, if required). Impacts are categorized as follows:

- **Significant and Unavoidable.** An impact that cannot be reduced to below the threshold level given reasonably available and feasible mitigation measures. Such an impact requires a Statement of Overriding Considerations to be issued if the project is approved per §15093 of the CEQA Guidelines.
- **Less than Significant with Mitigation Incorporated.** An impact that can be reduced to below the threshold level given reasonably available and feasible mitigation measures. Such an impact requires findings under §15091 of the CEQA Guidelines.
- **Less than Significant.** An impact that may be adverse but does not exceed the threshold levels and does not require mitigation measures. However, mitigation measures that could further lessen the environmental effect may be suggested if readily available and easily achievable.
- **No Impact:** The proposed project would have no effect on environmental conditions or would reduce existing environmental problems or hazards.

Table ES-1 Summary of Environmental Impacts, Mitigation Measures, and Residual Impacts

Impact	Mitigation Measure (s)	Residual Impact
Air Quality		
Impact AQ-1. The project would not directly or indirectly increase growth in the area and would help meet VMT reduction and transportation control measures set forth in SBAPCD's 2019 Ozone Plan. There would be no impacts.	None required	Less than significant
Impact AQ-2. Construction and operational emissions would not exceed SBAPCD's thresholds and would comply with all of SBAPCD's required emissions reduction measures. This impact would be less than significant.	None required	Less than significant
Impact AQ-3. The project does not include any sensitive uses and would not result in the emissions of TACs or other air contaminants during construction or operation which would significantly impact sensitive receptors. Impacts would be less than significant.	None required	Less than significant
Impact AQ-4. The project does not contain uses that would generate significant odor impacts. This impact would be less than significant.	None required	Less than significant
Biological Resources		
Impact BIO-1 (Initial Study). The existing warehouse building on the project site may provide suitable roosting locations for three species of bats, all CDFW Species of Special Concern. Also, the project site provides habitat for nesting birds.	BIO-1a Special-status Bat Species Avoidance and Minimization. To avoid disturbance of maternal bat roosts, demolition of the warehouse building and any other structures that may support roosting bats shall be conducted outside of the bat breeding season (typically April 1 through August 31), if feasible. If work must begin during the bat breeding season, a qualified biologist shall conduct presence/absence surveys for bats where suitable roosting habitat is present no more than 30 days prior to initiation of project activities. Surveys shall be conducted using acoustic detectors and by visually searching ledges, crevices, and overhangs in the warehouse and any other locations in the study area where bats may roost. If a maternal roost is detected, project activity shall cease. CDFW shall be consulted to determine if protective buffers may be established surrounding the roost, allowing project activities to resume in other parts of the project site. Demolition of a structure supporting a maternal roost shall not occur until the young have left the site. If a non-breeding roost is detected, CDFW shall be consulted to determine if the bats can be safely evicted.	Less than significant

Impact	Mitigation Measure (s)	Residual Impact
	<p>If no roosting bats are observed during pre-construction surveys, no further actions would be necessary.</p> <p>BIO-1b Preconstruction Nesting Bird Surveys. To avoid disturbance of nesting and special-status birds, including raptor species protected by the MBTA and CFGC, project activities including vegetation removal, ground disturbance, construction, and demolition shall occur outside of the bird breeding season (February 1 through August 31), if feasible.</p> <p>If work must begin during the breeding season, a pre-construction nesting bird survey shall be conducted no more than seven days prior to initiation of project activities. The nesting bird survey shall be conducted inside the project footprint plus a 500-foot for raptors and special-status species and a 300-foot buffer for all other birds. Inaccessible parts of the survey area shall be scanned using binoculars to ensure 100 percent visual coverage. The survey shall be conducted by a biologist familiar with the identification of bird species known to occur in southern California communities.</p> <p>If active nests (those containing eggs, nestlings, or associated with dependent fledglings) are found on-site, an avoidance buffer shall be implemented around each nest and demarcated with fencing or flagging. The size of the buffers shall be determined by the biologist based upon the species, the proposed work activity, and existing disturbances associated with land uses outside of the site. No project activity shall occur inside a nest buffer until the biologist determines that the nest is no longer active.</p> <p>If no nesting birds are observed during pre-construction surveys, no further actions would be necessary.</p>	
Cultural Resources		
<p>Impact CR-1 (Initial Study). The area is considered sensitive for archaeological resources, and unanticipated discoveries of archaeological resources during construction activities would be potentially significant.</p>	<p>CR-1 Unanticipated Discovery of Cultural Resources. If cultural resources are encountered during ground-disturbing activities, work in the immediate area must halt and an archaeologist meeting the Secretary of the Interior’s Professional Qualifications Standards for archaeology (National Park Service 1983) should be contacted immediately to evaluate the find. If the discovery proves to be eligible for listing on the California Register of Historical Resources, additional work may be warranted, such as data recovery excavation, Native American consultation, and archaeological monitoring to treat the find.</p>	<p>Less than significant</p>
Geology and Soils		
<p>Impact GEO-1 (Initial Study). Unanticipated fossil discoveries during any ground-disturbing activities associated with the project remain a possibility and impacts to any such resources would be potentially significant.</p>	<p>GEO-1 Unanticipated Discovery of Paleontological Resources. In the event an unanticipated fossil discovery is made during construction, in accordance with SVP (2010) guidelines, construction shall stop within 50 feet of the find or be redirected to another area of the site and a qualified professional paleontologist shall be retained to evaluate the discovery, determine its significance and if additional mitigation or treatment is warranted. Work in the area of the find will resume once the find is properly documented and authorization is given to resume</p>	<p>Less than significant</p>

Impact	Mitigation Measure (s)	Residual Impact
	<p>construction work by the qualified paleontologist in coordination with the City. Any significant paleontological resources found during construction monitoring will be prepared, identified, analyzed, and permanently curated in an approved regional museum repository (e.g., UCMP).</p>	
Greenhouse Gas Emissions		
<p>Impact GHG-1. The project’s construction and operational GHG emissions would not exceed established GHG thresholds. In addition, the project would indirectly reduce regional GHG emissions and vehicle miles traveled. Impact would be less than significant.</p>	<p>None required</p>	<p>Less than significant</p>
<p>Impact GHG-2. The proposed project would not conflict with applicable policies or plans and impacts would be less than significant.</p>	<p>None required</p>	<p>Less than significant</p>
Hazards and Hazardous Materials		
<p>Impact HAZ-1. The project is located on a site previously used for agricultural and industrial purposes and is located adjacent to active railroad tracks. The site contains hazardous materials that may be exposed during construction activities. With adherence to mitigation measures HAZ-1 and HAZ-2, impacts would be reduced to less than significant.</p>	<p>HAZ-1 Assessment Removal, and Remediation. Prior to demolition or onsite grading/site disturbance or improvements, a soil, soil vapor, and/or groundwater sampling assessment shall be completed to identify and/or define hazardous material impacts in the areas of concern. The areas of concern and associated chemicals of concern include:</p> <ul style="list-style-type: none"> ▪ Former agricultural use of the subject property – pesticides and arsenic; ▪ Adjacent presence of railroad tracks along the northern site boundary which transport and produce pesticides, heavy metals, petroleum hydrocarbons, herbicides, and SVOCs (including creosote, naphthalene); ▪ Former and current USTs/AST onsite - historic 6,000-gallon UST, existing 1,800-gallon diesel UST, and existing 3,000-gallon AST with secondary containment and associated drum that is utilized to store emergency overflow used oil onsite - heavy metals, petroleum hydrocarbons, and VOCs; and ▪ Former use of a bus ‘service shop’ that includes underground sumps, trench drains and possibly other features - heavy metals, petroleum hydrocarbons, and VOCs. <p>A geophysical survey shall be conducted to locate the historical UST prior to sampling. The sampling assessment shall be performed under the supervision of a professional geologist or other qualified environmental professional. The analytical results shall be compared to the most current applicable environmental screening levels, as recommended by Santa Barbara County Environmental Health – Hazardous Materials Unit.</p> <p>A Soil Management Plan (SMP) shall be prepared and followed by the demolition/grading contractor. The SMP will identify procedures to address the current onsite</p>	<p>Less than significant</p>

Impact	Mitigation Measure (s)	Residual Impact
	<p>features and unidentified features (USTs, clarifiers, sumps or other underground features) that are uncovered during the redevelopment of the site. If the sampling assessment analytical results are greater than the environmental screening levels, the Santa Barbara County Environmental Health – Hazardous Materials Unit shall be contacted to review and oversee the SMP and any additional assessments, site remediation, and/or health risk assessments that are deemed necessary. The onsite USTs, AST, drum, trench drains, and sumps shall be removed in accordance with local permits and guidelines as identified and required by Santa Barbara County Environmental Health – Hazardous Materials Unit.</p> <p>All necessary reports, regulations and permits shall be followed to achieve remediation of the site. The contaminated materials shall be remediated under the supervision of an environmental consultant licensed to oversee such remediation and under the direction of the lead oversight agency. The remediation program shall also be approved by a regulatory oversight agency, such as the Santa Barbara County Environmental Health – Hazardous Materials Unit. Alternatively, the Hazardous Materials Unit may determine that RWQCB or DTSC should be the lead agency for remediation oversight.</p> <p>All proper waste handling and disposal procedures shall be followed. Upon completion of the remediation, the environmental professional shall prepare a report summarizing the project, the remediation approach implemented, and the analytical results after completion of the remediation (including all waste disposal or treatment manifests) and site closure by the lead agency will be obtained.</p> <p>HAZ-2 Hazardous Building Material Survey and Demolition Plan. A hazardous building material survey shall be conducted prior to demolition or removal of any onsite structures. If any ACM, LBP, or PCBs are identified, the materials shall be removed in accordance with California and Federal OSHA as well as other state and federal regulations by licensed abatement contractors. All ACM, LBP, and PCB materials removed from the site shall be hauled and disposed of by a transportation company certified to handle these materials.</p>	
Noise		
<p>Impact NOI-1. Short-term construction of the project would temporarily increase local noise levels. The anticipated increase in construction noise would be less than significant to nearby sensitive receivers.</p>	<p>None required</p>	<p>Less than significant</p>

Impact	Mitigation Measure (s)	Residual Impact
Impact NOI-2. The project would include stationary sources that would increase noise levels. However, Noise levels generated by the project would not exceed 60 dba at the nearest property line. Impacts would be less than significant	None required	Less than significant
Impact NOI-3. The project would generate new vehicle trips that would increase noise levels on nearby roadways. However, ambient noise would not exceed the conditional noise levels for the site or affected receptors, and project-related changes in noise levels would not exceed 5 dba. Impacts would be less than significant	None required	Less than significant
Impact NOI-4. The project would result in groundborne vibration in the project area vicinity, during the construction phase. Vibration levels during project construction would not cause damage to nearby structures or substantially impact residents in nearby dwellings. This impact would be less than significant.	None required	Less than significant
Transportation and Traffic		
Impact T-1. The project would develop a new Train Depot, a primary objective of which is to reduce regional vehicle miles traveled (VMT). Impacts would be less than significant.	None required	Less than significant
Impact T-2. Construction or operation of the project would not result in a significant increase in transportation hazards in the area or on the project site. Impacts would be less than significant	None required	Less than significant
Impact T-3. Implementation of the project would not result in inadequate emergency access. This impact would be less than significant	None required	Less than significant
Tribal Cultural Resources		
Impact TCR-1. Grading and other ground-disturbing activities on the project site could result in impacts to previously unidentified tribal cultural resources. Therefore, this impact would be significant but mitigable.	TCR-1 Archaeological and Native American Monitoring. Prior to the issuance of a Grading Permit, or ground-disturbing activities, the developer shall obtain a qualified archaeological and Native American monitor for the ground disturbing activities of the project. Archaeological monitoring should be performed under the direction of the qualified archaeologist, defined as an archaeologist meeting the Secretary of the Interior's Professional Qualifications Standards for archaeology (NPS 1983). The	Less than significant

Impact	Mitigation Measure (s)	Residual Impact
	<p>qualified archaeologist, in consultation with the City of Goleta and the Native American monitor, may recommend the reduction or termination of monitoring depending upon observed conditions (i.e., no resources encountered within the first 50 percent of ground disturbance).</p> <p>TCR-2 Unanticipated Discovery of Tribal Cultural Resources. In the event that cultural resources of Native American origin are identified during construction activity all work shall be halted in the vicinity of the discovery until the significance of the resource can be assessed. The city shall begin or continue Native American consultation procedures, in coordination with a qualified archaeologist, if appropriate. If the city, in consultation with local Native Americans, determines that the resource is a tribal cultural resource and thus significant, a mitigation plan shall be prepared and implemented in accordance with state guidelines and in consultation with local Native American group(s). The mitigation plan may include but would not be limited to capping and avoidance, excavation and removal of the resource, interpretive displays, sensitive area signage, or other mutually agreed upon measure</p>	
Utilities and Service Systems		
<p>Impact U-1. The GWD has adequate supplies and water demand reduction strategies to serve the project and foreseeable development under normal and dry years. The water use from the Depot would not exceed available on-site credits and would comply with the SAFE Water Supplies Ordinance. Impacts on water supplies would be less than significant.</p>	<p>None required</p>	<p>Less than significant</p>

1 Introduction

This document is an Environmental Impact Report (EIR) for a proposed train depot development located at 27 South La Patera Lane, Goleta, California. The proposed Goleta Train Depot Project (hereafter referred to as the “proposed project” or “project”) would be constructed on a site currently occupied by one industrial warehouse structure. The project would involve demolition of the existing warehouse structure and construction of a new train depot building. Other components of the project include a parking lot and a passenger drop-off area, outdoor waiting areas, bike storage, signage, outdoor lighting, and landscaping.

This section discusses (1) the project and EIR background; (2) the legal basis for preparing an EIR; (3) the scope and content of the EIR; (4) issue areas found not to be significant by the Initial Study; (5) the lead, responsible, and trustee agencies; and (6) the environmental review process required under the California Environmental Quality Act (CEQA). The proposed project is described in detail in Section 2.0, *Project Description*.

1.1 Environmental Impact Report Background

Pursuant to *CEQA Guidelines* Section 15060(d), the city initiated the environmental process with the preparation of an Initial Study for the project (using the CEQA Environmental Checklist) to determine if it would have a potentially significant effect on the environment and to determine the preliminary scope of the EIR. The City of Goleta distributed the Initial Study and a Notice of Preparation (NOP) of the EIR for a 30-day agency and public review period starting on May 25, 2020 and ending on June 24, 2020. Due to the COVID-19 stay at home orders and health concerns, the City posted an EIR Scoping Presentation on May 25, 2020 to June 24, 2020. The Presentation was aimed at providing information about the proposed project to members of public agencies, interested stakeholders and residents/community members, and provided opportunities for questions or comments. The NOP and the public comments received are both presented in Appendix B of this EIR. Table 1-1 on the following page summarizes the content of the public comments and where the issues raised are addressed within the EIR.

1.2 Purpose and Legal Authority

The proposed project requires the discretionary approval of the City of Goleta City Council; therefore, the project is subject to the environmental review requirements of CEQA. In accordance with Section 15121 of the *CEQA Guidelines* (California Code of Regulations, Title 14), the purpose of this EIR is to serve as an informational document that:

“will inform public agency decision makers and the public generally of the significant environmental effects of a project, identify possible ways to minimize the significant effects, and describe reasonable alternatives to the project.”

This EIR has been prepared as a project EIR pursuant to Section 15161 of the *CEQA Guidelines*. A Project EIR is appropriate for a specific development project. As stated in the *CEQA Guidelines*:

“This type of EIR should focus primarily on the changes in the environment that would result from the development project. The EIR shall examine all phases of the project, including planning, construction, and operation.”

This EIR is to serve as an informational document for the public and City of Goleta review authorities and decision-makers. The process will include public hearings before City Council to consider certification of a Final EIR and approval of the proposed project.

Table 1-1 NOP Comments and EIR Response

Commenter	Comment/Request	How and Where It Was Addressed
Agency Comments		
Native American Heritage Commission (NAHC)	Acknowledged the receipt of the NOP and recommended applicable tribal consultation under AB 52 or SB 18.	Comment addressed in Section 4.6, <i>Tribal Cultural Resources</i> .
Santa Ynez Band of Chumash Indians	Requested formal notice and information on all projects in which Goleta would be the lead agency under CEQA and requests AB 52 consultation for the proposed project.	Comment addressed in Section 4.6, <i>Tribal Cultural Resources</i> .
California Department of Transportation	Provided a letter of support for the project.	No response required.
California Highway Patrol	Acknowledged receipt of the NOP and stated there would be no impacts to the Santa Barbara area operations.	No response required.
Public Comments		
Frank Arredondo of Ksen' Sku' Mu Chumash	The commenter provides comments on the adequacy of the Cultural Resources Report prepared for the project, which was included as Appendix B to the Initial Study. The commenter requested a survey by an archaeologist, an extended Phase I testing study, reevaluation of the previous research, and updated mitigation measures.	An additional site visit and survey by an archaeologist was conducted on September 10, 2020. Updated mitigation measures were recommended in the Cultural Report and included in Section 4.6, <i>Tribal Cultural Resources</i> . Due to the paved nature of the site and the continued use of the site and adjacent train station, an extended Phase 1 testing survey was not recommended. Mitigation measures were determined to cover concerns over potential resources on site.
	The commenter stated that AB 52 consultation should have begun in January 2019 when the City received a grant from the Santa Barbara County Association of Governments for the development of a new train station.	The Goleta Train Depot Master Plan was adopted in early February 2020 by the Goleta City Council. The Master Plan was developed to implement a multi-modal train depot on the City-own property adjacent to the Amtrak station, and was not considered a project under CEQA. With the adoption of the Master Plan in February 2020, the City moved forward with preparing plans for the proposed project. As discussed in Section 4.6, <i>Tribal Cultural Resources</i> , the City distributed AB 52 consultation letters for the proposed project to seven tribes and tribal representatives listed by NAHC as having interest in the project area in February 2020.

Commenter	Comment/Request	How and Where It Was Addressed
Julie Tumamait-Stenslie	The commenter requested a third-party review of the Cultural Report and monitoring during on-site demolition of the existing warehouse. The commenter also requested the use of native plants and that Barbareno/Ventureno Band of Mission Indians cultural interpretations be included in the project.	Comments on the overall landscaping design and cultural interpretations do not pertain to a CEQA issue but have been received by the City of Goleta. Mitigation measure have been included in Section 4.6, <i>Tribal Cultural Resources</i> .

1.3 Scope and Content

This EIR addresses impacts identified by the Initial Study to be potentially significant. The following specific issue areas were found to include potentially significant impacts and have been further analyzed within this EIR:

- Air Quality
- Greenhouse Gas Emissions
- Hazards and Hazardous Materials
- Noise
- Transportation
- Tribal Cultural Resources
- Utilities and Service Systems

The EIR preparers made use of pertinent City policies, guidelines, zoning regulations, certified EIRs and adopted CEQA documents, and other background documents.

The alternatives section of the EIR (Section 6.0) was prepared in accordance with Section 15126.6 of the *CEQA Guidelines* and focuses on alternatives that are capable of eliminating or reducing adverse effects associated with the project to a level that is less than significant while feasibly attaining most of the basic project objectives. In addition, the alternatives section identifies the “environmentally superior” alternative among all alternatives assessed. The alternatives evaluated include the CEQA-required “No Project” alternative and two alternative development scenarios for the project area.

The level of detail contained throughout this EIR is consistent with the requirements of CEQA. Section 15151 of the *CEQA Guidelines* provides the standard of adequacy on which this document is based. The *CEQA Guidelines* state:

An EIR should be prepared with a sufficient degree of analysis to provide decision-makers with information which enables them to make a decision which intelligently takes account of environmental consequences. An evaluation of the environmental effects of the proposed project need not be exhaustive, but the sufficiency of an EIR is to be reviewed in light of what is reasonably feasible. Disagreement among experts does not make an EIR inadequate, but the EIR should summarize the main points of disagreement among the experts. The courts have looked not for perfection, but for adequacy, completeness, and a good faith effort at full disclosure.

1.4 Issues Not Studied in Detail within the EIR

Table 1-2 summarizes issues from the environmental checklist that were addressed in the Initial Study (Appendix A). As indicated in the Initial Study, there is either no substantial evidence that significant impacts would occur in any of these specific issue areas, or that identified impacts could be mitigated to a level of less than significant through the implementation of mitigation measures. The mitigation measures proposed in the Initial Study are included in the Executive Summary Table ES-1 of this EIR.

Table 1-2 Issues Not Studied in Detail within the EIR

Issue Area	Initial Study Findings
Aesthetics	<p>The project site would not substantially impact scenic views, nor is it located on a State Scenic Highway. The site also lacks scenic resources such as trees, rock outcroppings, and vegetation. Therefore, impacts to scenic vistas would be less than significant.</p> <p>The proposed project would not substantially degrade the existing visual character or quality of the site and its surroundings, nor would it create significant impacts with respect to increased lighting. Impacts to these resources would be less than significant.</p>
Agricultural Resources	<p>The project site is within an urbanized area of Goleta that lacks agricultural lands or forests. Therefore, no impact to these resources would occur.</p>
Biological Resources	<p>The project site has the potential to have three sensitive wildlife species of bats to occur on-site. In addition, construction has the potential to impact protected nesting birds. Implementation of Mitigation Measure BIO-1 and BIO-2, which would require bat species avoidance and minimization measures and pre-construction nesting bird surveys would reduce potential impacts to a level that is less than significant.</p> <p>The project site is within an urbanized area and no sensitive habitats; locally designated; locally designated natural communities; habitat conservation plans; wetland habitats; or wildlife corridors exist on the site. Therefore, no impact would occur to these types of sensitive resources.</p> <p>The project site has limited vegetation and there are no trees on-site that are projected under the Goleta Municipal Code. Therefore, no impacts would occur to protected tree species.</p>
Cultural Resources	<p>The existing warehouse on the project site is not eligible for listing as a historical resource. In addition, the project would not directly or indirectly impact the Daniel Hill Adobe. As such, no protected historical resource would be impacted.</p> <p>Based on positive results of the Sacred Lands File (SLF) search, the ethnographic settlement patterns of the Chumash, and contact from the Santa Ynez Band of Chumash Indians, the area is considered sensitive for archaeological resources. Due to the existing level of ground disturbance and pedestrian survey, there is a low potential for encountering archaeological resources. Implementation of Mitigation Measure CR-1 would reduce any potential impacts to unanticipated discovery of any resources to a level that is less than significant.</p> <p>With adherence to existing required regulations, and the proposed mitigation measure CR-1, the project would have a less than significant impact on disturbing human remains.</p>
Energy	<p>Energy use during construction would be temporary and typical of similar projects, and project construction contractors would demonstrate compliance with applicable CARB regulations. Operational energy use would comply with standards set in California Building Code (CBC) Title 24, which would minimize the wasteful, inefficient, or unnecessary consumption of energy resources. Also, the project would reduce overall fuel energy demand by increasing ridership on passenger trains. Therefore, the project would not create significant impacts to energy use.</p> <p>The project does not conflict with energy reduction policies in the City's General Plan or Climate Action Plan. As such, there would be no impact related to energy policy inconsistencies.</p>

Issue Area	Initial Study Findings
Geology and Soils	<p>The project site is not located in an Alquist-Priolo Earthquake Fault Zone. Furthermore, the project would be subject to compliance with the seismic safety standards of the California Building Code (CBC), which are adopted and incorporated into the Goleta Municipal Code. Therefore, impacts to seismic ground shaking and rupture would be less than significant.</p> <p>Additionally, the project site is not located in an area with landslide risk. The Geotechnical Report concluded lateral spreading of soil due to lurching or liquefaction is relatively low on the project site as a silty-sand layer found below the groundwater level is potentially liquefiable. However, compliance with recommendations in the Geotechnical Report would reduce any potential impacts to less than significant.</p> <p>Compliance with the required NPDES permit and standard “best management practices” (BMPs) mitigation measures during construction, such as straw wattles and silt fencing, would reduce potential geological and soils related impacts resulting from loss of topsoil to a level that is less than significant.</p> <p>The project would not use septic tanks. Therefore, there would not be impacts from their use.</p> <p>Given that the fossiliferous deposits occur at greater depths than anticipate ground disturbance, the potential for encountering fossil resources is low and impacts to paleontological resources are not expected. Although unanticipated fossil discoveries during any ground-disturbing activities associated with the project remain a possibility, Implementation of Mitigation Measure GEO-1 would reduce potential impacts to paleontological resources to a level that is less than significant.</p>
Hazards and Hazardous Materials	<p>The nearest school is La Patera Elementary School, which is located approximately 0.7 mile to the north. Therefore, the project would not handle hazardous materials within 0.25 mile of an existing school and no significant impact would occur.</p> <p>According to the hazardous materials records search results, the project site was not listed in any databases that are indicative of a hazardous materials release. Three adjacent properties were listed in databases searches; but, based on the documents reviewed, the Phase I ESA for the proposed project concluded that the three adjacent sites are not expected to impact the subject property. Therefore, impacts would be less than significant.</p> <p>The project site is located approximately 0.3 mile north of the Santa Barbara Municipal Airport and within the adopted 1993 (ALUP) for the Santa Barbara Municipal Airport. Transit uses, such as the proposed project, are determined to be compatible within the Safety Zone 2/Approach Zone. Additionally, the proposed project would not require a General Plan Amendment and would comply with all applicable ALUP development standards and land use regulations, specifically those related to limiting building height and lot density. Therefore, the project would be considered consistent with the ALUP and the City’s General Plan and would not result in significant impacts related to safety hazards.</p> <p>The proposed project would comply with all existing zoning regulations and all building and safety standards. As such, it would not result in the construction of any new facilities or establishment of new uses that could impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan in the City of Goleta. Therefore, no impacts to hazards or hazardous materials would occur.</p> <p>The project site is located within a 5-minute response time of Fire Station #1411. Additionally, the site is not located near areas designated to have risks to wildland fires. Therefore, there would be no impacts related to wildland fires.</p>
Hydrology and Water Quality	<p>Conformance with National Pollutant Discharge Elimination System (NPDES) Statewide General Construction Activity Stormwater permit, City of Goleta Municipal Code Section 15.09.290, which requires an Erosion and Sediment Control Plan, and implementation of a Stormwater Pollution Prevention Plan (SWPPP) along with project-specific BMPs would ensure that the proposed project does not violate any water quality standards or waste discharge requirements during construction. Additionally, the project would be subject to the Central Coast Regional Water Quality Control Board’s Central Coast Post Construction Requirements and would submit a Stormwater Control Plan to demonstrate adequate stormwater management features and facilities to treat and capture stormwater on-site. Integrating these</p>

Issue Area	Initial Study Findings
	<p>mitigation measures would ensure that the proposed project would not create any significant impacts related to hydrology and water quality.</p> <p>The project would connect to existing Goleta Water District water service and would not involve on-site groundwater extraction. As such, the project would not result in any drawdown of an underlying aquifer. Therefore, potential impacts would be at a level that is less than significant.</p> <p>The project site is not located in a floodway or flood zone and does not contain a river or stream that would be altered and result in flooding on- or off-site. Compliance with NPDES requirements, implementation of a SWPPP, installing on-site BMPs and an Erosion and Sediment Control Plan, and following the Stormwater Control Plan would further ensure that no unintended or significant impacts would occur. As such, the project would not impact erosion or siltation on or off site, the transport of pollutants in runoff, or the stormwater drainage systems. Furthermore, the project would not violate water quality standards or degrade water quality during construction or operation and, therefore, would not interfere with the implementation of the Basin Plan. Therefore, potential impacts would be less than significant.</p>
Land Use and Planning	<p>The project site is surrounded by a mix of office and light industrial development. The project would be located entirely within a parcel that is currently developed by an existing warehouse structure. Therefore, there would be no impacts to land use and planning.</p> <p>The project does not involve any General Plan Amendment or any amendment to an existing Specific Plan. The project site is located within the Business Park (BP) Zoning District, and transportation terminals are an allowed use in the BP zone with the approval of a Major Conditional Use Permit. The proposed land use would not conflict with the Zoning District development standards and the train depot would comply with all applicable site development standards and City regulations, including height, lot coverage, setbacks, parking, lighting, landscaping, and signage, or would request a modification to one or more of those standards. Pursuant to the City’s General Plan, deviations from City development standards are permissible, but would require the approval of a Resolution by the City Council. As proposed, land use and planning impacts would be less than significant.</p>
Mineral Resources	<p>There are no existing or planned surface mining operations within the City. As such, no impact would occur related to protected mineral resources.</p>
Noise	<p>The project is located outside the Noise Exposure Range of the adopted Santa Barbara Airport ALUP. Therefore, noise-related impacts would be at a level that is less than significant.</p>
Population and Housing	<p>The proposed project would serve both local Goleta residents as well as residents throughout the State of California using Amtrak’s Pacific Surfliner rail services. Therefore, the project would not induce a substantial unplanned population growth in the area either directly or indirectly and impacts would be less than significant.</p> <p>The project site is currently occupied by an existing warehouse structure that is partially occupied by the Food Bank of Santa Barbara County and serving as temporary as-needed office space for the City during the COVID-19 pandemic. There are neither existing housing units on the project site nor are there people residing on the project site in any form of temporary housing or shelter. Therefore, the project would not displace any existing housing units or people and no impacts to population and housing would occur.</p>

Issue Area	Initial Study Findings
Public Services	<p>Fire protection services would continue to be provided to the site by Santa Barbara County Fire Department (SBCFD), and police protection services would be provided by the Santa Barbara County Sheriff's Office (SBCSO). The project site is located in an urban area of the City, which is developed with office and light industrial uses, and is currently served by these fire and police services. The new train depot would not exceed the capacity of the SBCFD or SBCSO to provide protective services or result in the need for new or expanded fire or police facilities. Additionally, access to the site would continue to be taken from South La Patera Lane, a public road right-of-way of the City of Goleta. Therefore, potential impacts to public services would be less than significant.</p> <p>The proposed project is for the upgrading of an existing public transportation facility from a simple train stop to a train depot. The project would not involve new housing nor would it result in direct or indirect population growth. As such, the project would not result in additional enrollment of school aged children in either Goleta Union or Santa Barbara Unified School Districts or an increased demand for parks or other public facilities. Therefore, there would be no potentially significant impacts to public services.</p>
Recreation	<p>The proposed project is for the upgrading of an existing public transportation facility from a simple train stop to a train depot. The project would not result in a direct or indirect increase in population growth, would not increase the use of recreational facilities in the City, nor would it require the construction or expansion of recreational facilities. Therefore, there would not be any potentially significant impacts to recreation.</p>
Utilities	<p>The proposed project site is currently served by existing connections to water, wastewater, stormwater, electric, gas, and telecommunication facilities. The project may require minor relocations or improvements of the existing utility connections to serve the project, but these would occur within the footprint of existing on-site development. Therefore, any potential impacts would be at a level that is less than significant.</p> <p>Wastewater from the proposed project would be collected and treated by the Goleta Sanitary District (GSD), which operates the Goleta Wastewater Treatment Plant. The development of a new 9,000 square foot train depot would not increase wastewater production compared to existing conditions, which included a 39,800 square foot warehouse. In addition, there is adequate capacity at the wastewater treatment plant to handle additional flows. Impacts would be less than significant.</p> <p>Solid waste generated by the proposed project as well as throughout the rest of the City is disposed of at the Tajiguas Landfill, which has a maximum permitted capacity of 23.3 million cubic yards and a maximum daily capacity of 1,500 tons per day. Construction waste would comply with CalGreen Construction and Demolition (C&D) Debris Recycling Requirements, which required the diversion of 65 percent of construction waste. According to the City's adopted CEQA Thresholds Manual, a project specific impact threshold is 196 tons of solid waste per year. The operation of the Depot would produce approximately 23 tons of solid waste per year, which is below adopted thresholds of significance. Therefore, potentially significant impacts to solid waste infrastructure would be less than significant.</p> <p>The City is a part of the Santa Barbara Regional Integrated Waste Management Reporting Authority and is meeting its waste disposal requirements under AB 939. The project is a City project and would be required to comply with all applicable solid waste diversion programs and State reduction statutes. Therefore, potential impacts related to solid waste management would be less than significant.</p>
Wildfire	<p>The proposed project site is located within an urbanized area of the City of Goleta and is surrounded by existing urban development, including industrial, commercial, interstate highway, and railway development. The project is not located within a high fire hazard severity zone with the nearest high fire zone being approximately 0.9 miles to the north southwest. Therefore, there would be no potentially significant impact to the risk of wildfire.</p>

1.5 Lead, Responsible, and Trustee Agencies

The *CEQA Guidelines* define lead, responsible and trustee agencies. The City of Goleta is the lead agency for the project because it holds principal responsibility for approving the proposed project.

A responsible agency refers to a public agency other than the lead agency that has discretionary approval over the project. Responsible agencies for the proposed project include the Central Coast Regional Water Quality Control Board (RWQCB), which regulates water quality in the region, the Goleta Water District (GWD), which regulates potable water in the region, and the Goleta Sanitary District (GSD), which regulates sanitary waste disposal. The EIR will also be submitted to these agencies for review and comment.

A trustee agency refers to a State agency having jurisdiction by law over natural resources affected by a project. There are no trustee agencies for the proposed project.

1.6 Environmental Review Process

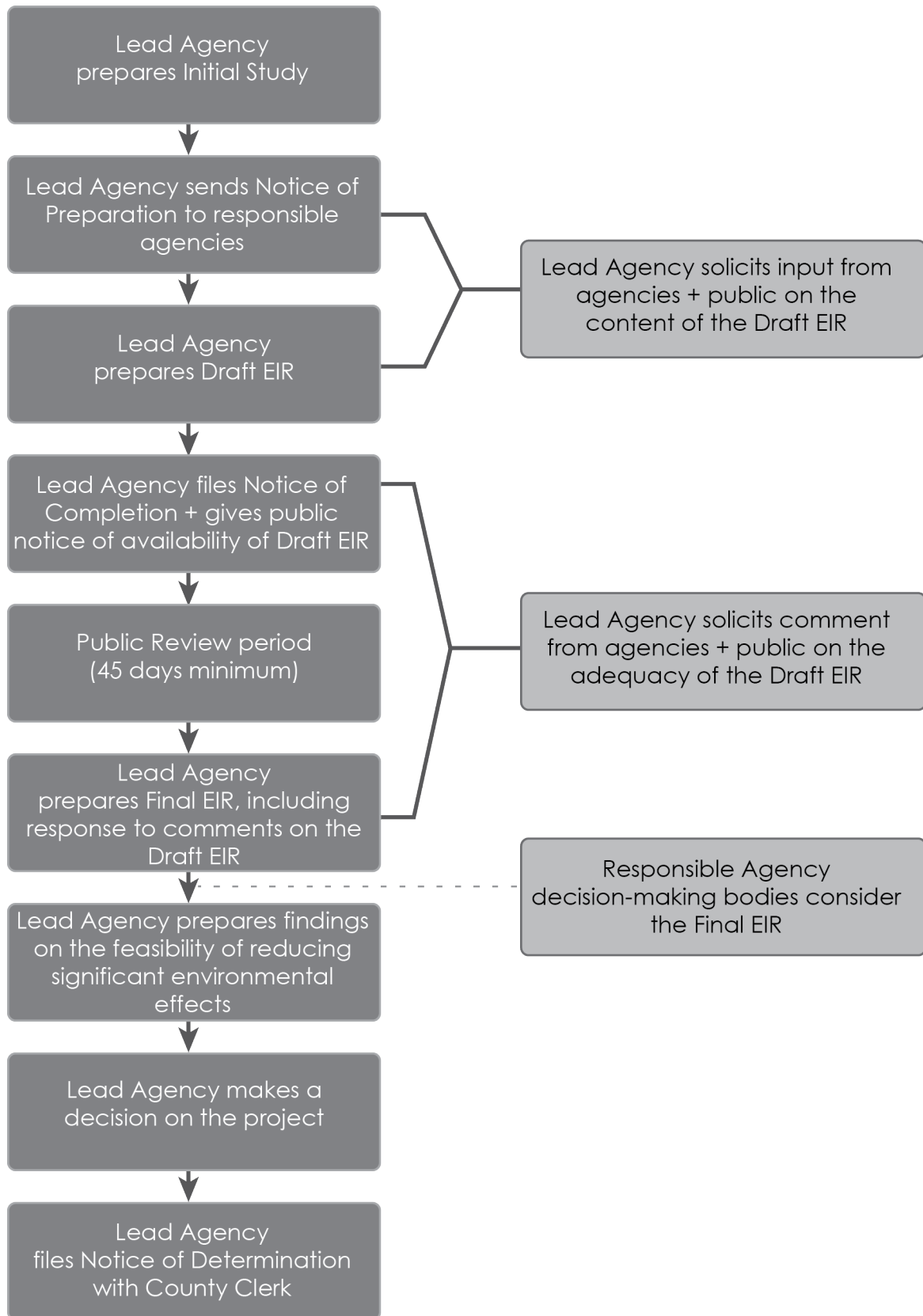
The environmental review process, as required under CEQA, is summarized below and illustrated in Figure 1-1. The steps are presented in sequential order.

1. **Notice of Preparation (NOP) and Initial Study.** After deciding that an EIR is required, the lead agency (City of Goleta) must file a NOP soliciting input on the EIR scope to the State Clearinghouse, other concerned agencies, and parties previously requesting notice in writing (*CEQA Guidelines* Section 15082; Public Resources Code Section 21092.2). The NOP must also be posted in the County Clerk's office for 30 days. The NOP may be accompanied by an Initial Study that identifies the issue areas for which the project could potentially create significant environmental impacts. The City of Goleta prepared an Initial Study to determine the scope and content of the Draft EIR.
2. **Draft EIR Prepared.** The Draft EIR must contain: a) table of contents or index; b) summary; c) project description; d) environmental setting; e) discussion of significant impacts (direct, indirect, cumulative, growth-inducing and unavoidable impacts); f) a discussion of alternatives; g) mitigation measures; and h) discussion of irreversible changes.
3. **Notice of Completion (NOC).** The lead agency must file a NOC with the State Clearinghouse when it completes a Draft EIR and then prepare a Public Notice of Availability of the Draft EIR. The lead agency must place the NOC in the County Clerk's office for 30 days (Public Resources Code Section 21092) and send a copy of the NOC to any interested party requesting it (*CEQA Guidelines* Section 15087). Additionally, public notice of the availability of the Draft EIR must also be given through at least one of the following procedures: a) publication in a newspaper of general circulation; b) posting on and off the project site; and/or c) direct mailing to both owners and occupants of contiguous properties to the proposed project site. The lead agency must solicit input from other agencies and the public and respond in writing to all comments received (Public Resources Code Sections 21104 and 21253). The public review period for the Draft EIR is 45 days (Public Resources Code 21091).
4. **Final EIR.** A Final EIR must include: a) the Draft EIR; b) copies of comments received during public review; c) a list of persons and entities commenting; and d) responses to comments.
5. **Certification of Final EIR.** Prior to making a decision on a proposed project, the lead agency must certify the following: a) the Final EIR has been completed in compliance with CEQA; b) the Final EIR was presented to the decision-making body of the lead agency; and c) the decision-

making body reviewed and considered the information in the Final EIR prior to approving the project (*CEQA Guidelines* Section 15090).

6. **Lead Agency Project Decision.** The lead agency may a) disapprove the project because of its significant environmental effects; b) require changes to the project to reduce or avoid significant environmental effects; or c) approve the project despite its significant environmental effects, if the proper findings and a statement of overriding considerations are adopted (*CEQA Guidelines* Sections 15042 and 15043).
7. **Findings/Statement of Overriding Considerations.** For each significant impact of the project identified in the EIR, the lead agency must find, based on substantial evidence, that either a) the project has been changed to avoid or substantially reduce the magnitude of the impact; b) changes to the project are within another agency's jurisdiction and such changes have or should be adopted; or c) specific economic, social, or other considerations make the mitigation measures or project alternatives infeasible (*CEQA Guidelines* Section 15091). If a lead agency approves a project with unavoidable significant environmental effects, it must prepare a written Statement of Overriding Considerations that sets forth the specific social, economic, or other reasons supporting the lead agency's decision.
8. **Mitigation Monitoring Reporting Program.** When the lead agency makes findings on significant effects identified in the EIR, it must also adopt a reporting or monitoring program for the mitigation measures that were adopted or made conditions of project approval to mitigate the significant effects.
9. **Notice of Determination (NOD).** The lead agency must file a NOD after deciding to approve a project for which an EIR was prepared (*CEQA Guidelines* Section 15094). A local agency must file the NOD with the County Clerk. The NOD must be posted for 30 days and sent to any interested party previously requesting notice. Posting of the NOD starts a 30-day statute of limitations on CEQA legal challenges (Public Resources Code Section 21167[c]).

Figure 1-1 Environmental Review Process



2 Project Description

This section describes the proposed project, including the project applicant, the project site and surrounding land uses, major project characteristics, project objectives, and discretionary actions needed for approval.

2.1 Project Applicant

City of Goleta
Neighborhood Services
130 Cremona Drive, Suite B
Goleta, California 93117

2.2 Lead Agency Contact Person

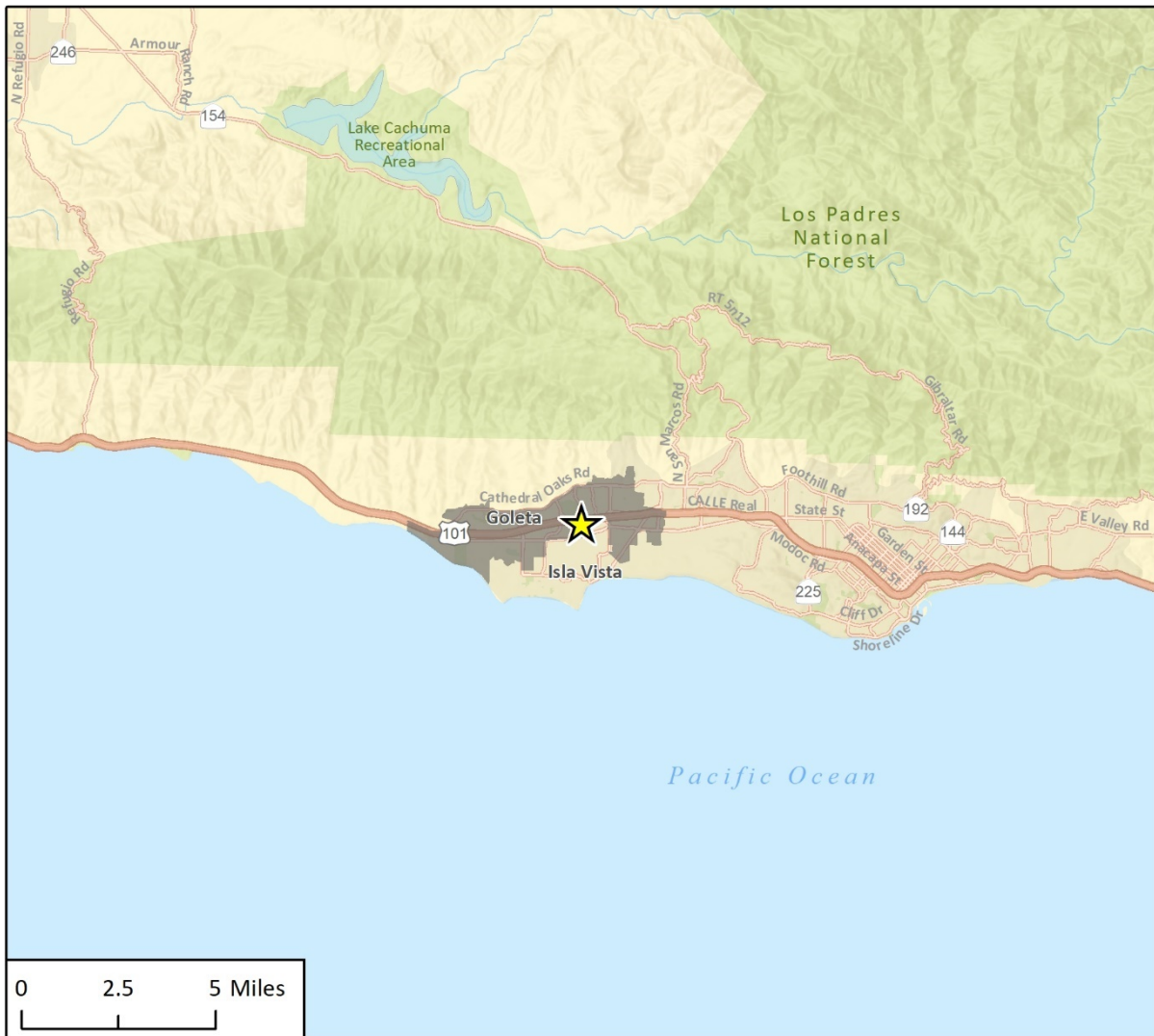
Jaime A. Valdez, Interim Neighborhood Services Director
City of Goleta
jvaldez@cityofgoleta.org
(805) 961-7568

2.3 Project Location

The proposed project is located within Santa Barbara County, California, in the City of Goleta. The site is addressed as 27 South La Patera Lane, which is located at the northern terminus of the cul-de-sac, adjacent to the existing Goleta Rail Station. The project site is denoted by Assessor's Parcel Number 073-050-033 and is approximately a 2.5-acre, relatively flat, and rectangular lot. The site is currently developed with a 39,800 square-foot vacant warehouse structure, with an associated parking lot, outdoor storage area, and vehicle yard. The existing warehouse structure covers approximately 50 percent of the overall site and is situated in the middle of the northern side of the project site.

The proposed project site is regionally accessible from U.S. Route 101 (U.S. 101) and locally accessible from Hollister Avenue, which transects the City from east to west. Figure 2-1 shows the regional location of the project, which is located in Santa Barbara County. The project is located near a number of regionally important areas, land uses, and transportation facilities, which include Old Town Goleta, University of California Santa Barbara (UCSB), the Santa Barbara Airport, the Union Pacific Railroad (UPRR), U.S. 101, Goleta Beach, and the existing Goleta Rail Station, as shown in Figure 2-2. Figure 2-3 shows the specific project location and its neighborhood context, which is an urban area surrounded by a roadway to the north and urban structures (office buildings, warehouses, and commercial buildings) on each of the remaining sides.

Figure 2-1 Regional Location



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- ★ Project Location
 - City of Goleta Limits
- N

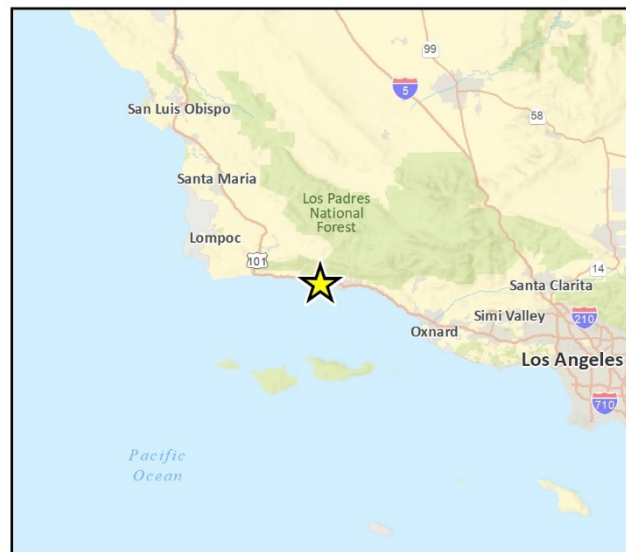


Fig 1 Regional Location

Figure 2-2 Nearby Regionally Important Areas, Land Uses, and Transportation Facilities



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Fig. X Project Service Area

Figure 2-3 Project Site Location



Imagery provided by Microsoft Bing and its licensors © 2019.

Fig. 2 Project Location

2.4 Existing Site Characteristics

2.4.1 Current Land Use Designation and Zoning

The project site's land use designation is listed as Business Park (I-BP) according to the City's General Plan/Coastal Land Use Plan (General Plan). The zoning designation of the project site is depicted as an Office District with a Business Park (BP) designation under the City's Title 17 Zoning Ordinance. Uses that are generally permitted in the BP zone include Public/Quasi-Public Uses (e.g., Day Care Facilities, Emergency Shelters, Government Buildings, etc.); Commercial Uses (e.g., Business Services, Information Technology Services, etc.); Industrial Uses (e.g., Limited Industrial, R&D and Technology, etc.); Transportation, Communication, and Utility Uses (e.g., Antennas and Passenger Terminals [with a Major Conditional Use Permit]); and various Accessory Uses that are customarily incidental to the principally permitted use. Lastly, numerous other uses may also be allowable and permitted within BP zoning districts upon request and approval of either a Minor or Major Conditional Use Permit.

2.4.2 Surrounding Land Uses

The project site is currently zoned for light industrial and business park uses. The existing setting and surrounding land uses include the Goleta Rail Station, as well as the Union Pacific Railroad (UPRR) and U.S. 101, which are both located to the north of the project site. To the east and west of the project site sit existing light industrial and warehouse facilities. Office and business park uses are also located to the south of the project site along Hollister Avenue. Also located near the southern property line of the project site is the historic Daniel Hill Adobe, which has been designated by Santa Barbara County as a Place of Historic Merit and is also recognized in the City of Goleta's General Plan as a locally significant historic resource.

2.5 Project Characteristics

The adjacent Goleta Rail Station opened in 1998 and lacks sufficient amenities for train riders. There is a shortage of adequate parking stalls for personal vehicles, limited waiting areas and shelters for riders, minimal bicycle parking facilities, safety concerns due to poor lighting and access, a lack of nearby food or beverage options, and a lack of convenient amenities such as WiFi or electronic device charging areas. The proposed project would demolish and remove the existing industrial warehouse structure in order to develop a new Goleta Train Depot (Depot) on the City-owned property adjacent to the existing Goleta Rail Station. New pedestrian connections would be provided to the Goleta Rail Station's existing platform and platform canopy. No improvements to the existing platform or platform canopy are proposed as part of this project as they are both located on UPRR owned property. Figure 2-4a and Figure 2-4b show photographs of the existing on-site structure that would be demolished and the property line adjacent to the Goleta Rail Station. After demolition, a new Goleta Train Depot building and required associated amenities for the Depot would be constructed. These amenities would be located both within the project site as well as within the City-owned right-of-way adjacent to and leading to the site.

The proposed Depot structure would be approximately 9,000 square feet in size and would provide a permanent, enclosed, and safe structure for Amtrak passengers to use as they wait to board or after they disembark from trains. The Depot would be located in the northern portion of the project site, adjacent to the railroad right-of-way, as shown on the site plan in Figure 2-5. The parking lot and driveways would be located in the southern portion of the project site, with site landscaping,

Figure 2-4a Site Photographs



View of the east side of the existing building looking northwest



View of the south side of the existing building looking east towards S. Patera Lane

Figure 2-4b Site Photographs



View of the west side of the existing building looking north



View of the north side of the existing building looking east along the railroad right-of-way

Figure 2-5 Site Plan



Goleta Depot - Overall Site Plan

SCALE: 1" = 20'



lighting, and signage located throughout the site. The architecture of the structure would be a traditional depot design with modern elements. The structure would have large windows and columns to support a roof overhang to create protected outdoor areas around the building.

2.5.1 Design

The Depot design process has included an extensive community outreach effort as well as an internal design review process through the City's Design Review Board (DRB). The architect originally developed three design concepts inspired by the history, architecture and culture of the Goleta Valley as well as the function and "gateway" characterization of the proposed Depot. The concepts included an agrarian and traditional California train depot inspired design, a contemporary "sunrise" building, and a modern thematic design emulating a schooner, an icon of the City of Goleta and the Spanish meaning of the word goleta. The concepts were presented to the community through the Notice of Preparation hearing, a project review workshop for the community as well as an online survey. In addition, the design concepts were presented to the City Council a number of times. The consensus was to proceed with the traditional California train depot design. The architect then presented the design to the City DRB who provided extensive input over three meetings and provided input such that the design adheres more strictly to the traditional California train depot design aesthetic. The proposed Depot structure would be a traditional California train depot.

2.5.2 On-Site Amenities

The proposed project would also include a number of on-site amenities that are intended to increase train ridership and improve upon the overall enjoyment and convenience of rail travel. These amenities include a lobby, vending machines, a café and kitchen area for riders to purchase beverages and food, restroom facilities, multiple indoor waiting areas, a meeting room, an on-site ticketing area, as well as adequate luggage and storage space for the public to use. The project would also accommodate bicycle access and provide on-site bicycle storage options.

In addition to amenities located inside the proposed Depot building, the project would also provide adequate vehicle parking within an adjacent surface parking lot. Additionally, an outdoor seating and a play area for children, and a proposed "Kiss N' Ride" space in front of the building would allow for designated pick-up and drop-off locations for passengers, including a separate space to accommodate Transportation Network Companies (TNCs) such as Uber and Lyft. Finally, historical displays both inside and outside of the proposed Depot building would provide riders and visitors with a chance to learn more about the railroad history of Goleta and the South Coast area.

2.5.3 Signage

Signage at the proposed new Train Depot would be provided for convenient and effective wayfinding throughout the site for train users. The signs would be designed in compliance with *Amtrak Graphic Signage Standards Manual* and would be consistent in general appearance with other Amtrak stations up and down the coast. The proposed signage would also be designed and situated on site to be consistent with the City's sign regulations in Title 17. Proposed signage to be included in the Goleta Train Depot would include:

- **Service Identification Signs.** Identifying service and amenities at the Train Depot.
- **Curb Identifier Signs.** Identifying designated areas for passenger pick-up or drop-off, as well as designating areas for TNC services.

- **Freestanding Displays.** To provide information on shuttle and bus services as well as other historical information.
- **Monument Signs.** In addition to traditional wayfinding signage, a limited number of project monument signage with project identification would also be installed throughout the site.
- **Electronic Changeable Copy.** To provide updated information on train timing and information for passengers.

2.5.4 Lighting and Safety Features

On-site lighting would be low intensity, hooded, directed downward, and fully cut-off. The proposed lighting would be installed throughout the project site within the parking lot, along pedestrian walkways, and outside the Train Depot building in order to improve on-site wayfinding and public safety. Lighting would be designed in compliance with the City's General Plan policies and development standards within Title 17, Zoning Ordinance relating to outdoor lighting. In addition to on-site lighting, the project would also provide designated crosswalk areas between the Depot's parking lot and the proposed Train Depot building, as shown in Figure 2-5.

Law enforcement would be provided by the Santa Barbara County Sheriff's Department, which is contracted by the City to provide police services. Fire services would be provided by Santa Barbara County Fire Department (SBCFD).

2.5.5 Landscaping

The proposed project would also include adequate landscaping throughout the site, both within parking lot planters, within the Goleta Train Depot entrance median, and to the east and west of the proposed Depot building itself, consistent with Chapter 17.34 of the Goleta Zoning Ordinance. Newly planted native trees would be located adjacent to the Depot building and would provide shade for waiting passengers. All plants and landscaping would use drought-tolerant, low-water usage plant varieties. Lastly, a large percentage of the site landscape areas would be designed to accommodate low impact design (LID) measures for storm water management using flow-through rain gardens, optional filter boxes, permeable pavers, and/or other forms of porous pavement. Water for on-site landscaping would be supplemented by water trucks from the Goleta Water District's (GWD) Recycled Water Hauling Program.

2.5.6 Off-Site Improvements

Project implementation proposes to include incorporating several existing off-site activities and improvements. These include use of an existing turnaround located at the northern terminus of South La Patera Lane, which serves as the stopping point and turnaround for Santa Barbara Metropolitan Transit District (MTD) and Amtrak buses accessing the existing Goleta Rail Station. This area also provides access to the Rail Station, areas for designated passenger pick-up and drop-off, and space for large vehicles and buses using South La Patera Lane to turn around. The project proposes to relocate the existing turnaround southward in order to move the portion of the existing turnaround that is partially located within UPRR right-of-way. The relocated turnaround would also allow space for new amenities and services for passengers on the east side of the Train Depot. The relocated turnaround would continue to provide an adequate area for emergency vehicles, buses, and large trucks. A new bus stop would also be located at the turnaround area, as shown in Figure 2-5, which would provide an additional stop for the Santa Barbara Metropolitan Transit District (MTD) peak hour and bus services and future expanded shuttle services. Each of these

proposed improvements would occur entirely within City's road right-of-way and would involve various roadway and sidewalk improvements.

2.5.7 Parking and Site Access

Access to the site would be reconfigured from its existing single two-way ingress/egress located at the southeast corner of the project site to two one-way entrance and exit driveways located off South La Patera Lane at the northeastern and southeastern corners of the site, as shown in Figure 2-5. The driveways would also be connected by an internal, U-shaped accessway, which would be located to the south of the proposed Depot building. An additional turnaround would be located at the entry of the site and would be designed to allow buses and shuttles to provide easy drop-off and pick-up passengers. Approximately 111 parking spaces would be provided for passengers to leave their vehicles for various lengths of time. Additionally, electric vehicle charging stations would be provided on site, pursuant to Chapter 17.38 zoning requirements of the Goleta Municipal Code.

2.5.8 Utilities

Electricity to the project site would continue to be provided by Southern California Edison (SCE) and natural gas would continue to be provided by the Southern California Gas Company (SoCalGas). Potable water would be supplied by the GWD and sanitary sewer services would be provided by the Goleta Sanitary District (GSD). ~~Law enforcement would be provided by the Santa Barbara County Sheriff's Department, which is contracted by the City to provide police services. Fire services would be provided by Santa Barbara County Fire Department (SBCFD), which is also contracted by the City to provide fire emergency services.~~

In general, the project would connect to and use all of the different existing utilities, infrastructure, and other facilities that are currently providing services to the project site and other surrounding development.

The project site and surrounding area are served by existing internet, telephone, and television providers operating in the City. Due to the nature of the proposed project, internet services would be the main need for the project. There are a number of internet providers that can serve the project site, including but not limited to Frontier, Spectrum, Cox Communications, and Viasat. The internet provider would be chosen at a later date.

2.5.9 Construction and Grading

Construction of the proposed project is expected to occur over approximately 24 months and would occur in the following five phases:

1. The first phase of construction would involve demolition and removal of all debris and waste materials associated with the existing 39,800 square foot warehouse structure;
2. The second phase would include initial site preparation to remove any remnant concrete foundations and any remaining miscellaneous debris and vegetation within the development area to prepare for rough grading of the site;
3. The third phase would include rough grading to prepare it for construction activities;
4. The fourth phase would involve construction and painting of the new Depot, as well as any associated finish grading around the site; and

5. The fifth phase would involve paving and striping of the parking lot and ingress/egress areas, as well as the installation of site landscaping, lighting, and signage.

2.5.10 Green Building Features

The project would be constructed to California Building Code (CBC) Title 24, which requires implementation of energy-efficient light fixtures and building materials, newly constructed buildings to meet energy performance standards, and the installation of low-flow water features. Electric vehicle charging stations would be provided on site, pursuant to Chapter 17.38 of the Goleta Municipal Code. Bicycle locks and on-site bicycle storage facilities would also be provided to support alternative modes of transportation. Also, approximately half of the roof would contain solar panels to capture solar energy. In addition, City Resolution No. 12-65 states, “all new building construction for City owned and operated buildings of 2,000 square feet or greater of conditioned space must achieve the United States Green Building Council's (USGBC) Leadership in Energy and Environmental Design (LEED) rating system Silver certification,” unless the project meets certain exceptions. The proposed Depot would be designed and constructed consistent with City Resolution No. 12-65.

2.6 Project Objectives

- Construct a full-service, multi-modal train depot that provides high-demand, modern, user-friendly amenities for train riders.
- Develop civic pride and identity through a traditional depot design and community education at the Depot.
- Increase train ridership along the Pacific Surfliner train corridor, especially during peak rail service, to help implement State and regional transit plans.
- Reduce regional greenhouse gas emissions from transportation sources by improving transit use and reducing vehicle miles travelled by single-occupancy vehicles.
- Improve overall connectivity with the local transit system and the Depot to connect passengers with their destinations and create a regional transit hub.

2.7 Required Review and Approvals

The proposed project would require the following City review and approvals and entitlements, along with standard building and grading permits:

- City Council adoption of EIR

In addition, review and approval from the following agencies would also be required:

- **Santa Barbara County Association of Government (SBCAG).** SBCAG is the Regional Transportation Planning Agency and the recipient of the TIRCIP grant funding for the project
- **Union Pacific.** Work and improvements within Union Pacific right-of-way would require consultation and approval
- **Amtrak.** On-site amenities would have to be consistent with *Amtrak Station Program and Planning Guidelines*

- **Goleta Water District.** A can-and-will serve letter would be required prior to approval of the project
- **Goleta Sanitary District.** A can-and-will serve letter would be required prior to approval of the project

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3 Environmental Setting

This section provides a general overview of the environmental setting for the proposed project, including the cumulative projects setting. More detailed descriptions of the environmental setting for each environmental issue area can be found in Section 4.0, *Environmental Impact Analysis*.

3.1 Regional Setting

The project site is located in the City of Goleta, approximately 0.3 miles north of the Santa Barbara Airport, 1.4 miles north of the University of California Santa Barbara (UCSB), 1.6 miles inland from the Pacific Ocean, and eight miles west of the civic center of the City of Santa Barbara and County of Santa Barbara. Figure 2-1 in Section 2.0, *Project Description*, shows the location of the project site in the region and Figures 2-2 and 2-3 show the location of the project site in relationship to the surrounding neighborhood.

A grid system of east-west and north-south roadways, including freeways, arterials, collectors, and local streets, provide vehicular access throughout the City. The nearby major roadways include Hollister Avenue, S. Fairview Avenue, and Storke Road. The closest freeways are U.S. 101 and State Route 217 (SR 217). The UPRR railroad right-of-way and the Goleta Amtrak Station are located adjacent to the project site to the north. The Mediterranean climate of the region and the coastal influence produce moderate temperatures year-round, with rainfall concentrated in the winter months. Although air quality in the area has steadily improved in recent years, the Santa Barbara region remains a nonattainment area for particulate matter (SBAPCD 2020a).

3.2 Project Site Setting

As shown in Figure 2-3 in Section 2.0, *Project Description*, the project site is bordered by light industrial and warehouse uses to the east and west, office and business park development to the south, and UPRR and U.S. 101 right-of-way to the north. There is a two-story warehouse building to the east across South La Patera Lane from the project site, a three-story office building and the historic Daniel Hill Adobe immediately to the south, and a large, one-story office and warehouse building to the west. The project site is currently occupied by a 38,000 square-foot one-story warehouse structure that is only partially occupied by the local Food Bank of Santa Barbara County and available for use by City Public Works staff during the COVID-19 pandemic.

3.3 Cumulative Development

In addition to the specific impacts of individual projects, CEQA requires EIRs to consider potential cumulative impacts of a proposed project. CEQA defines “cumulative impacts” as two or more individual impacts that, when considered together, are substantial or will compound other environmental impacts. Cumulative impacts are the combined changes in the environment that result from the incremental impact of development of the proposed project and other nearby projects. For example, traffic impacts of two nearby projects may be less than significant when analyzed separately but could have a significant impact when analyzed together. Cumulative impact analysis allows the EIR to provide a reasonable forecast of future environmental conditions and can more accurately gauge the effects of a series of projects.

CEQA requires cumulative impact analysis in EIRs to consider either a list of planned and pending projects that may contribute to cumulative effects or a forecast of future development potential. Current planned and pending projects in Goleta and surrounding areas, including the City of Santa Barbara are listed in Table 3-1. Cumulative projects include a listing of all major discretionary projects which are either pending, approved, or currently under construction. The list of City of Goleta projects was compiled on February 25, 2021. There were no cumulative projects in the County of Santa Barbara near the proposed project, but two cumulative projects were identified on the UCSB campus. Cumulative projects in the City of particular note include the 7,000 Hollister Avenue residential development and 5955 Calle Real hotel, which are either located in close proximity or along the same major arterial as the project site, or are major projects in the City. These projects are considered in the cumulative analyses in Section 4.0, *Environmental Impact Analysis*.

Table 3-1 Cumulative Projects List

Project No.	Project Location ¹	Land Use and Size	Status
City of Goleta			
1	22 South Fairview Ave.	Commercial/Industrial, 6,519 sf	Under Construction
2	6830 Cortona Dr.	Residential, 176 units	Under Construction
3	n/a	Oil Infrastructure removal	Under Construction
4	n/a	Oil Infrastructure plug	Under Construction
5	n/a	Oil Infrastructure plug	Under Construction
6	7388 Calle Real	Residential, 10 units	Under Construction
7	S. Kellogg Ave.	Residential/Commercial, 175 units	Under Construction
8	301 Coromar Dr.	Office/Light Industrial, 44,924 sf	Under Construction
9	7000 Hollister Ave.	Residential, 27 units	Under Construction
10	909 S. Kellogg Ave.	Industrial	Under Construction
11	n/a	Trails and Coastal Access improvements	Approved
12	n/a	Tree removal	Approved
13	30 Las Armas Rd	Battery Storage	Approved
14	6765 Navigator Way	Office/Light Industrial, 16,750 sf	Under Construction
15	6759 Navigator Way	Office/Light Industrial, 31,584 sf	Under Construction
16	355 Coromar Dr.	Industrial, 98,780 sf	Approved
17	130 Robin Hill Rd.	Industrial, 1,100 sf	Under Construction
18	6789 Navigator Way	Office/ Light Industrial, 23,882 sf	Approved
19	10 S. Kellogg Ave.	Industrial, 136,067 sf	Approved
20	8301 Hollister Ave.	Residential, 1 unit	Approved
21	180 N. Fairview Ave	Commercial 2,396 sf	Approved
22	6045 Stow Canyon Rd.	Residential, 8,134 sf	Approved
23	7414 and 7418 Hollister Ave.	Industrial, subdivision	Approved
24	n/a	Open space, management plan	Approved
25	625 Dara Rd.	Residential, land use change	Approved
26	454 S. Patterson Ave.	Commercial, 20,000 sf	Under Construction
27	7400 Cathedral Oaks Rd.	Residential, 60 units	Under Review

Project No.	Project Location ¹	Land Use and Size	Status
28	Calle Real and Calaveras Ave.	Residential, 60 units	Under Review
29	6868 and 6864 Cortona Dr.	Battery Storage	Environmental Review
30	North of Calle Koral and west of Los Carneros	Residential, 228 units and 132 senior units	Under Review
31	5955 Calle Real	Commercial, 132-room hotel	Environmental Review
32	425 S. Kellogg Ave.	Commercial auto center, site improvements and subdivision	Environmental Review
33	907 S. Kellogg Ave.	Industrial, 70,594 sf	Environmental Review
34	5631 Calle Real	Commercial, land use change	Under Review
35	250, 260, and 270 Storke Road	Commercial, 1,339 sf	Under Review
36	334 S. Patterson Ave.	Mixed Use	Under Review
37	351 S. Patterson Ave	Hospital remodel and pool facility	Under Review
38	82 Coromar Dr.	Industrial, battery storage	Pending Project
39	Fairview Ave and Hollister Ave.	Commercial, wireless antenna	Pending Project
40	5392 and 5400 Hollister Ave.	Mixed Use, 11,556 sf	Pending Project
41	355 Coromar Drive	54,080 sf distribution facility	Pending Project
42	5385 Hollister Ave	13,620 sf office building, 33,166 sf R&D building	Pending Project
UCSB			
43	Northeast UCSB main campus	Henly Hall, student facilities	Under Construction
44	Central UCSB main campus	Classroom building	Under Construction

¹ Cumulative project details were sourced from City of Goleta, UCSB, Santa Barbara County, and City of Santa Barbara
Sf = square feet

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4 Environmental Impact Analysis

This section discusses the possible environmental effects of the Goleta Depot Project for the specific issue areas that were identified through the scoping process as having the potential to experience significant effects. A “significant effect” as defined by the *CEQA Guidelines* §15382:

means a substantial, or potentially substantial, adverse change in any of the physical conditions within the area affected by the project including land, air, water, minerals, flora, fauna, ambient noise, and objects of historic or aesthetic significance. An economic or social change by itself shall not be considered a significant effect on the environment. A social or economic change related to a physical change may be considered in determining whether the physical change is significant.

The assessment of each issue area begins with a discussion of the environmental setting related to the issue, which is followed by the impact analysis. In the impact analysis, the first subsection identifies the methodologies used and the “significance thresholds,” which are those criteria adopted by the City and other agencies, universally recognized, or developed specifically for this analysis to determine whether potential effects are significant. The next subsection describes each impact of the proposed project, mitigation measures for significant impacts, and the level of significance after mitigation. Each effect under consideration for an issue area is separately listed in bold text with the discussion of the effect and its significance. Each bolded impact statement also contains a statement of the significance determination for the environmental impact as follows:

- **Significant and Unavoidable.** An impact that cannot be reduced to below the threshold level given reasonably available and feasible mitigation measures. Such an impact requires a Statement of Overriding Considerations to be issued if the project is approved per §15093 of the *CEQA Guidelines*.
- **Less than Significant with Mitigation Incorporated.** An impact that can be reduced to below the threshold level given reasonably available and feasible mitigation measures. Such an impact requires findings under §15091 of the *CEQA Guidelines*.
- **Less than Significant.** An impact that may be adverse but does not exceed the threshold levels and does not require mitigation measures. However, mitigation measures that could further lessen the environmental effect may be suggested if readily available and easily achievable.
- **No Impact.** The proposed project would have no effect on environmental conditions or would reduce existing environmental problems or hazards.

Following each environmental impact discussion is a list of mitigation measures (if required) and the residual effects or level of significance remaining after implementation of the measure(s). In cases where the mitigation measure for an impact could have a significant environmental impact in another issue area, this impact is discussed and evaluated as a secondary impact. The impact analysis concludes with a discussion of cumulative effects, which evaluates the impacts associated with the proposed project in conjunction with other planned and pending developments in the area listed in Section 3.0, *Environmental Setting*. The Executive Summary of this EIR summarizes all impacts and mitigation measures that apply to the proposed project.

Section 15065 of the *CEQA Guidelines* also requires the following specific issues be addressed as part of the environmental review for the project:

Goleta Train Depot Project

- The potential for the project to substantially degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, substantially reduce the number or restrict the range of a rare or endangered plant or animal or eliminate important examples of the major periods of California history or prehistory;
- Project impacts that are individually limited but cumulatively considerable. ("Cumulatively considerable" means that the incremental effects of a project are considerable when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects); and
- Environmental effects of the project which will cause substantial adverse effects on human beings, either directly or indirectly.

Section 4, *Biological Resources*, in the Initial Study included as Appendix A describes the project's potential effects of the project on plant and animal species populations, habitats, communities, and migratory patterns. Section 5, *Cultural Resources*, in the Initial Study and Section 4.6, *Tribal Cultural Resources*, in this EIR describes the project's potential effects on important historical and prehistoric cultural and tribal cultural resources. As discussed in these sections, the project would not result in unmitigable, significant impacts to biological, cultural, or tribal cultural resources. Potential adverse environmental effects to human beings are discussed in the Initial Study in Sections 7, *Geology/Soils*, Section 9, *Hazards and Hazardous Materials*, Section 10, *Hydrology and Water Quality*, Section 11, *Land Use/Planning* and in the EIR in Section 4.1, *Air Quality* and Section 4.4, *Noise*. As discussed above, each environmental analysis section of the EIR concludes with a discussion of the project's contribution to cumulative effects and the Initial Study includes a discussion of the issues required in Section 15065 of the *CEQA Guidelines*.

4.1 Air Quality

This section discusses the project’s potential impacts relating to air quality. The modeling from the California Emissions Estimator Model (CalEEMod) was used in the impact analysis. The CalEEMod air quality model results are provided in Appendix C.

4.1.1 Setting

Climate and Topography

The project site is located in the South Central Coast Air Basin (SCCAB), which includes all of San Luis Obispo, Santa Barbara, and Ventura Counties. The 2019 Ozone Plan for Santa Barbara County describes the air quality setting for the county in detail, including the local climate and meteorology, current and projected air quality, and the regulatory framework for the management of air quality. The climate of the SCCAB is strongly influenced by its proximity to the Pacific Ocean and the location of the semi-permanent high-pressure cell in the northeastern Pacific. The Mediterranean climate of the Goleta region produces moderate average temperatures although extreme temperatures can be reached in the winter and summer. The warmest months of the year are August and September, and the coldest month of the year is January. The annual average maximum temperature is 69.3 degrees Fahrenheit (°F), while the annual average minimum temperature is 48.6°F. Rainfall is concentrated in the winter months. Local climate conditions are shown below in Table 4.1-1.

Table 4.1-1 Goleta Climate Conditions

Temperature Condition	Amount
Average annual rainfall	16.3 inches
Annual average maximum temperature	69.3°F
Annual average minimum temperature	48.6°F
Warmest month	August/September
Coolest month	January
Annual mean temperature	59°F

Note: Averages are based on the period of record from January 1, 1894 to June 10, 2016 with the exception of annual mean temperature, which is based on the period of record from January 1, 1894 to October 31, 2012.

Source: Western Regional Climate Center 2016

Temperature inversions (warmer air on top of cooler air) is a common meteorological condition in the area. Inversions in Goleta are formed by the more rapid cooling of air near the ground at night, especially during the winter. This type of inversion is typically seen at lower elevations and is generally accompanied by stable air. Inversions limit the dispersal of air pollutants within the regional airshed because more stable air conditions (i.e., low wind speeds and uniform temperatures) result in lower rates of pollutant dispersion.

Air Pollutants of Primary Concern

The general characteristics of the six criteria pollutants regulated by the federal Clean Air Act and California Clean Air Act are described below.

Ozone

Ozone is produced by a photochemical reaction (triggered by sunlight) between nitrogen oxides (NO_x) and reactive organic gases (ROG).¹ NO_x are formed during the combustion of fuels, while ROG is formed during combustion and evaporation of organic solvents. Because ozone requires sunlight to form, it mostly occurs in concentrations considered serious between the months of April and October. Ozone is a pungent, colorless, toxic gas with direct health effects on humans, including respiratory and eye irritation and possible changes in lung functions. Groups that tend to be the most sensitive to ozone include children, the elderly, people with respiratory disorders, and people who exercise strenuously outdoors.

Carbon Monoxide

Carbon monoxide (CO) is a localized pollutant that is found in high concentrations only near its source. The major source of CO, a colorless, odorless, poisonous gas, is automobile traffic. Therefore, elevated concentrations are usually only found near areas of high traffic volumes. Carbon monoxide health effects are related to its affinity for hemoglobin in the blood. At high concentrations, CO reduces the amount of oxygen in the blood, causing heart difficulties in people with chronic diseases, reduced lung capacity, and impaired mental abilities.

Nitrogen Dioxide

Nitrogen dioxide (NO₂) is a by-product of fuel combustion, with the primary source being motor vehicles and industrial boilers and furnaces. The principal form of nitrogen oxide produced by combustion is nitric oxide (NO), but NO reacts rapidly to form NO₂, creating the mixture of NO and NO₂ commonly called NO_x. Nitrogen dioxide is an acute irritant. A relationship between NO₂ and chronic pulmonary fibrosis may exist, and an increase in bronchitis in young children at concentrations below 0.3 parts per million (ppm) may occur. Nitrogen dioxide absorbs blue light, gives a reddish-brown cast to the atmosphere, and reduces visibility. It can also contribute to the formation of small particulate matter (PM₁₀) and acid rain.

Suspended Particulates

Small particulate matter measuring no more than 10 microns in diameter is considered PM₁₀, while fine particulate matter measuring no more than 2.5 microns in diameter is considered PM_{2.5}. Suspended particulates are mostly dust particles, nitrates, and sulfates. Both PM₁₀ and PM_{2.5} are by-products of fuel combustion and wind erosion of soil and unpaved roads and are directly emitted into the atmosphere through these processes. Suspended particulates are also created in the atmosphere through chemical reactions. The characteristics, sources, and potential health effects associated with PM₁₀ and PM_{2.5} can be very different. PM₁₀ generally comes from windblown dust

¹ CARB defines VOC and ROG similarly as, "any compound of carbon excluding CO, carbon dioxide, carbonic acid, metallic carbides or carbonates, and ammonium carbonate," with the exception that VOC are compounds that participate in atmospheric photochemical reactions (CARB 2009). For the purposes of this analysis, ROG and VOC are considered comparable in terms of mass emissions and the term ROG is used in this report.[1] CARB defines VOC and ROG similarly as, "any compound of carbon excluding CO, carbon dioxide, carbonic acid, metallic carbides or carbonates, and ammonium carbonate," with the exception that VOC are compounds that participate in atmospheric photochemical reactions (CARB 2009). For the purposes of this analysis, ROG and VOC are considered comparable in terms of mass emissions and the term ROG is used in this report. SLOAPCD uses the term ROG to denote organic precursors.

and dust kicked up from mobile sources. PM_{2.5} is generally associated with combustion processes, as well as formation in the atmosphere as a secondary pollutant through chemical reactions. PM_{2.5} is more likely to penetrate deeply into the lungs and poses a health threat to all groups, but particularly to the elderly, children, and those with respiratory problems. More than half of the small and fine particulate matter that is inhaled into the lungs remains there. These materials can damage health by interfering with the body's mechanisms for clearing the respiratory tract or by acting as carriers of an absorbed toxic substance.

Sulfur Dioxide

Sulfur dioxide (SO₂) is included in a group of highly reactive gases known as "oxides of sulfur." The largest sources of SO₂ emissions are from fossil fuel combustion at power plants (73 percent) and other industrial facilities (20 percent). Smaller sources of SO₂ emissions include industrial processes such as extracting metal from ore and the burning of fuels with a high sulfur content by locomotives, large ships, and off-road equipment. Sulfur dioxide is linked with a number of adverse effects on the respiratory system.

Lead

Lead (Pb) is a toxic metal that can be emitted from industrial sources, leaded aviation gasoline, and lead-based paint. Lead may cause a range of health effects, from behavioral problems and learning disabilities to seizures and death.

Toxic Air Contaminants

Toxic air contaminants (TACs) are a diverse group of air pollutants that may cause or contribute to an increase in deaths or serious illness, or that may pose a present or potential hazard to human health. TACs include both organic and inorganic chemical substances that may be emitted from a variety of common sources, including gasoline stations, motor vehicles, dry cleaners, industrial operations, painting operations, and research and teaching facilities. One of the main sources of TACs in California is diesel engines that emit exhaust containing solid material known as diesel particulate matter (DPM), (see CARB 2019a). TACs are different than criteria pollutants because ambient air quality standards have not been established for TACs. TACs occurring at extremely low levels may still cause health effects, and it is typically difficult to identify levels of exposure that do not produce adverse health effects. TAC impacts are described by carcinogenic risk and by chronic (i.e., long duration) and acute (i.e., severe but of short duration) adverse effects on human health.

Current Air Quality

Table 4.1-2 summarizes the annual air quality data for the local airshed. California Air Resources Board (CARB) maintains over 60 air quality monitoring stations throughout California, including two stations in Santa Barbara County. Other monitoring stations in Santa Barbara County are maintained by SBAPCD. The nearest monitoring station to the project site is the Goleta-Fairview station, located at 380 N. Fairview Avenue approximately 0.9-mile northeast of the project site. The pollutants monitored at this station are ozone, PM₁₀, PM_{2.5}, and NO₂. The data collected at this station is generally representative of the baseline air quality experienced in the project area. SO₂ has not been monitored at this station since 2009. The last recorded 24-hour average SO₂ value was 0.001 ppm, which is below the state 24-hour standard of 0.14 ppm and the federal 24-hour standard of 0.04 ppm. CO has not been monitored at this station since 2012. The last recorded 8-hour average CO value was 0.65 ppm, which is below the state and federal 8-hour CO standard of 9.0 ppm.

Table 4.1-2 Ambient Air Quality Data

Pollutant	2017	2018	2018
Ozone (ppm), Worst Hour	0.1	0.077	0.072
Number of days of state exceedances (>0.09 ppm)	1	0	0
Number of days of federal exceedances (>0.12 ppm)	0	0	0
Ozone (ppm), 8-Hour Average ¹	0.068	0.056	0.062
Number of days of state and federal exceedances (>0.07 ppm)	0	0	0
NO ₂ (ppm), Worst Hour	0.035	0.029	0.027
Number of days of state exceedances (>0.18 ppm)	0	0	0
Number of days of federal exceedances (>0.10 ppm)	0	0	0
PM ₁₀ (µg/m ³), Worst 24 Hours	189.0	72.5	61.1
Number of days of state exceedances (>50 µg/m ³)	12	4	2
Number of days of federal exceedances (>150 µg/m ³)	1	0	0
PM _{2.5} (µg/m ³), Worst 24 Hours	130.5	35.6	26.3
Number of days of federal exceedances (>35 µg/m ³)	10	1	0

Source: CARB 2019c

The primary pollutants of concern in the project area are PM₁₀, PM_{2.5}, and ozone. As shown in Table 4.1-2, PM₁₀ concentrations exceeded the state PM₁₀ standard for 12 days day in 2017 and four days in 2018 and for two days in 2019. PM_{2.5} concentrations exceeded the federal standard for ten days in 2017 and for one day in 2018. Ozone exceeded the state standard for one day in 2017.

Sensitive Receptors

Ambient air quality standards have been established to represent the levels of air quality considered sufficient, with an adequate margin of safety, to protect public health and welfare. Standards are designed to protect that segment of the public most susceptible to respiratory distress, such as children under 14; the elderly over 65; persons engaged in strenuous work or exercise; and people with cardiovascular and chronic respiratory diseases. Therefore, the majority of sensitive receptor locations are residences, schools, and hospitals.

Sensitive receptors near the project site consist primarily of the residential areas 500 feet north of the project site across UPRR right-of-way and U.S. 101. The nearest school is La Patera Elementary School located approximately 0.7 mile to the north. The nearest park is the Los Carneros Park and associated hiking trails, which is located as close as 660 feet north from the project site across UPRR right-of-way and U.S. 101. Therefore, the nearest sensitive receptors to the proposed project are the residences and Los Carneros Park located to the north across U.S. 101 from the project site.

4.1.2 Regulatory Setting

Federal and State

The federal and state Clean Air Acts regulate the emission of airborne pollutants from various mobile and stationary sources. The United States Environmental Protection Agency (U.S. EPA) is the federal agency designated to administer air quality regulation, while the CARB is the state equivalent within the California Environmental Protection Agency (CalEPA). These agencies have established ambient air quality standards for the protection of public health. Local air quality

management control and planning is provided through regional Air Pollution Control Districts (APCDs) established by CARB for the 14 statewide air basins. The CARB is responsible for control of mobile emission sources, while the local APCDs are responsible for control of stationary sources and enforcing regulations. As stated above, Goleta is located in the Santa Barbara County portion of the SCCAB, which is under the jurisdiction of the Santa Barbara County Air Pollution Control District (SBAPCD).

The U.S. EPA and CARB establish ambient air quality standards for major pollutants at thresholds intended to protect public health. Federal and state standards have been established for ozone, CO, NO₂, SO₂, lead, PM₁₀, and PM_{2.5}. Table 4.1-3 summarizes the California Ambient Air Quality Standards (CAAQS) and the National Ambient Air Quality Standards (NAAQS) for each of these pollutants. California standards are more restrictive than federal standards for each of these pollutants, except for lead, the eight-hour average for CO, and the eight-hour average for ozone.

Table 4.1-3 Current Federal and State Ambient Air Quality Standards

Pollutant	Federal Standard	California Standard
Ozone	0.070 ppm (8-hr avg)	0.09 ppm (1-hr avg) 0.070 ppm (8-hr avg)
Carbon Monoxide	35.0 ppm (1-hr avg) 9.0 ppm (8-hr avg)	20.0 ppm (1-hr avg) 9.0 ppm (8-hr avg)
Nitrogen Dioxide	0.100 ppm (1-hr avg) 0.053 ppm (annual avg)	0.18 ppm (1-hr avg) 0.030 ppm (annual avg)
Sulfur Dioxide	0.075 ppm (1-hr avg)	0.25 ppm (1-hr avg) 0.04 ppm (24-hr avg)
Lead	0.15 µg/m ³ (rolling 3-month avg) 1.5 µg/m ³ (calendar quarter)	1.5 µg/m ³ (30-day avg)
Particulate Matter (PM ₁₀)	150 µg/m ³ (24-hr avg)	50 µg/m ³ (24-hr avg) 20 µg/m ³ (annual avg)
Particulate Matter (PM _{2.5})	35 µg/m ³ (24-hr avg) 12 µg/m ³ (annual avg)	12 µg/m ³ (annual avg)
Sulfates	No Federal Standards	25 µg/m ³ (24-hr avg)
Hydrogen Sulfide	No Federal Standards	0.03 ppm (1-hr avg)
Vinyl Chloride	No Federal Standards	0.01 ppm (24-hr avg)

ppm= parts per million
µg/m³ = micrograms per cubic meter
Source: CARB 2016

In accordance with Section 109(b) of the federal Clean Air Act, the national ambient air quality standards (NAAQS) established at the federal level are designed to be protective of public health with an adequate margin of safety. The NAAQS were designed to include an adequate margin of safety to be protective of those segments of the public most susceptible to respiratory distress, such as children under the age of 14, the elderly (over the age of 65), persons engaged in strenuous work or exercise, and people with cardiovascular and chronic respiratory diseases. To derive these standards, the U.S. EPA reviews data from integrated science assessments and risk/exposure assessments to determine the ambient pollutant concentrations at which human health impacts occur, then reduces these concentrations to establish a margin of safety (U.S. EPA 2018). As a result,

human health impacts caused by the air pollutants may affect people when ambient air pollutant concentrations are at or above the concentrations established by the NAAQS. The closer a region is to attaining a particular NAAQS, the lower the human health impact is from that pollutant (brief for San Joaquin Valley Unified Air Pollution Control District 2018). Accordingly, ambient air pollutant concentrations below the NAAQS and California standards are considered to be protective of human health (CARB 2019a and 2019b). The NAAQS and the underlying science that forms the basis of the NAAQS are reviewed every five years to determine whether updates are necessary to continue protecting public health with an adequate margin of safety (U.S. EPA 2015).

Ambient air pollutant concentrations are affected by the rates and distributions of corresponding air pollutant emissions, as well as by climactic and topographic influences. The primary determinant of concentrations of non-reactive pollutants (such as CO, PM₁₀ and PM_{2.5}) is proximity to major sources. Ambient CO levels usually closely follow the spatial and temporal distributions of vehicular traffic. SBAPCD monitors criteria pollutant levels to ensure that air quality standards are met, and if they are not met, develops strategies to meet the standards. Depending on whether or not the standards are met or exceeded, the air basin is classified as being in “attainment” or “nonattainment.” Santa Barbara County is designated nonattainment for the state 24-hour and annual standard for PM₁₀ (SBAPC 2020a). The County is also unclassifiable/attainment for the federal PM_{2.5} standard and unclassified for the state PM_{2.5} standard. Effective July 1, 2020 the County is designated as attainment for the state 1-hour and 8-hour standards (SBAPCD 2020b).

SAFE Vehicle Rule

On September 27, 2019, the U.S. EPA and the National Highway Traffic Safety Administration published the Safer Affordable Fuel-Efficient (SAFE) Vehicles Rule Part One: One National Program. The SAFE Rule Part One revokes California’s authority to set its own GHG emissions standards and to adopt its own zero-emission vehicle mandates. On April 30, 2020, the U.S. EPA and the National Highway Traffic Safety Administration published Part Two of the SAFE Vehicles Rule, which revised corporate average fuel economy and CO₂ emissions standards for passenger cars and trucks of model years 2021-2026 such that the standards increase by approximately 1.5 percent each year through model year 2026 as compared to the approximately five percent annual increase required under the 2012 standards (National Highway Traffic Safety Administration 2021). To account for the effects of the SAFE Vehicles Rule, CARB released off-model adjustment factors on June 26, 2020 to adjust GHG emissions outputs from the EMFAC model (CARB 2020).

Local

Santa Barbara County Air Pollution Control District

SBAPCD, the lead air quality regulatory agency for Santa Barbara County, maintains air quality comprehensive programs for planning, regulation, enforcement, technical innovation, and promotion of the understanding of air quality issues. The 2001 Clean Air Plan (CAP) was adopted as the County portion of the State Implementation Plan (SIP), designed to meet and maintain clean air standards. The 2019 Ozone Plan (2019 Plan) is the ninth triennial update to the initial state Air Quality Attainment Plan adopted by the SBAPCD Board of Directors in 1991 (other updates were done in 1994, 1998, 2001, 2004, 2007, 2010, 2013, and 2016). Each of the plan updates have implemented an “every feasible measure” strategy to ensure continued progress toward attainment of the state ozone standards (SBAPCD 2019). SBAPCD also inspects stationary sources to ensure they abide by permit requirements, responds to citizen complaints, monitors ambient air quality

and meteorological conditions, and implements other programs and regulations required by the federal and State Clean Air Acts.

SBAPCD maintains a guidance document for assessing and mitigating air quality impacts under the California Environmental Quality Act (CEQA), which includes tools and methodologies to quantify air pollutant emissions and characterize impacts, and strategies to mitigate impacts (SBAPCD 2017). SBAPCD also adopted its Environmental Review Guidelines pursuant to CEQA, which contains procedures for environmental review, adopted thresholds of significance, time limits, fees, forms, and District-approved exemptions to CEQA review (SBAPCD 2015).

City of Goleta General Plan

The City of Goleta General Plan Conservation Element is intended to guide land use planning by providing goals and policies to preserve air quality. Goals and policies that are applicable to the project include:

Policy CE 12 Protection of Air Quality: To maintain and promote a safe and healthy environment by protecting air quality and minimizing pollutant emissions from new development and from transportation sources

CE 12.2 Control of Air Emissions from New Development: The following shall apply to reduction of air emissions from new development:

- a. Any development proposal that has the potential to increase emissions of air pollutants shall be referred to the Santa Barbara County Air Pollution Control District for comments and recommended conditions prior to final action by the City.
- b. All new commercial and industrial sources shall be required to use the best available air pollution control technology. Emissions control equipment shall be properly maintained to ensure efficient and effective operation.
- c. Wood-burning fireplace installations in new residential development shall be limited to low-emitting state- and U.S. EPA- certified fireplace inserts and woodstoves, pellet stoves, or natural gas fireplaces. In locations near monarch butterfly Environmentally Sensitive Habitat Areas (ESHA), fireplaces shall be limited to natural gas.
- d. Adequate buffers between new sources and sensitive receptors shall be required.
- e. Any permit required by the Santa Barbara County Air Pollution Control District shall be obtained prior to issuance of final development clearance by the City.

CE 12.3 Control of Emissions during Grading and Construction: Construction site emissions shall be controlled by using the following measures:

- a. Watering active construction areas to reduce windborne emissions.
- b. Covering trucks hauling soil, sand, and other loose materials.
- c. Paving or applying nontoxic solid stabilizers on unpaved access roads and temporary parking areas.
- d. Hydroseeding inactive construction areas.
- e. Enclosing or covering open material stockpiles.
- f. Revegetating graded areas immediately upon completion of work.

4.1.3 Impact Analysis

a. Methodology and Significance Thresholds

Methodology

Expected air pollutant emissions from construction and operation of the project were estimated using the CalEEMod version 2016.3.2, based on information provided by the project applicant and CalEEMod default values for projects in Santa Barbara County when project specifics were not known.

Construction

Construction of the proposed project was assumed to begin in August 2022 and conclude August 2023, pursuant to the project schedule, with full operation anticipated to begin in 2024. The model assumed the depot structure would be 9,000 square-feet as a conservative approach. The model included 39,800 square-feet of demolition for the existing on-site warehouse, and also assumed up to 15,000 square-feet of soil export during construction. Construction equipment estimates used CalEEMod assumptions, which are based on surveys of construction projects within California conducted by members of CAPCOA (CAPCOA 2017). If construction is delayed or occurs over a longer period, emissions could be reduced because of (1) a more modern and cleaner burning construction equipment fleet mix than assumed in the CalEEMod, and/or (2) a less intensive buildout schedule (i.e., fewer daily emissions occurring over a longer time interval).

Operation

Operational emissions include mobile source emissions, energy emissions, and area source emissions from the proposed Depot. Mobile source emissions were quantified based on traffic volumes provided in the Traffic Impact Analysis prepared by Linscott, Law & Greenspan (TIA; Appendix F). CalEEMod defaults were used for the remaining operational inputs. See Appendix C for detailed modeling assumptions.

Significance Thresholds

The following thresholds are based on Appendix G of the *State CEQA Guidelines*. Impacts would be significant if the project would:

- Conflict with or obstruct implementation of the applicable air quality plan;
- Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is nonattainment under an applicable federal or state ambient air quality standard;
- Expose sensitive receptors to substantial pollutant concentrations; or
- Result in other emissions (such as those leading to odors) adversely affecting a substantial number of people.

As stated in the *State CEQA Guidelines*, the significance criteria established by the regional air quality management or air quality pollution control district may be relied upon to make determinations. SBAPCD's recommended significance criteria are described in its *Environmental Review Guidelines* and are included below.

Construction Emissions Thresholds

APCD does not currently have quantitative thresholds of significance for short-term construction emissions. However, CEQA requires that the short-term impacts such as exhaust emissions from construction equipment and fugitive dust generation during grading be analyzed. SBAPCD recommends that construction-related NO_x, ROG, PM₁₀, and PM_{2.5} emissions, from diesel and gasoline powered equipment, paving, and other activities, be quantified.

According to the SBAPCD's *Scope and Content of Air Quality Sections in Environmental Documents*, SBAPCD uses 25 tons per year for all pollutants except for CO as a guideline for determining the significance of construction impacts (SBAPCD 2017).

Standard dust control measures must be implemented for any discretionary project involving earthmoving activities, regardless of size or duration. According to the SBAPCD, proper implementation of these required measures reduces fugitive dust emissions to a level that is less than significant (SBAPCD 2017). Therefore, all construction activity would be required to incorporate the SBAPCD requirements pertaining to minimizing construction-related emissions and demolition of existing structures. The City of Goleta also requires implementation of standard emission and dust control techniques for all construction, as outlined in the General Plan/Community Land Use Planning Policy (GP/CLUP) Policy CE 12.3

Operational Emissions Thresholds

As described in SBAPCD's *Scope and Content of Air Quality Sections in Environmental Documents* and in *Environmental Review Guidelines*, a project will have a significant air quality effect on the environment if operation would:

- Emit (from all sources, both stationary and mobile) more than 240 lbs/day for ROG and NO_x or more than 80 lbs/day for PM₁₀.
- Emit more than 25 lbs/day of NO_x or ROG from motor vehicle trips only.
- Cause or contribute to a violation of any California or National Ambient Air Quality Standard (except ozone).
- Exceed the APCD health risk public notification thresholds adopted by the APCD Board (10 excess cancer cases in a million for cancer risk and a Hazard Index of more than 1.0 for non-cancer risk).
- Be inconsistent with the latest adopted federal and state air quality plans for Santa Barbara County.

There is no daily operational threshold for CO. CO is in attainment and due to the relatively low background ambient CO levels in Santa Barbara County, localized CO impacts associated with congested intersections are not expected to exceed the CO health-related air quality standards (SBAPCD 2017).

b. Project Impacts and Mitigation Measures

Threshold: Would the project conflict with or obstruct implementation of the applicable air quality plan?
--

Impact AQ-1 THE PROJECT WOULD NOT DIRECTLY OR INDIRECTLY INCREASE GROWTH IN THE AREA AND WOULD HELP MEET VMT REDUCTION AND TRANSPORTATION CONTROL MEASURES SET FORTH IN SBAPCD'S 2019 OZONE PLAN. THERE WOULD BE NO IMPACTS.

The emission projections used to develop the SBAPCD 2019 Ozone Plan are based on growth profiles, vehicle trends and vehicle miles traveled (VMT). As such, projects that propose development that is consistent with the growth anticipated by the City's General Plan would be consistent with the Clean Air 2019 Ozone Plan. In addition, a project would be inconsistent with the 2019 Ozone Plan if it would fail to incorporate all applicable control measures and transportation control measures.

As discussed in Section 13, *Population and Housing*, of the Initial Study included as Appendix A, the proposed Depot would serve local and statewide residents utilizing Amtrak's Pacific Surfliner rail service to and from the Central Coast. The project has no residential or commercial uses and would not directly or indirectly increase population growth. In addition, one of the main goals of the project is to reduce overall VMT in the region, consistent with the 2019 Ozone Plan. The proposed Depot would provide amenities for train riders such as indoor waiting areas, restrooms, increased parking and drop-off locations, and improved safety features, which are expected to increase ridership on Amtrak's Pacific Surfliner. It is estimated the Depot would reduce overall VMT in the area by approximately six million miles per year (SBCAG 2018). The project would not conflict with the transportation control measures and would help implement transportation control measure T-5, *Improve Commuter Public Transit Service*. There are no other control measures in the 2019 Ozone Plan that are applicable to the proposed project. Therefore, the proposed project would not conflict with or obstruct the implementation of the 2019 Ozone Plan and there would be no impacts.

Mitigation Measures

No mitigation measures would be required.

Significance After Mitigation

No impacts would result.

Threshold: Would the project result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable federal or state ambient air quality standard?

Impact AQ-2 CONSTRUCTION AND OPERATIONAL EMISSIONS WOULD NOT EXCEED SBAPCD'S THRESHOLDS AND WOULD COMPLY WITH ALL OF SBAPCD'S REQUIRED EMISSIONS REDUCTION MEASURES. THIS IMPACT WOULD BE LESS THAN SIGNIFICANT.

Construction

Construction of the Depot would generate temporary emissions of air pollutants. Ozone precursors (NO_x and ROG) as well as CO and diesel exhaust PM (exhaust PM_{2.5} and PM₁₀) would be emitted by construction equipment, while fugitive dust (PM₁₀) would be emitted by activities that disturb the soil, such as demolition, grading and excavation, road construction, and building construction. Table 4.1-4 shows the estimated maximum daily construction emissions each year during construction.

Table 4.1-4 Estimated Annual Construction Emissions

Construction Year	Maximum Emissions (pounds/day)					
	ROG	SO _x	NO _x	CO	PM ₁₀	PM _{2.5}
2022 Maximum	1.2	0.1	22.3	12.9	4.7	1.1
2023 Maximum	21.1	<0.1	6.5	7.3	0.4	0.3
Maximum	21.1	0.1	22.3	12.9	4.7	1.1
SBAPCD Regional Thresholds	25	-	25	-	25	25
Threshold Exceeded?	No	-	No	-	No	No

Source: CalEEMod Outputs, Appendix C

As shown in Table 4.1-4, the maximum potential annual construction emissions associated with the project would not exceed the SBCAPCD's guideline of 25 tons per year for all pollutants except for CO, which is used for determining significance of construction exhaust emissions. Therefore, impacts to air quality during pre-construction export and construction activities would not violate any air quality standards or contribute substantially to existing or projected air quality violations. In addition, SBCAPCD requires construction emissions and dust control measures for all projects involving earthmoving activities regardless of size or duration. According to the SBCAPCD's *Scope and Content of Air Quality Sections in Environmental Documents* (SBAPCD 2017), implementation of required dust control measures results in fugitive dust emissions that are less than significant. The measures include:

- During construction, use water trucks or sprinkler systems to keep all areas of vehicle movement damp enough to prevent dust from leaving the site. At a minimum, this should include wetting down such areas in the late morning and after work is completed for the day. Increased watering frequency should be required whenever the wind speed exceeds 15 mph. Reclaimed water should be used whenever possible. However, reclaimed water should not be used in or around crops for human consumption.
- Minimize amount of disturbed area and reduce on site vehicle speeds to 15 miles per hour or less.

- If importation, exportation and stockpiling of fill material is involved, soil stockpiled for more than two days should be covered, kept moist, or treated with soil binders to prevent dust generation. Trucks transporting fill material to and from the site should be tarped from the point of origin.
- Gravel pads should be installed at all access points to prevent tracking of mud onto public roads.
- After clearing, grading, earth moving or excavation is completed, treat the disturbed area by watering, or revegetating, or by spreading soil binders until the area is paved or otherwise developed so that dust generation will not occur.
- The contractor or builder should designate a person or persons to monitor the dust control program and to order increased watering, as necessary, to prevent transport of dust offsite. Their duties should include holiday and weekend periods when work may not be in progress. The name and telephone number of such persons should be provided to the Air Pollution Control District prior to grading/building permit issuance and/or map clearance.

The project would implement the above measures as construction best management practices. With implementation of SBAPCD construction and dust control measures, construction emission impacts would be less than significant.

Operation

Operational emissions are those associated with the general operation and use of the Depot after construction. Operational emissions are those associated with vehicle trips, natural gas use, and area sources, such as landscaping, consumption of consumer products, and off-gassing from architectural coatings. Emissions associated with Project-generated daily traffic were estimated based on the trip generation rates provided in the TIA. Table 4.1-5 shows the maximum daily operational emissions resulting from the operation of the Depot.

Table 4.1-5 Estimated Operation Emissions

Source	Maximum Emissions (pounds/day)				
	ROG	NO _x	CO	PM ₁₀	PM _{2.5}
Area Emissions	0.2	<0.1	<0.1	0	0
Mobile Emissions	0.5	1.4	3.0	0.9	0.2
Combined Emissions	0.7	1.4	3.9	0.9	0.2
Mobile Threshold	25	25	-	-	-
Combined Threshold	240	240	-	80	-
Exceed Thresholds?	No	No	-	No	-

Source: CalEEMod Outputs, Appendix C

As shown in Table 4.1-5, the emissions generated by operation of the proposed Depot would not exceed SBAPCD's regional thresholds for criteria pollutants. Therefore, the project would not contribute substantially to an existing or projected air quality violation and impacts would be less than significant.

Mitigation Measures

No mitigation measures would be required.

Significance After Mitigation

Impacts would be less than significant without mitigation.

Threshold: Would the project expose sensitive receptors to substantial pollutant concentrations?

Impact AQ-3 THE PROJECT DOES NOT INCLUDE ANY SENSITIVE USES AND WOULD NOT RESULT IN THE EMISSIONS OF TACS OR OTHER AIR CONTAMINANTS DURING CONSTRUCTION OR OPERATION WHICH WOULD SIGNIFICANTLY IMPACT SENSITIVE RECEPTORS. IMPACTS WOULD BE LESS THEN SIGNIFICANT.

Land uses such as schools, daycare centers, hospitals, or senior centers are sensitive to poor air quality conditions because infants, the elderly, and people with respiratory ailments are more susceptible to air quality-related health problems than the general public. Residential areas are also considered sensitive to air pollution because residents (including children and the elderly) tend to be at home for extended periods of time, resulting in sustained exposure to any pollutants present. The project does not propose a sensitive land use and the nearest sensitive receptors are residential neighborhoods located 500 feet north of the project site, across U.S. 101.

Criteria Pollutants

Construction and operation of the project would result in the release of criteria pollutants such as suspended particles, ozone, and carbon monoxide. As shown in Table 4.1-4 and Table 4.1-5, the project would not generate criteria air pollutant emissions that would exceed adopted SBAPCD emissions thresholds during construction or operational activities or project operation.

A CO hotspot is a localized concentration of CO that is above a CO ambient air quality standard. Localized CO hotspots can occur at intersections with heavy peak hour traffic. Specifically, hotspots can be created at intersections where traffic levels are sufficiently high such that the local CO concentration exceeds the federal one-hour standard of 35.0 ppm or the federal and state eight-hour standard of 9.0 ppm (CARB 2016). SBCAPCD is in conformance with state and federal CO standards, establishing low background concentrations of CO. As discussed in Section 4.5, *Transportation*, the project would have a relatively small trip generation of approximately 351 daily trips and the intersections in the area are not congested. Based on the low background level of CO in the project area, low trip generation and intersection operation in the area, improving vehicle emissions standards for new cars in accordance with state and federal regulations, and the project's low level of operational CO emissions, the project would not create new hotspots or contribute substantially to existing hotspots.

In addition, standard dust control measures would be implemented for the project pursuant to SBAPCD. Therefore, the project would not expose sensitive receptors to substantial criteria pollutant concentrations. Therefore, the project would not impact nearby sensitive receptors.

Toxic Air Contaminants

Construction-related activities would result in temporary project-generated emissions of DPM exhaust emissions from off-road, heavy-duty diesel equipment for site preparation, grading, building construction, and other construction activities (exhaust PM_{2.5} and PM₁₀). A majority of DPM emissions is in the form of PM_{2.5} while some is in the form of PM₁₀. DPM was identified as a toxic air contaminant (TAC) by CARB in 1998. Generation of DPM from construction projects typically occurs in a single area for a short period. According to the OEHHA, health risk assessments, which

determine the exposure of sensitive receptors to toxic emissions, should be based on a 70-year exposure period; however, such assessments should be limited to the period/duration of activities associated with the project.

The maximum DPM emissions would occur during site preparation and grading activities. These activities would last up to three months. DPM emissions would decrease for the remaining construction period because construction activities such as building construction and architectural coating would require less construction equipment. While the maximum DPM emissions associated with site preparation and grading activities would only occur for a portion of the overall construction period, these activities represent the estimated worst-case condition for the total construction period. This would represent less than one percent of the total exposure period for health risk calculation of 70 years. In addition, as shown in Table 4.1-4 under Impact AQ-2 above, PM_{2.5} and PM₁₀ emissions would not exceed SBAPCD thresholds during any stage of construction. Therefore, DPM emissions would not create DPM generated by project construction would not create conditions where the probability is greater than one in one million of contracting cancer for the Maximally Exposed Individual (the individual who would be the most at risk for exposure) or to generate ground-level concentrations of non-carcinogenic TACs that exceed a Hazard Index greater than one for the Maximally Exposed Individual. Emissions from construction activities would not result in significant health impacts.

Operation of the project would include the operation of the proposed Depot and would not result in DPM from off-road, heavy-duty diesel equipment which could create health impacts. Therefore, the project would not expose sensitive receptors to significant pollutant concentrations and impacts would be less than significant.

Mitigation Measures

No mitigation measures would be required.

Significance After Mitigation

Impacts would be less than significant without mitigation.

Threshold: Would the project result in other emissions (such as those leading to odors) adversely affecting a substantial number of people?
--

Impact AQ-4 THE PROJECT DOES NOT CONTAIN USES THAT WOULD GENERATE SIGNIFICANT ODOR IMPACTS. THIS IMPACT WOULD BE LESS THAN SIGNIFICANT.

SBAPCD's *Scope and Content of Air Quality Sections in Environmental Documents* states that certain projects such as fast food restaurants, bakeries, and coffee roasting facilities may have the potential to cause significant odor impacts because of the nature of their operation and their location (SBAPCD 2017). Other uses that are typically associated with significant odor-generating impacts include wastewater treatment plants, landfills, confined animal facilities, composting stations, food manufacturing plants, refineries, and chemical plants.

Odors from construction activities are associated with construction equipment exhaust and the application of asphalt and architectural coatings. Odors emitted from construction activities would be temporary and cease upon completion of project construction. The proposed project does not contain uses that would emit odors and impact surrounding land uses. The train schedule and frequency would not be impacted by the project. The café space within the proposed depot would not result in generation of a high degree of nuisance odors, such as that could be associated with a high-volume food service facility, because it would not be a high-volume food facility. Therefore, impacts would be less than significant.

Mitigation Measures

No mitigation measures would be required.

Significance After Mitigation

Impacts would be less than significant without mitigation.

4.1.4 Cumulative Impacts

The planned and pending projects near the proposed project are listed in Table 3-1 (Section 3, *Environmental Setting*). Cumulative development in the City of Goleta and surrounding areas in the County of Santa Barbara and City of Santa Barbara have the potential to contribute to cumulatively significant impact related to existing exceedances of ambient air quality standard, which are the state 24-hour and annual standard for PM₁₀ and the state 1-hour and 8-hour standards for ozone.

Pursuant to Goleta CEQA thresholds, the project would have a significant cumulative impact if it were inconsistent with the adopted federal and state air quality plans of the region. As discussed in Impact AQ-1, the Project would be consistent with the growth assumptions within the 2019 Ozone Plan. In addition, because criteria pollutant emissions and regional thresholds are cumulative in nature and the proposed project's emissions would not exceed regional thresholds as discussed in Impact AQ-2, the project would not result in a cumulatively considerable net increase of criteria pollutants and cumulative impacts would be less than significant.

References

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4.2 Greenhouse Gas Emissions

This section discusses the proposed project's potential impacts related to greenhouse gas (GHG) emissions and climate change. CalEEMod was used to model the project's GHG impact, which is included in this analysis and provided in Appendix C. The project's trip distribution rates used in emissions estimates are based on the Trip Impact Assessment prepared by Linscott, Law & Greenspan in August 2020 and included as Appendix F.

4.2.1 Setting

Climate Change and Greenhouse Gases

Climate change is the observed increase in the average temperature of Earth's atmosphere and oceans along with other substantial changes in climate (such as wind patterns, precipitation, and storms) over an extended period. The term "climate change" is often used interchangeably with the term "global warming," but "climate change" is preferred to "global warming" because it helps convey other changes in addition to rising temperatures. The baseline against which these changes are measured originates in historical records identifying temperature changes that have occurred in the past, such as during previous ice ages. The global climate changes continuously, as evidenced by repeated episodes of substantial warming and cooling documented in the geologic record. The rate of change has typically been incremental, with warming or cooling trends occurring over the course of thousands of years. The past 10,000 years have been marked by a period of incremental warming, as glaciers have steadily retreated across the globe. However, scientists have observed substantial acceleration in the rate of warming during the past 150 years (Intergovernmental Panel on Climate Change [IPCC] 2014). The understanding of anthropogenic warming and cooling influences on climate has led to a high confidence (95 percent or greater chance) that the global average net effect of human activities has been the dominant cause of warming since the mid-twentieth century (IPCC 2014).

Gases that absorb and re-emit infrared radiation in the atmosphere are called GHGs. The gases widely seen as the principal contributors to human-induced climate change include carbon dioxide (CO₂), methane (CH₄), nitrous oxides (N₂O), fluorinated gases such as hydrofluorocarbons and perfluorocarbons, and sulfur hexafluoride (SF₆). Water vapor is excluded from the list of GHGs because it only stays in the atmosphere for a short time and its atmospheric concentrations are largely determined by natural processes, such as oceanic evaporation.

Both natural processes and human activities emit GHGs. CO₂ and CH₄ are emitted in the greatest quantities from human activities. CO₂ emissions are largely by-products of fossil fuel combustion, whereas CH₄ results from off-gassing associated with agricultural practices and landfills. Observations of CO₂ concentrations, globally averaged temperature, and sea level rise are generally well within the range of the extent of the earlier IPCC projections. Recently observed increases in CH₄ and N₂O concentrations are smaller than those assumed in the scenarios in the previous assessments. Each IPCC assessment used new projections of future climate change that have become more detailed as the models have become more advanced.

Manmade GHGs include fluorinated gases, such as SF₆ many of which have greater heat-absorption potential than CO₂. Different types of GHGs have varying global warming potentials (GWP). The GWP of a GHG is the potential of a gas or aerosol to trap heat in the atmosphere over a specified timescale (generally 100 years). Because GHG absorb different amounts of heat, a common

reference gas (CO₂) is used to relate the amount of heat absorbed to the amount of the gas emissions, referred to as “carbon dioxide equivalent” (CO₂e), and is the amount of a GHG emitted multiplied by its GWP. CO₂ has a 100-year GWP of one. By contrast, CH₄ has a GWP of 25, meaning its global warming effect is 25 times greater than CO₂ on a molecule per molecule basis (IPCC 2007).

The accumulation of GHGs in the atmosphere regulates the earth’s temperature. Without the natural heat trapping effect of GHGs, Earth’s surface would be about 93 degrees °F cooler (California Environmental Protection Agency 2006). However, emissions from human activities, particularly the consumption of fossil fuels for electricity production and transportation, have elevated the concentration of these gases in the atmosphere beyond the level of naturally occurring concentrations.

Greenhouse Gas Inventory

Global

Worldwide anthropogenic emissions of GHG were approximately 46,000 million metric tons (MMT, or gigatonne) of CO₂e in 2010 (IPCC 2014). CO₂ emissions from fossil fuel combustion and industrial processes contributed about 65 percent of total emissions in 2010. Of anthropogenic GHGs, CO₂ was the most abundant accounting for 76 percent of total 2010 emissions. CH₄ emissions accounted for 16 percent of the 2010 total, while N₂O and fluorinated gases account for six and two percent, respectively (IPCC 2014).

Federal

Total United States GHG emissions were 6,456.7 MMT of CO₂e in 2017 (U.S. EPA 2019). Since 1990, total United States emissions have increased by an average annual rate of 0.04 percent, for a total increase of 1.3 percent since 1990. However, emissions decreased by 0.5 percent from 2016 to 2017. The decrease from 2016 to 2017 was a result of multiple factors, including (1) a continued shift from coal to natural gas and other non-fossil fuel energy sources in the electric power sector and (2) milder weather in 2017 resulting in overall decreased electricity usage. In 2017, the industrial and transportation end-use sectors accounted for 30 percent and 29 percent, respectively, of GHG emissions while the residential and commercial end-use sectors accounted for 15 percent and 16 percent of GHG emissions, respectively, with electricity emissions distributed among the various sectors.

California

Based on the CARB California GHG Inventory for 2000-2017, California produced 424.1 MMT of CO₂e in 2017. Transportation is the major source of GHG emissions in California, contributing 41 percent of the state’s total GHG emissions. The industrial sector is the second largest source, contributing 24 percent of the state’s GHG emissions, and electric power accounts for approximately 15 percent (CARB 2019). California emissions are due in part to its large size and large population compared to other states. In 2016, the State of California achieved its 2020 GHG emission reduction targets as emissions fell below 431 MMT of CO₂e (CARB 2019).

City of Goleta Emissions Inventory

The City of Goleta conducted a GHG emissions inventory in the City for 2007, which represents the baseline inventory, or existing conditions in the City. The inventory determined the City produced 325,532 MT CO₂e, excluding stationary sources, which is equivalent to the annual GHG emissions

generated by approximately 68,000 passenger vehicles (Goleta 2014). The major source of GHG emissions in the City are associated with transportation, which contributed 48 percent of the City's total GHG emissions, followed by building energy (electricity and natural gas use) at 44 percent (Goleta 2014).

Potential Effects of Climate Change

Globally, climate change has the potential to affect numerous environmental resources though potential impacts related to future air temperatures and precipitation patterns. Scientific modeling predicts that continued GHG emissions at or above current rates would induce more extreme climate changes during the 21st century than were observed during the 20th century. Long-term trends have found that each of the past three decades have been warmer than all the previous decades in the instrumental record, and the decade from 2000 through 2010 has been the warmest. The observed global mean surface temperature (GMST) for the decade from 2006 to 2015 was approximately 0.87 degrees Celsius (°C) (0.75°C to 0.99°C) higher than the average GMST over the period from 1850 to 1900. Furthermore, several independently analyzed data records of global and regional Land-Surface Air Temperature (LSAT) obtained from station observations are in agreement that LSAT as well as sea surface temperatures have increased. Due to past and current activities, anthropogenic GHG emissions are increasing global mean surface temperature at a rate of 0.2°C per decade. In addition to these findings, there are identifiable signs that global warming is currently taking place, including substantial ice loss in the Arctic over the past two decades (IPCC 2014 and 2018).

According to *California's Fourth Climate Change Assessment*, statewide temperatures from 1986 to 2016 were approximately 1°F to 2°F higher than those recorded from 1901 to 1960. Potential impacts of climate change in California may include loss in water supply from snowpack, sea level rise, more extreme heat days per year, more large forest fires, and more drought years (State of California 2018). While there is growing scientific consensus about the possible effects of climate change at a global and statewide level, current scientific modeling tools are unable to predict what local impacts may occur with a similar degree of accuracy. In addition to statewide projections, *California's Fourth Climate Change Assessment* includes regional reports that summarize climate impacts and adaptation solutions for nine regions of the state as well as regionally-specific climate change case studies (State of California 2018). Below is a summary of some of the potential effects that could be experienced in California and the Central Coast region as a result of climate change.

Air Quality

Higher temperatures, which are conducive to air pollution formation, could worsen air quality in California. Climate change may increase the concentration of ground-level ozone, but the magnitude of the effect, and therefore its indirect effects, are uncertain. As temperatures have increased in recent years, the area burned by wildfires throughout the state has increased, and wildfires have been occurring at higher elevations in the Sierra Nevada Mountains (State of California 2018). If higher temperatures continue to be accompanied by an increase in the incidence and extent of large wildfires, air quality would worsen. However, if higher temperatures are accompanied by wetter, rather than drier conditions, the rains would tend to temporarily clear the air of particulate pollution and reduce the incidence of large wildfires, thereby ameliorating the pollution associated with wildfires. Additionally, severe heat accompanied by drier conditions and poor air quality could increase the number of heat-related deaths, illnesses, and asthma attacks throughout the state (California Natural Resources Agency 2009).

Water Supply

Analysis of paleoclimatic data (such as tree-ring reconstructions of stream flow and precipitation) indicates a history of naturally and widely varying hydrologic conditions in California and the west, including a pattern of recurring and extended droughts. Uncertainty remains with respect to the overall impact of climate change on future precipitation trends and water supplies in California. This uncertainty regarding future precipitation trends complicates the analysis of future water demand, especially where the relationship between climate change and its potential effect on water demand is not well understood. However, the average early spring snowpack in the western United States, including the Sierra Nevada Mountains, decreased by about 10 percent during the last century. During the same period, sea level rose over 5.9 inches along the central and southern California coast (State of California 2018). The Sierra snowpack provides the majority of California's water supply by accumulating snow during the state's wet winters and releasing it slowly during the state's dry springs and summers. A warmer climate is predicted to reduce the fraction of precipitation falling as snow and result in less snowfall at lower elevations, thereby reducing the total snowpack (DWR 2008; State of California 2018). The State of California projects that average spring snowpack in the Sierra Nevada and other mountain catchments in central and northern California will decline by approximately 66 percent from its historical average by 2050 (State of California 2018).

Hydrology and Sea Level Rise

As discussed above, climate change could potentially affect the amount of snowfall, rainfall, and snow pack; the intensity and frequency of storms; flood hydrographs (flash floods, rain or snow events, coincidental high tide and high runoff events); sea level rise and coastal flooding; coastal erosion; and the potential for salt water intrusion. Climate change has the potential to induce substantial sea level rise in the coming century (State of California 2018). The rising sea level increases the likelihood and risk of flooding. The rate of increase of global mean sea levels over the 2001-2010 decade, as observed by satellites, ocean buoys and land gauges, was approximately 3.2 mm per year, which is double the observed 20th century trend of 1.6 mm per year (World Meteorological Organization [WMO] 2013). As a result, global mean sea levels averaged over the last decade were about 8 inches higher than those of 1880 (WMO 2013). Sea levels are rising faster now than in the previous two millennia, and the rise is expected to accelerate, even with robust GHG emission control measures. The most recent IPCC report predicts a mean sea-level rise of 10 to 37 inches by 2100 (IPCC 2018). A rise in sea levels could completely erode 31 to 67 percent of southern California beaches, result in flooding of approximately 370 miles of coastal highways during 100-year storm events, jeopardize California's water supply due to salt water intrusion, and induce groundwater flooding and/or exposure of buried infrastructure (State of California 2018). In addition, increased CO₂ emissions can cause oceans to acidify due to the carbonic acid it forms. Increased storm intensity and frequency could affect the ability of flood-control facilities, including levees, to handle storm events.

Wildfire

Climate change and the potential resulting changes in weather patterns could have ecological effects on a global and local scale. Increasing concentrations of GHGs are likely to accelerate the rate of climate change. Scientists project that the annual average maximum daily temperatures in California could rise by 4.4 to 5.8°F in the next 50 years and by 5.6 to 8.8°F in the next century (State of California 2018a). Soil moisture is likely to decline in many regions, and intense rainstorms are likely to become more frequent. Rising temperatures could have four major impacts on plants and animals related to (1) timing of ecological events; (2) geographic distribution and range; (3) species'

composition and the incidence of nonnative species within communities; and (4) ecosystem processes, such as carbon cycling and storage (Parmesan 2006; State of California 2018). Many of the impacts identified above would impact ecosystems and wildlife in the Central Coast region. Increases in wildfire would further remove sensitive habitat; increased severity in droughts would potentially starve plants and animals of water; and sea level rise will affect sensitive coastal ecosystems.

Agriculture

California has a \$50 billion annual agricultural industry that produces over a third of the country's vegetables and two-thirds of the country's fruits and nuts (California Department of Food and Agriculture 2018). Higher CO₂ levels can stimulate plant production and increase plant water-use efficiency. However, if temperatures rise and drier conditions prevail, certain regions of agricultural production could experience water shortages of up to 16 percent; water demand could increase as hotter conditions lead to the loss of soil moisture; crop-yield could be threatened by water-induced stress and extreme heat waves; and plants may be susceptible to new and changing pest and disease outbreaks (State of California 2018). In addition, temperature increases could change the time of year certain crops, such as wine grapes, bloom or ripen, and thereby affect their quality (California Climate Change Center 2006).

Ecosystems and Wildlife

Climate change and the potential resulting changes in weather patterns could have ecological effects on a global and local scale. Increasing concentrations of GHGs are likely to accelerate the rate of climate change. Scientists project that the annual average maximum daily temperatures in California could rise by 4.4 to 5.8°F in the next 50 years and by 5.6 to 8.8°F in the next century (State of California 2018). Soil moisture is likely to decline in many regions, and intense rainstorms are likely to become more frequent. Rising temperatures could have four major impacts on plants and animals related to (1) timing of ecological events; (2) geographic distribution and range; (3) species' composition and the incidence of nonnative species within communities; and (4) ecosystem processes, such as carbon cycling and storage (Parmesan 2006; State of California 2018).

4.2.2 Regulatory Setting

Federal Regulations

Federal GHG Emissions Regulation

The U.S. Supreme Court in *Massachusetts et al. v. Environmental Protection Agency et al.* ([2007] 549 U.S. 05-1120) held that the U.S. EPA has the authority to regulate motor-vehicle GHG emissions under the federal Clean Air Act. The U.S. EPA issued a Final Rule for mandatory reporting of GHG emissions in October 2009. This Final Rule applies to fossil fuel suppliers, industrial gas suppliers, direct GHG emitters, and manufacturers of heavy-duty and off-road vehicles and vehicle engines and requires annual reporting of emissions. In 2012, the U.S. EPA issued a Final Rule that establishes the GHG permitting thresholds that determine when CAA permits under the New Source Review Prevention of Significant Deterioration (PSD) and Title V Operating Permit programs are required for new and existing industrial facilities.

In 2014, the U.S. Supreme Court in *Utility Air Regulatory Group v. EPA* (134 S. Ct. 2427 [2014]) held that U.S. EPA may not treat GHGs as an air pollutant for purposes of determining whether a source

is a major source required to obtain a PSD or Title V permit. The Court also held that PSD permits that are otherwise required (based on emissions of other pollutants) may continue to require limitations on GHG emissions based on the application of BACT.

California Regulations

CARB is responsible for the coordination and oversight of State and local air pollution control programs in California. California has numerous regulations aimed at reducing the state's GHG emissions. These initiatives are summarized below.

Assembly Bill 1493

AB 1493 (2002), California's Advanced Clean Cars program (referred to as Pavley), requires CARB to develop and adopt regulations to achieve "the maximum feasible and cost-effective reduction of GHG emissions from motor vehicles." On June 30, 2009, U.S. EPA granted the waiver of CAA preemption to California for its GHG emission standards for motor vehicles beginning with the 2009 model year. Pavley I regulates model years from 2009 to 2016 and Pavley II, which is now referred to as "LEV (Low Emission Vehicle) III GHG", regulates model years from 2017 to 2025. The Advanced Clean Cars program coordinates the goals of the LEV, Zero Emissions Vehicles, and Clean Fuels Outlet programs, and would provide major reductions in GHG emissions. By 2025, when the rules will be fully implemented, new automobiles will emit 34 percent fewer GHGs and 75 percent fewer smog-forming emissions from their model year 2016 levels (CARB 2011).

Assembly Bill 32

California's major initiative for reducing GHG emissions is outlined in AB 32, the "California Global Warming Solutions Act of 2006," which was signed into law in 2006. AB 32 codifies the statewide goal of reducing GHG emissions to 1990 levels by 2020 and requires CARB to prepare a Scoping Plan that outlines the main State strategies for reducing GHGs to meet the 2020 deadline. AB 32 requires CARB to adopt regulations to require reporting and verification of statewide GHG emissions. Based on this guidance, CARB approved a 1990 statewide GHG level and 2020 limit of 427 million MTCO₂e. The Scoping Plan was approved by CARB on December 11, 2008 and included measures to address GHG emission reduction strategies related to energy efficiency, water use, and recycling and solid waste, among other measures. Many of the GHG reduction measures included in the Scoping Plan (e.g., Low Carbon Fuel Standard, Advanced Clean Car standards, Cap-and-Trade, etc.) have been adopted since approval of the Scoping Plan.

Senate Bill 32

SB 32, signed into law on September 8, 2016, extends AB 32 by requiring the State to further reduce GHGs to 40 percent below 1990 levels by 2030 (the other provisions of AB 32 remain unchanged). On December 14, 2017, CARB adopted the 2017 Scoping Plan, which provides a framework for achieving the 2030 target. The 2017 Scoping Plan relies on the continuation and expansion of existing policies and regulations, such as the Cap-and-Trade Program, as well as implementation of recently adopted policies and policies, such as SB 350 and SB 1383 (see below). The 2017 Scoping Plan also puts an increased emphasis on innovation, adoption of existing technology, and strategic investment to support its strategies. As with the 2013 Scoping Plan Update, the 2017 Scoping Plan does not provide project-level thresholds for land use development. Instead, it recommends that local governments adopt policies and locally appropriate quantitative thresholds consistent with statewide per capita goals of six MTCO₂e by 2030 and two MTCO₂e by 2050 (CARB 2017). As stated

in the 2017 Scoping Plan, these goals may be appropriate for plan-level analyses (city, county, sub-regional, or regional level), but not for specific individual projects because they include all emissions sectors in the State (CARB 2017).

Senate Bill 100

Adopted on September 10, 2018, SB 100 supports the reduction of GHG emissions from the electricity sector by accelerating the State’s Renewables Portfolio Standard (RPS) Program, which was last updated by SB 350 in 2015. SB 100 requires electricity providers to increase procurement from eligible renewable energy resources to 33 percent of total retail sales by 2020, 60 percent by 2030, and 100 percent by 2045.

Senate Bill 97

Senate Bill (SB) 97, signed in August 2007, acknowledges that climate change is an environmental issue that requires analysis in CEQA documents. In March 2010, the California Natural Resources Agency (Resources Agency) adopted amendments to the State CEQA Guidelines for the feasible mitigation of GHG emissions or the effects of GHG emissions. The adopted guidelines give lead agencies the discretion to set quantitative or qualitative thresholds for the assessment and mitigation of GHG and climate change impacts.

Senate Bill 375

SB 375, signed in August 2008, enhances the state’s ability to reach AB 32 goals by directing CARB to develop regional GHG emission reduction targets to be achieved from passenger vehicles by 2020 and 2035. In addition, SB 375 directs each of the state’s 18 major Metropolitan Planning Organizations (MPOs) to prepare a “sustainable communities strategy” (SCS) that contains a growth strategy to meet these emission targets for inclusion in the Regional Transportation Plan (RTP). On March 22, 2018, CARB adopted updated regional targets for reducing GHG emissions from 2005 levels by 2020 and 2035. The Association of Bay Area Governments (ABAG) was assigned targets of a 10 percent reduction in GHGs from transportation sources by 2020 and a 19 percent reduction by 2035 (CARB 2018b). ABAG’s Plan Bay Area RTP/SCS per-capita CO₂ emissions reductions meet and exceed the SB 375 target for year 2035 due to robust funding of the Climate Initiatives Program.

Senate Bill 1383

Adopted in September 2016, SB 1383 requires CARB to approve and begin implementing a comprehensive strategy to reduce emissions of short-lived climate pollutants. The bill requires the strategy to achieve the following reduction targets by 2030:

- Methane – 40 percent below 2013 levels
- Hydrofluorocarbons – 40 percent below 2013 levels
- Anthropogenic black carbon – 50 percent below 2013 levels

The bill also requires the California Department of Resources Recycling and Recovery (CalRecycle), in consultation with the CARB, to adopt regulations that achieve specified targets for reducing organic waste in landfills.

Executive Order S-B-05

In Jun 2005, the former Governor Arnold Schwarzenegger issued Executive Order S-B-05, which established statewide greenhouse gas reduction targets of 1990 levels by 2020 and 80 percent below 1990 levels by 2050.

Executive Order B-55-18

On September 10, 2018, the governor issued Executive Order B-55-18, which established a new statewide goal of achieving carbon neutrality by 2045 and maintaining net negative emissions thereafter. This goal is in addition to the existing statewide GHG reduction targets established by SB 375, SB 32, SB 1383, and SB 100.

California Integrated Waste Management Act (Assembly Bill 341)

The California Integrated Waste Management Act of 1989, as modified by AB 341, requires each jurisdiction's source reduction and recycling element to include an implementation schedule that shows: diversion of 25 percent of all solid waste by January 1, 1995, through source reduction, recycling, and composting activities; diversion of 50 percent of all solid waste on and after January 1, 2000; and diversion of 75 percent of all solid waste by 2020, and annually thereafter. CalRecycle is required to develop strategies to implement AB 341, including source reduction.

California Building Standards Code

The California Code of Regulations, Title 24, is referred to as the California Building Code. It consists of a compilation of several distinct standards and codes related to building construction including plumbing, electrical, interior acoustics, energy efficiency, handicap accessibility, and so on. The California Building Code's energy efficiency and green building standards are outlined below.

PART 6 – BUILDING ENERGY EFFICIENCY STANDARDS

The California Code of Regulations, Title 24, Part 6 is the Building Energy Efficiency Standards. This code, originally enacted in 1978, establishes energy-efficiency standards for non-residential buildings to reduce California's energy demand. The Building Energy Efficiency Standards is updated periodically to incorporate and consider new energy-efficiency technologies and methodologies as they become available. New construction and major renovations must demonstrate their compliance with the current Building Energy Efficiency Standards through submission and approval of a Title 24 Compliance Report to the local building permit review authority and the California Energy Commission (CEC).

The 2019 standards focus on these key areas: updated thermal envelope standards (preventing heat transfer from the interior to exterior and vice versa); nonresidential ventilation requirements; and nonresidential lighting requirements (CEC 2019). Under the 2019 standards, nonresidential buildings would be 30 percent more energy efficient compared to the 2016 standards (CEC 2019).

PART 11 – CALIFORNIA GREEN BUILDING STANDARDS

The California Green Building Standards Code, referred to as CALGreen, was added to Title 24 as Part 11 first in 2009 as a voluntary code, which then became mandatory effective January 1, 2011 (as part of the 2010 California Building Code). The 2016 CALGreen institutes mandatory minimum environmental performance standards for all ground-up new construction of non-residential structures. It also includes voluntary tiers (I and II) with stricter environmental performance

standards for these same categories of residential and non-residential buildings. Local jurisdictions must enforce the minimum mandatory Green Building Standards and may adopt additional amendments for stricter requirements.

The mandatory standards require the following practices:

1. 20 percent reduction in indoor water use relative to specified baseline levels
2. 50 percent construction/demolition waste diverted from landfills
3. Inspections of energy systems to ensure optimal working efficiency
4. Use of low pollutant emitting exterior and interior finish materials such as paints, carpets, vinyl flooring, and particleboards
5. Implementation of dedicated circuitry to facilitate installation of electric vehicle (EV) charging stations in newly constructed attached garages for single-family and duplex dwellings
6. Installation of EV charging stations at least three percent of the parking spaces for all new multi-family developments with 17 or more units

The voluntary standards require the following:

1. Tier I—15 percent improvement in energy requirements, stricter water conservation requirements for specific fixtures, 65 percent reduction in construction waste, 10 percent recycled content, 20 percent permeable paving, 20 percent cement reduction, cool/solar reflective roof
2. Tier II—30 percent improvement in energy requirements, stricter water conservation requirements for specific fixtures, 75 percent reduction in construction waste, 15 percent recycled content, 30 percent permeable paving, and 30 percent cement reduction, cool/solar reflective roof

Similar to the compliance reporting procedure for demonstrating Building Energy Efficiency Standards compliance in new buildings and major renovations, compliance with the CALGreen water-reduction requirements must be demonstrated through completion of water use reporting forms for new low-rise residential and non-residential buildings. Buildings must demonstrate a 20 percent reduction in indoor water use by either showing a 20 percent reduction in the overall baseline water use as identified in CALGreen or a reduced per-plumbing-fixture water use rate.

Local Regulations

Goleta Climate Action Plan

Adopted in July of 2014, the City of Goleta's Climate Action Plan (CAP; Goleta 2014) sets a 2020 target to achieve a 11 percent reduction below 2007 community-wide emissions. The CAP also has a 2030 target that is derived based on the linear trajectory between the 2020 reduction target and the 2050 target established by Executive Order S-3- 05, which sets a 2030 target of 26 percent below 2020 levels. The CAP contains GHG reduction measures for building energy efficiency, renewable energy, on-road transportation use, water consumption, off-road transportation equipment, solid waste generation, and municipal measures to meet the GHG reduction targets.

Goleta General Plan/Coastal Land Use Plan

The City of Goleta General Plan Conservation Element (Goleta 2006) is intended to guide land use planning by providing goals and policies to reduce GHG emissions. Goals and policies that are applicable to the project include:

Policy CE 13 Energy Conservation: To promote energy efficiency in future land use and development within Goleta, encourage use of renewable energy sources, and reduce reliance upon fossil fuels

CE 13.4 Energy Conservation for City Facilities and Operations: The City shall implement energy conservation requirements for City-owned facilities at the time of major improvements. Energy conservation measures may include energy-efficient interior and exterior building lighting, energy-efficient street lighting, natural ventilation and solar hot water systems, and landscaping with drought-tolerant species and deciduous trees to shade streets and the south and west sides of buildings in summer. For all City construction projects, the City shall comply with the state's energy conservation building standards set forth in Title 24. The City vehicle fleet shall use a mix of fuels that best achieves energy efficiency while meeting operational needs.

Policy CE 15 Water Conservation and Materials Recycling: To conserve scarce water supply resources and to encourage reduction in the generation of waste materials at the source and recycling of waste materials

CE 15.2 Water Conservation for City Facilities: In order to minimize water use, the City shall upgrade City-owned facilities with low water use plumbing fixtures, water conserving landscaping, low flow irrigation, and reclaimed water for exterior landscaping at the time of major improvements.

CE 15.5 Reduction of Construction Wastes: In instances where demolitions of existing buildings and structures are authorized, it is encouraged that such structures be deconstructed and that structural components, fixtures, and materials be salvaged for future reuse. Provisions for recycling of waste materials at all construction sites, including and demolition sites shall be required

Goleta Green Building Program

The City's Green Building Program took effect January 1, 2013 and was incorporated into Chapter 15.12 of the Goleta Municipal Code. The Program contains voluntary measures and incentives for projects utilizing green building practices. Under the Green Building Program, the City adopted a Green Building Policy under Resolution No. 12-65 for new municipal facilities, which states all new City-owned buildings of 2,000 square feet or greater must meet LEED Silver certification standards except in limited instances.

4.2.3 Impact Analysis

a. Methodology and Significance Thresholds

Methodology

Calculations of CO₂, CH₄, and N₂O emissions are provided to identify the magnitude of potential project effects. The analysis focuses on CO₂, CH₄, and N₂O because these make up 98 percent of all

GHG emissions by volume (IPCC 2014) and are the GHGs the project would emit in the largest quantities. Emissions of all GHGs are converted into their equivalent GWP in terms of CO₂ (CO₂e). Minimal amounts of other GHGs (such as chlorofluorocarbons [CFCs]) would be emitted; however, these other GHG emissions would not substantially add to the total calculated CO₂e amounts. GHG emissions from construction and operation of the project were estimated using CalEEMod version 2016.3.2 based on project-specific information. The input data and subsequent construction and operation GHG emission estimates for development facilitated by the project are discussed below, and the CalEEMod output files are included in Appendix C.

Construction Emissions

Project construction emissions were estimated based on:

- anticipated start and finish dates of construction activity
- inventories of construction equipment to be used
- areas to be excavated and graded
- volumes of materials to be exported from and imported to the project site.

The analysis assessed maximum daily emissions from individual construction activities, including demolition, site preparation, grading, building construction, paving, and architectural coating. The model assumed the depot structure would be 9,000 square-feet as a conservative approach. The model also assumed up to 15,000 square-feet of soil export during construction, and construction equipment estimates used CalEEMod defaults, which are based on surveys of construction projects within California conducted by members of CAPCOA (CAPCOA 2017).

Operational Emissions

CalEEMod provides operational emissions of CO₂, CH₄, and N₂O. Emissions from energy use include electricity and natural gas use. The emissions factors for natural gas combustion are based on EPA's AP-42 (*Compilation of Air Pollutant Emissions Factors*) and CCAR General Reporting Protocol. Electricity emissions are calculated by multiplying the energy use times the carbon intensity of the utility district per kilowatt hour (CAPCOA 2017). Electricity emissions are calculated by multiplying the energy use times the carbon intensity of the utility district per kilowatt hour (CAPCOA 2017).

Emissions from area sources, including consumer products, landscape maintenance equipment, and architectural coating were calculated in CalEEMod and utilize standard emission rates from CARB, U.S. EPA, and emission factor values provided by the local air district (CAPCOA 2017). Emissions from waste generation were also calculated in CalEEMod and are based on the IPCC's methods for quantifying GHG emissions from solid waste using the degradable organic content of waste (CAPCOA 2017). Waste disposal rates by land use and overall composition of municipal solid waste in California was primarily based on data provided by CalRecycle. Emissions from water and wastewater usage calculated in CalEEMod were based on the default electricity intensity from the CEC's 2006 Refining Estimates of Water-Related Energy Use in California using the average values for northern and southern California.

Mobile source emissions were quantified based on the Traffic Impact Analysis prepared by Linscott, Law & Greenspan. Because CalEEMod does not calculate N₂O emissions from mobile sources, N₂O emissions were quantified using guidance from CARB and the Emission FACTors (EMFAC) 2017 Emissions Inventory for the Santa Barbara County region for the year 2030 using the EMFAC2011 categories.

Non-residential energy usage was reduced by 30 percent to account for the requirements of 2019 Title 24 standards (CEC 2019). In addition, CalEEMod does not incorporate water use reductions achieved by 2016 CALGreen, which requires a 20 percent increase in indoor water use efficiency. Thus, in order to account for compliance with CALGreen, a 20 percent reduction in indoor water use was included in the water consumption calculations. i.e., AB 341).

The project would be served by Southern California Edison (SCE). Therefore, SCE’s energy intensity factors (i.e., the amount of CO₂, CH₄, and N₂O emitted per megawatt-hour supplied) were used to calculate GHG emissions. As of 2012, SCE procured 20.6 percent of its electricity from renewable sources (SCE 2012). Per SB 100, the statewide Renewables Portfolio Standard (RPS), one of California’s programs for advancing renewable energy, requires electricity providers to increase procurement from eligible renewable energy sources to 33 percent by 2020 and 60 percent by 2030. The default SCE energy intensity factors included in CalEEMod are based on data from 2012. Therefore, the 2012 intensity factor of 702 pounds per megawatt hour (MWh) for CO₂e was used to calculate energy intensity in 2030 in compliance with the RPS Program. As the project’s GHG threshold is based upon 2030 goals (as described further below), this 2030 energy factor was included in CalEEMod for the proposed project scenario. SCE energy intensity factors that include this reduction are shown in Table 4.2-1.

Table 4.2-1 SCE Energy Intensity Factors

	2012 ¹ (lbs/MWh)	2030 (lbs/MWh)
Percent Procurement	20.6	60
Carbon dioxide (CO ₂)	702.44	353.87
Methane (CH ₄)	0.029	0.015
Nitrous Oxide (N ₂ O)	0.006	0.003

¹ SCE 2012

Significance Thresholds

CEQA Guidelines section 15126.2(a) clarifies that an EIR shall focus analysis on the significant effects of a proposed project on the environment. CEQA Guidelines section 15064.4 requires a lead agency to describe, calculate, or estimate the amount of GHG emissions resulting from a project. The lead agency is given discretion whether to:

1. Quantify GHG emissions resulting from a project, and/or
2. Rely on a qualitative analysis or performance-based standards.

The revisions to CEQA Guidelines section 15064.4.(2)(b) clarify that in determining the significance of a project’s greenhouse gas emissions, the lead agency should focus its analysis on the reasonably foreseeable incremental contribution of the project’s emissions to the effects of climate change. A project’s incremental contribution may be cumulatively considerable even if it appears relatively small compared to statewide, national or global emissions. Section 15064.4(b) states that a lead agency should consider the following factors when determining the significance of impacts from GHG emissions on the environment:

1. The extent to which the project may increase or reduce GHG emissions as compared to the existing environmental setting;

2. Whether the project emissions exceed a threshold of significance that the lead agency determines applies to the project; and
3. The extent to which the project complies with regulations or requirements adopted to implement a statewide, regional, or local plan for the reduction or mitigation of GHG emissions.

The lead agency has discretion to select a model or methodology it considers most appropriate to enable decision makers to intelligently account for the project’s incremental contribution to climate change. Currently, neither the State of California nor the City of Goleta has established CEQA significance thresholds for GHG emissions.

In June 2010, the Bay Area Air Quality Management District (BAAQMD) became the first regulatory agency in the nation to approve guidelines that establish thresholds of significance for GHG emissions. These thresholds are summarized in Table 4.2-2.

Table 4.2-2 BAAQMD GHG Emissions Thresholds

GHG Emission Source Categories	Operational Emissions
Land Use Development Projects	1,100 Metric Ton (MT) CO ₂ e/yr or 4.6 MT CO ₂ e/SP/yr
Stationary Source Projects	10,000 MT CO ₂ e /yr

Land use development projects include residential, commercial, industrial, and public land uses and facilities.
 SP = Service Population (residents + employees).
 Stationary Sources include land uses that would accommodate processes and equipment that emit GHG emissions and would require an Air District permit to operate

On June 10, 2010, the Santa Barbara County Planning & Development Department produced a memorandum “Support for Use of Bay Area Air Quality Management District Greenhouse Gas Emissions Standards,” which states, “while Santa Barbara County land use patterns differ from those in the Bay Area as a whole, Santa Barbara County is similar to certain Bay Area counties (Sonoma, Solano, and Marin) in terms of population growth, land use patterns, General Plan/Coastal Land Use Plan policies, and average commute patterns and times. Because of these similarities, the methodology used by BAAQMD to develop its GHG emission significance thresholds, as well as the thresholds themselves, have applicability to Santa Barbara County and represent the best available interim standards for Santa Barbara County.”

The City of Goleta is located in Santa Barbara County and shares meteorological attributes, as well as similar land use patterns and policies, and thresholds deemed applicable in Santa Barbara County would also reasonably apply to projects within the City Goleta. The City has consistently relied on these standards as the methodology for establishing a threshold for analyzing the potential greenhouse gas impacts of a project. Therefore, this analysis uses the BAAQMD/Santa Barbara County Interim Thresholds of Significance to determine the significance of GHG emissions related to this project, based on the 1,100 MT CO₂e/year threshold for commercial land uses. There is no BAAQMD threshold of significance for construction emissions.

SB 32 and Executive Order (EO) S-3-05 extend the state’s GHG reduction goals to meet a state goal of reducing GHG emissions to 1990 levels by 2020, 40 percent below 1990 levels by 2030, and 80 percent below 1990 levels by 2050. Since SB 32 requires the state to reduce GHG levels by 40 percent below 1990 levels by the year, a reasonable SB 32-based working threshold would be 40

percent below the 1,100 MTCO₂e BAAQMD/Santa Barbara County Interim Threshold or $1,100 \times 0.6 = 660$ MTCO₂e. Therefore, for the purpose of evaluating the significance of GHG emissions for a project with a buildout year after 2020, a project estimated to generate 660 MTCO₂e or more GHG emissions would have a significant adverse impact that is cumulatively considerable.

b. Project Impact Analysis

Threshold: Would the project generate GHG emissions, either directly or indirectly, that may have a significant impact on the environment?

Impact GHG-1 THE PROJECT'S CONSTRUCTION AND OPERATIONAL GHG EMISSIONS WOULD NOT EXCEED ESTABLISHED GHG THRESHOLDS. IN ADDITION, THE PROJECT WOULD INDIRECTLY REDUCE REGIONAL GHG EMISSIONS AND VEHICLE MILES TRAVELED. IMPACT WOULD BE LESS THAN SIGNIFICANT (CLASS III).

Construction Emissions

Project construction would generate temporary GHG emissions primarily from diesel-powered construction equipment as well as from vehicles transporting construction workers to and from the project site and heavy trucks to transport building materials and construction equipment. The City of Goleta nor SBCAPCD have adopted significance criteria for construction activities. Therefore, this analysis amortizes construction emissions over the project's lifetime (typically assumed to be 30 years) and adds them to the operational emissions for comparison to the 660 MT CO₂e per year identified above to determine significance. Estimated annual construction-related GHG emissions are shown in Table 4.2-3.

Table 4.2-3 Estimated Construction Emissions of Greenhouse Gases

Construction Year	Annual Emissions MT CO ₂ e
2022	136.3
2023	77.1
Total	213.4
Amortized over 30 years	7.1

Notes: See Appendix C for modeling results. Some numbers may not add up precisely due to rounding considerations.

As shown in Table 4.2-3, project construction would emit approximately 213.4 MT of CO₂e over the construction period, or approximately 7.1 MT of CO₂e per year when amortized over a 30-year period (the assumed minimum project lifetime).

Combined Annual Emissions

The operation of the proposed Depot would generate long-term GHG emissions from new vehicle trips (mobile emissions) to the site, combustion of natural gas and use of electricity (energy emissions), solid waste disposal, water use, and consumer products, architectural coatings, and landscaping equipment (area emissions). Table 4.2-4 summarizes and combines the amortized construction and operational GHG emissions associated with the project.

Table 4.2-4 Estimated Combined Annual GHG Emissions

Emission Source	Emissions (MT CO₂e per year)
Construction	
Amortized over 30 years	7.1
Operational	
Area	<1
Energy	16.1
Solid Waste	4.4
Water	1.0
Mobile ¹	137.5
Total	166.2

¹ Includes N₂O emissions

Source: Appendix C for CalEEMod results

As shown in Table 4.2-4, the project would produce approximately 166 MT CO₂e per year, which would not exceed the established threshold of 660 MT CO₂e per year. In addition, pursuant to City of Goleta Resolution No. 12-65, the project could be required to achieve LEED Silver certification, which could result in fewer annual emissions than estimated due to increased energy savings. The Depot would also replace an existing warehouse, which currently emits GHG emissions through area, energy, solid waste, water, and mobile sources. Also, as discussed in Section 2, *Project Description*, one of the main goals of the project is to reduce regional GHG emissions through increasing train ridership and reducing vehicle miles travelled in the region. According to the Transit and Capital Rail Capital Program application from SBCAG, the project could reduce regional GHG emissions by approximately 525,000 MT CO₂e through implementation (SBCAG 2018). Therefore, the project's GHG emissions would be less than significant.

Mitigation Measures

No mitigation measures would be required.

Significance After Mitigation

Impacts would be less than significant without mitigation.

Threshold: Would the project conflict with an applicable plan, policy, or regulation adopted for the purpose of reducing the emissions of greenhouse gases?

Impact GHG-2 THE PROPOSED PROJECT WOULD NOT CONFLICT WITH APPLICABLE POLICIES OR PLANS AND IMPACTS WOULD BE LESS THAN SIGNIFICANT (CLASS III).

The proposed project was evaluated for consistency with applicable local and State plans that were developed with the intent of reducing GHG emissions. Each applicable plan is discussed separately below.

2017 Scoping Plan

Development facilitated by the project would be consistent with these goals through project design, which includes complying with the latest Title 24 Green Building Code and Building Efficiency Energy Standards. As the goal of the project is to increase residents in urban areas to increase use of alternative modes of transportation for work, school, and recreational activities, it would have the effect of reducing vehicle trips and therefore GHG emissions associated with fossil fuel use. This supports 2017 Scoping Plan goals for the encouragement of alternative transportation use and VMT reduction. Therefore, the project would be consistent with the 2017 Climate Change Scoping Plan.

City of Goleta Climate Action Plan

The City’s CAP is a long-range plan to reduce GHG emissions from city government operations and community activities within Goleta. The CAP is a qualified GHG reduction plan consistent with State CEQA Guidelines Section 15183.5 through year 2020. The CAP also identified an emission reduction target for 2030 and presents an emissions reductions scenario to achieve the target, under the auspices of the Executive Order S-3-05. The City’s 2020 GHG forecast predicts that On-Road Transportation and Land Use will account for approximately 42 percent of the City’s GHG emissions.

The City’s CAP contains policies and programs targeting energy efficiency. As demonstrated in Table 4.2-5, the project would be consistent with the City’s CAP Energy policies that are relevant to this project. As such, the project would not conflict with or obstruct a state or local plan for renewable energy or energy efficiency, and there would be no impact.

Table 4.2-5 Project Consistency with Applicable Climate Action Plan Policies

Policies	Project Consistency
Chapter 3.4: GHG Emission Reductions and Measures for 2020	
Policy T-4: Develop Design Guidelines for Improved Design for New Developments	Consistent. The project building would be designed and equipped with features that conserve and reduce energy consumption. The building would comply with the latest Title 24 standards and City of Goleta Resolution No. 12-65.
Policy T-5: Develop Design Guidelines and Incentives to Encourage Transit-Oriented Development	Consistent. The project would enhance train station amenities and accessibility to reduce the need for single occupancy vehicles and reduce VMT. The project would help facilitate commuters to and from work as well as other destinations. Building would be designed to implement energy conservation features.
Policy T-8: Encourage Bicycle Parking through Development of Design Guidelines and Policies	Consistent. The project would feature several on-site amenities to encourage ridership including bicycle racks and bicycle safety infrastructure.

Policies	Project Consistency
Policy T-11: Continue to Encourage End-of-Trip Facilities	Consistent. The proposed Depot building would include a lobby, a café and kitchen area for riders to purchase beverages and food, restroom facilities, indoor waiting areas, a community room, an on-site ticketing area, and luggage and storage space adjacent to the Amtrak platform.

Source: Goleta 2014

Goleta General Plan/Coastal Land Use Plan

The City of Goleta General Plan Conservation Element is intended to guide land use planning by providing goals and policies to reduce GHG emissions. As demonstrated by Table 4.2-6, the project would be consistent with applicable goals and policies.

Table 4.2-6 Project Consistency with Applicable General Plan Policies

Policies	Project Consistency
Chapter 4.4 City Policies	
CE 13.4 Energy Conservation for City Facilities and Operations: The City shall implement energy conservation requirements for City-owned facilities at the time of major improvements. Energy conservation measures may include energy-efficient interior and exterior building lighting, energy-efficient street lighting, natural ventilation and solar hot water systems, and landscaping with drought-tolerant species and deciduous trees to shade streets and the south and west sides of buildings in summer. For all City construction projects, the City shall comply with the state’s energy conservation building standards set forth in Title 24. The City vehicle fleet shall use a mix of fuels that best achieves energy efficiency while meeting operational needs.	Consistent. The project building would be designed and equipped with features that conserve and reduce energy consumption. The building would comply with the latest Title 24 standards and City of Goleta Resolution No. 12-65.
CE 15.2 Water Conservation for City Facilities: In order to minimize water use, the City shall upgrade City-owned facilities with low water use plumbing fixtures, water conserving landscaping, low flow irrigation, and reclaimed water for exterior landscaping at the time of major improvements.	Consistent. Project facilities would be designed and equipped with features that increase water use efficiency by 20 percent. The building would comply with CALGreen standards.
CE 15.5 Reduction of Construction Wastes: In instances where demolitions of existing buildings and structures are authorized, it is encouraged that such structures be deconstructed and that structural components, fixtures, and materials be salvaged for future reuse. Provisions for recycling of waste materials at all construction sites, including and demolition sites shall be required	Consistent. In accordance with the Goleta Green Building Program, the project would divert 50 percent of construction/demolition waste from landfills through recycling and source reduction activities.
TE 1.1 Alternative Modes: The City’s intent shall be to achieve a realistic and cost-effective balance between travel modes, including bikeways, pedestrian circulation, and bus transit. The City shall encourage the use of alternative modes of transportation, such as bus transit, bicycling, and walking, which have the additional beneficial effect of reducing consumption of non-renewable energy sources.	Consistent. The project would provide a new Depot which would increase train ridership and alternative modes and transport and commuting.
TE 1.5 Multimodal Transportation Center. The City supports consideration of a multimodal transportation center in the city to facilitate interconnection and transfers between express bus routes, automobile, bicycle and pedestrian circulation, and potentially commuter and other passenger rail services. While a proposed area in the vicinity of the current Amtrak terminal should be studied, alternative sites should also be explored; the ultimate location will depend on the results of such study.	Consistent. The Depot would provide a multimodal transportation center for rail users, bus users, bikers, pedestrians, and personal vehicles.

Policies	Project Consistency
<p>TW 8.2 Rail Terminal. Figure 7-4 identifies the location of the existing Amtrak terminal as of 2005. The City, in cooperation with Amtrak and any future commuter rail service provider, should actively explore and promote the development of an expanded multimodal transportation center that includes a rail station in the city as referenced in TE 7.3. As of 2005, facilities were limited to a passenger platform. The City supports regional funding and construction of a terminal facility that includes a building with an indoor waiting area, ticketing, information kiosks, restrooms, and other appropriate amenities; parking; and drop-off and pick-up areas. Small-scale ancillary commercial services, such as a small restaurant, may also be permitted as integral to the terminal facility.</p>	<p>Consistent. The project would develop a multimodal transportation center at the existing Amtrak Station.</p>
<p>Source: Goleta 2006</p>	

Goleta Green Building Program

Pursuant to City of Goleta Resolution No. 12-65, the project would be constructed to achieve LEED Silver certification, unless the exceptions under Resolution No. 12-65 are met. Therefore, the project would be consistent with this program.

Summary

As described above, GHG emissions impacts would be less than significant according to the BAAQMD/Santa Barbara County Interim Thresholds of Significance. In addition, GHG emissions impacts from development facilitated by the project would be less than significant by being consistent with 2017 Scoping Plan, City CAP, City General Plan, and the County Goleta Green Building Program.

Mitigation Measures

No mitigation measures would be required.

Significance After Mitigation

Impacts would be less than significant without mitigation.

4.2.4 Cumulative Impacts

Cumulative development in the City of Goleta and surrounding cities and County would include residential development, warehouses, commercial, office, and public facilities. Each of the proposed developments would generate GHG emissions from vehicle trips, electrical and water use, and other sources. The analysis of GHG emissions is cumulative in nature, as emissions affect the accumulation of GHGs in the earth's atmosphere. Projects that fall below provided thresholds are considered to have a less than significant impact, both individually and cumulatively. The proposed project falls below the applicable threshold of 660 MT CO₂e per year. In addition, the project is estimated to reduce regional GHG emissions by 525,000 MT CO₂e through implementation.

The City of Goleta has a number of projects that would reduce overall GHG emissions in the City. The City's Green Building Program will reduce emissions from current and new users and the cumulative projects in the City. The City also has a number of incentive programs for residences and businesses to reduce their electricity consumption and cumulatively reduce GHG emissions from energy use. The project would comply with Title 24 Building Energy Efficiency and California Green

Building standards and would be required to comply with City Resolution No. 12-65. In addition, the proposed project is expected to reduce GHG emissions associated with fossil fuel use in the City and regionally through encouraging train use over vehicle use. Therefore, cumulative impacts would be less than significant.

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4.3 Hazards and Hazardous Materials

Based on Appendix G of the CEQA Guidelines, this section analyzes the project's potential impacts regarding hazards and hazardous materials. The Initial Study concluded the project would not have a significant impact related to hazardous material sites, airport hazards, wildland fires, and emergency response, which are discussed in Section 1, *Introduction*, and in the Initial Study (Appendix A). The analysis considers potential hazards or hazardous conditions from on-site conditions. The analysis in this section is based, in part, on the *Phase I Environmental Site Assessment* (ESA) prepared by Rincon Consultants, Inc. attached as Appendix D of this EIR.

4.3.1 Setting

On-Site Potential Hazards

The project site is located in an area that is primarily composed of commercial and industrial land uses. Properties in the vicinity of the subject property include light industrial and commercial businesses, an Amtrak Station and a railroad right-of-way. A Phase I Environmental Site Assessment (Phase I ESA) was completed to assess potential existing hazards on the project site. The Phase I ESA found the following conditions are present on-site or have the potential to occur:

- 6,000-gallon historic underground storage tank (UST) reported on the subject property;
- 1,800-gallon diesel UST located on the subject property;
- Soil contamination from the former Industrial use of the subject property as a bus transportation facility, as well as the presence of former sumps and "service shops;"
- The presence of railroad tracks adjacent to the north of the subject property; and
- The presence of a capped water supply well reported on the subject property.

Other potential hazards that may occur on the project site include asbestos containing materials and lead based paint, radon, and hazardous material transport. The project site setting associated with each of these potential hazards is discussed more fully below.

Residual Agricultural Chemicals

The Phase I ESA determined the project site was historically used for agricultural purposes, along with the general area around the project site. As a result, residual agricultural chemicals including pesticides, arsenic, and herbicides may be present in the soil.

Asbestos Containing Materials and Lead Based Paint

Asbestos was used as insulation in walls or ceilings or as a component in adhesives in older buildings (pre-1979). Asbestos can pose a health risk when very small particles become airborne. Lead is a highly toxic metal that was used for many years in products found in and around homes, including paint. Lead-based paint (LBP) was commonly used in residential construction prior to the enactment of federal regulations limiting its use in the late 1970s. Exposure to lead can cause a range of health effects, from behavioral problems and learning disabilities, to seizures and death. The primary source of lead exposure in residential settings is deteriorating LBP. Lead dust can form when LBP is dry scraped, dry sanded, or heated. Dust also forms when painted surfaces bump or rub together. LBP that is in good condition is usually not a hazard.

The existing warehouse structure on the project site was constructed in 1967. Due to the age of the on-site structure, asbestos and lead may be present in and near the structure.

Radon

Radon is a naturally occurring gas produced by the breakdown of uranium in soil, rock, and water. Accumulations of this gas inside structures can become a health hazard because radon is known to cause lung cancer. The threat of radon is very low in well-ventilated structures. According to the U.S. EPA, the general area of the project site has a predicted indoor screening level of less than significant per EPA guidelines. Therefore, based upon the reported subsurface characteristics of the area, the project site exhibits no potential for high-level radon exposure (Appendix D).

4.3.2 Regulatory Setting

An overview of regulatory agencies and certain key hazardous materials laws and regulations applicable to the project, and to which the project must conform, is provided below.

Federal Regulations

Several federal agencies regulate hazardous materials. These include the U.S. EPA, the United States Occupational Safety and Health Administration (USOSHA), and the United States Department of Transportation (U.S. DOT). Applicable federal regulations are contained primarily in Titles 10, 29, 40, and 49 of the Code of Federal Regulations (CFR). Some of the major federal laws and issue areas include the following statutes and implementing regulations:

- Resources Conservation and Recovery Act (RCRA) of 1976 - hazardous waste management;
- Hazardous and Solid Waste Amendments Act (HSWA) - hazardous waste management;
- Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) - cleanup of contamination;
- Superfund Amendments and Reauthorization Act (SARA) - cleanup of contamination; and
- Emergency Planning and Community Right-to-Know (SARA Title III) – business inventories and emergency response planning.

The U.S. EPA is the primary federal agency responsible for the implementation and enforcement of hazardous materials regulations. In most cases, enforcement of environmental laws and regulations established at the federal level is delegated to State and local environmental regulatory agencies. In addition, with respect to emergency planning, the Federal Emergency Management Agency (FEMA) is responsible for ensuring the establishment and development of policies and programs for emergency management at the federal, State, and local levels. This includes the development of a national capability to mitigate against, prepare for, respond to, and recover from a full range of emergencies.

The U.S. EPA has authorized the California Department of Toxic Substance Control (DTSC) to enforce hazardous waste laws and regulations in California. Requirements place “cradle-to-grave” responsibility for hazardous waste disposal on the shoulders of hazardous waste generators. Waste generators must ensure that their wastes are disposed of properly, and legal requirements dictate the disposal requirements for many waste streams (i.e., a ban on the disposal of many types of hazardous wastes in landfills).

Asbestos Hazard Emergency Response Act (AHERA) (1986)

This Act is the federal legislation that governs the control and abatement of asbestos hazards present in school buildings. The purpose of this Act is to also require the U.S. EPA to evaluate the extent of danger to human health posed by asbestos in public and commercial buildings and the means to respond to any identified danger.

Federal Occupational Safety and Health Administration (OSHA) - Process Safety Management Standard (29 CFR 1910.119)

This standard includes requirements for preventing or minimizing the consequences of catastrophic releases of toxic, reactive, flammable, or explosive chemicals. Requirements of this standard include providing employees with information pertaining to hazardous chemicals, training employees on the operation of equipment with hazardous materials, and employer requirements to perform a process hazard analysis.

Lead-Based Paint Elimination Final Rule 24 CFR 33

Regulations for lead-based paint (LBP) are contained in the Lead-Based Paint Elimination Final Rule 24 Code of Federal Regulations (CFR) 33, governed by the U.S. Department of Housing and Urban Development, which requires sellers and lessors to disclose known LBP and LBP hazards to prospective purchasers and lessees. Additionally, all LBP abatement activities must be in compliance with California and Federal OSHA and with the State of California Department of Health Services requirements. Only LBP trained and certified abatement personnel are allowed to perform abatement activities. All lead LBP removed from structures must be hauled and disposed of by a transportation company licensed to transport this type of material at a landfill or receiving facility licensed to accept the waste.

State Regulations

The primary State agencies with jurisdiction over hazardous chemical materials management are the DTSC and the State Water Quality Control Board (SWQCB). Other State agencies involved in hazardous materials management and oversight are the Department of Industrial Relations, California OSHA (Cal OSHA) implementation, Office of Emergency Services (OES - California Accidental Release Prevention Implementation), CARB, California Department of Transportation (Caltrans), State Office of Environmental Health Hazard Assessment (OEHHA - Proposition 65 implementation) and CalRecycle (formerly the California Integrated Waste Management Board, CIWMB). The enforcement agencies for hazardous materials transportation regulations are the California Highway Patrol (CHP) and Caltrans. Hazardous materials and waste transporters are responsible for complying with all applicable packaging, labeling, and shipping regulations.

Relevant hazardous materials management laws in California include, but are not limited to, the following statutes and implementation regulations:

- Hazardous Materials Management Act - business plan reporting;
- Hazardous Waste Control Act - hazardous waste management;
- Safe Drinking Water and Toxic Enforcement Act of 1986 (Proposition 65) – release of and exposure to carcinogenic chemicals;
- Hazardous Substance Act - cleanup of contamination;

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- Hazard Communication; and
- Hazardous Materials Storage and Emergency Response.

California Environmental Protection Agency

The California Environmental Protection Agency (CalEPA) has broad jurisdiction over hazardous materials management in California. Within CalEPA, the DTSC has primary regulatory responsibility for hazardous waste management and cleanup. Enforcement of regulations has been delegated to local jurisdictions that enter into agreements with DTSC for the generation, transport, and disposal of hazardous materials under the authority of the Hazardous Waste Control Law.

Along with the DTSC, the SWQCB is responsible for implementing regulations pertaining to management of soil and groundwater investigation and cleanup. SWQCB regulations are contained in Title 27 of the California Code of Regulations (CCR). Additional State regulations applicable to hazardous materials are contained in Title 22 of the CCR. Title 26 of the CCR is a compilation of those sections or titles of the CCR that are applicable to hazardous materials.

Department of Toxic Substances Control

RCRA is the principal federal law that regulates the generation, management, and transportation of hazardous materials and other wastes. The DTSC regulates hazardous waste in California primarily under the authority of the federal RCRA, and the California Health and Safety Code. Other laws that affect hazardous waste are specific to handling, storage, transportation, disposal, treatment, reduction, cleanup, and emergency planning. In addition, DTSC reviews and monitors legislation to ensure that the position reflects the DTSC's goals. From these laws, DTSC's major program areas develop regulations and consistent program policies and procedures. The regulations determine what those who handle hazardous waste must do to comply with the laws.

California law provides the general framework for regulation of hazardous wastes by the Hazardous Waste Control Law (HWCL) passed in 1972. DTSC is the State's lead agency in implementing the HWCL. The HWCL provides for State regulation of existing hazardous waste facilities, which include "any structure, other appurtenances, and improvements on the land, used for treatment, transfer, storage, resource recovery, disposal, or recycling of hazardous wastes," and requires permits for, and inspections of, facilities involved in generation and/or treatment, storage and disposal of hazardous wastes.

The oversight of hazardous materials release sites often involves several different agencies that may have overlapping authority and jurisdiction. The DTSC and SWQCB are the two primary State agencies responsible for issues pertaining to hazardous materials release sites. Air quality issues related to remediation and construction at contaminated sites are also subject to federal and State laws and regulations that are administered at the local level.

Investigation and remediation activities that would involve potential disturbance or release of hazardous materials must comply with applicable federal, State, and local hazardous materials laws and regulations. The DTSC has developed standards for the investigation of sites where hazardous materials contamination has been identified or could exist based on current or past uses. The standards identify approaches to determine if a release of hazardous wastes/substances exists at a site and delineate the general extent of contamination; estimate the potential threat to public health and/or the environment from the release and provide an indicator of relative risk; determine if an expedited response action is required to reduce an existing or potential threat; and complete

preliminary project scoping activities to determine data gaps and identify possible remedial action strategies to form the basis for development of a site strategy.

California Accidental Release Prevention Program (CalARP)

The CalARP program (CCR Title 19, Division 2, Chapter 4.5) covers certain businesses that store or handle more than a certain volume of specific regulated substances at their facilities. The list of regulated substances is found in Article 8, Section 2770.5 of the CalARP program regulations. The businesses that use a regulated substance above the noted threshold quantity must implement an accidental release prevention program, and some may be required to complete a Risk Management Plan (RMP). An RMP is a detailed engineering analysis of the potential accident factors present at a business and the mitigation measures that can be implemented to reduce this accident potential. The purpose of an RMP is to decrease the risk of an off-site release of a regulated substance that might harm the surrounding environment and community. An RMP includes the following components: safety information, hazard review, operating procedures, training, maintenance, compliance audits, and incident investigation. The RMP must consider the proximity to sensitive populations located in schools, residential areas, general acute care hospitals, long-term health care facilities, and child day-care facilities, and must also consider external events such as seismic activity.

Regional

Santa Barbara County Air Pollution Control District (SBCAPCD)

The SBCAPCD establishes Rules that regulate or control various air pollutant emissions and emissions sources, including hazardous emissions sources in the County of Santa Barbara within the South Central Coast Air Basin (Basin). The SBCAPCD coordinates its actions with local, State, and federal government agencies, the business community, and private citizens to achieve and maintain healthy air quality.

Local

City of Goleta General Plan

The General Plan Safety Element establishes Goals and Policies addressing community health and safety, including potential hazards and hazardous materials concerns. Goleta Goals and Policies implemented through its General Plan support prevention and education measures acting to minimize the occurrence and effects of hazards, emergencies and disasters; and include measures to allow Goleta to respond appropriately under hazardous, emergency, or disaster conditions.

City of Goleta Emergency Operations Plan

The Emergency Operations Plan (EOP) establishes the overall approach for emergency response, including organization and task management, identification of policies and procedures, and coordination of planning efforts of the various emergency staff and service elements. The purpose of the City's EOP is to define the actions required of the City before, during, and after an emergency to guide the City's response to major emergencies and disasters pursuant to state and federal requirements.

Santa Barbara County Department of Environmental Health

Under the California Unified Hazardous Waste and Hazardous Material Management Regulatory Program, (Chapter 6.11, Division 20, Section 25404 of the Health and Safety Code), hazards/hazardous materials management is addressed locally through the Certified Unified Program Agency (CUPA). The CUPA for Santa Barbara County, including Goleta, is the Santa Barbara County Department of Environmental Health, Hazardous Materials Division. The CUPA oversees the enforcement and administration of six consolidated environmental programs:

- Hazardous Materials Release Response Plans & Inventory (Business Plan)
- Underground Storage Tanks (UST)
- Hazardous Waste Generators
- Onsite Hazardous Waste Treatment
- Aboveground Petroleum Storage Act (APSA)
- California Accidental Release Prevention (CalARP)

Santa Barbara County Airport Land Use Commission

The project site is located within the Santa Barbara Airport Influence Area. The 1993 Santa Barbara County Airport Land Use Compatibility Plan (ALUCP) establishes various policies and compatibility maps for individual ALUCP airports, including Santa Barbara Airport. Santa Barbara County Airport Land Use Commission (Santa Barbara County ALUC) review is required when a project is located within the boundaries of an Airport Influence Area and the project proposes a legislative action like a General Plan Amendment, Specific Plan Amendment, Zone Change, or Zoning Ordinance (Santa Barbara County ALUC 1993). As discussed in the Initial Study, the project is located within the Airport Influence Area but does not include a land use change.

4.3.3 Impact Analysis

a. Methodology and Significance Thresholds

Assessment of impacts is based on the Phase I ESA (Appendix D), prepared for the project site. The Phase I ESA was completed to assess potential existing hazards on the project site. The following tasks were undertaken as part of the Phase I ESA investigation:

- Performed a reconnaissance of the subject property to identify obvious indicators of the existence of hazardous materials.
- Observed adjacent or nearby properties from public thoroughfares in an attempt to see if such properties are likely to use, store, generate, or dispose of hazardous materials.
- Obtained and reviewed an environmental records database search to obtain information about the potential for hazardous materials to exist at the subject property or at properties located in the vicinity of the subject property.
- Reviewed files for the subject property and immediately adjacent properties as identified in the database report, as applicable.
- Reviewed the current United States Geological Survey (USGS) topographic map to obtain information about the subject property and regional topography and uses of the subject property and surrounding sites.

- Reviewed additional pertinent record sources (e.g., California Division of Oil, Gas, and Geothermal Resources records, online databases of hazardous substance release sites, etc.), as necessary, to identify the presence of RECs at the subject property.
- Reviewed reasonably ascertainable historical resources (e.g., aerial photographs, topographic maps, fire insurance maps, city directories, etc.) to assess the historical land use of the subject property and adjacent properties.
- Provided a user interview questionnaire to a representative of the client, the user of the Phase I ESA.
- Provided a property owner interview questionnaire to the property owner or a designated subject property representative identified to Rincon by the client.
- Conducted interviews with other property representatives (e.g., key site manager, occupants, etc.), as applicable.
- Reviewed available client-provided information (e.g., previous environmental reports, title documentation, etc.).

The following thresholds are based on Appendix G of the State CEQA Guidelines. A significant impact related to hazards and hazardous materials would occur if the project would:

1. Create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials;
2. Create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment;
3. Emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within one-quarter mile of an existing or proposed school;
4. Be located on a site which is included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5 and, as a result, create a significant hazard to the public or the environment;
5. For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, result in a safety hazard or excessive noise for people residing or working in the project area;
6. Impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan; and/or
7. Expose people or structures, either directly or indirectly, to a significant risk of loss, injury or death involving wildland fires.

The Initial Study (Appendix A) determined the proposed project would have no impact on handling hazardous materials near a school, being located on a hazardous material site, or risk to wildland fire (Thresholds 3-4 and 7). The Initial Study determined the project would have a less than significant impact on hazards from a nearby airport and the impairment of an emergency response plan (Thresholds 5 and 6). The Initial Study concluded the project could result in potentially significant impacts related to Threshold 1 and 2, which are analyzed in this section of the EIR. All other thresholds are discussed in the Initial Study and summarized in Table 1-2 in Section 1, *Introduction*.

Threshold:	Would the project create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials?
Threshold:	Would the project create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the likely release of hazardous materials into the environment?

Impact HAZ-1 THE PROJECT IS LOCATED ON A SITE PREVIOUSLY USED FOR AGRICULTURAL AND INDUSTRIAL PURPOSES AND IS LOCATED ADJACENT TO ACTIVE RAILROAD TRACKS. THE SITE CONTAINS HAZARDOUS MATERIALS THAT MAY BE EXPOSED DURING CONSTRUCTION ACTIVITIES. WITH ADHERENCE TO MITIGATION MEASURES HAZ-1 AND HAZ-2, IMPACTS WOULD BE REDUCED TO LESS THAN SIGNIFICANT.

Construction-Related Impacts

During project construction, accidental conditions could occur as a result of any of the following: direct dermal contact with hazardous materials; incidental ingestion of hazardous materials, or inhalation of airborne dust released from dried hazardous materials. The transportation of hazardous materials could result in accidental spills, leaks, toxic releases, fire, or explosion. Appropriate documentation for all hazardous waste that is transported, stored, or used in connection with specific project-site activities would be provided as required for compliance with existing hazardous materials regulations codified in the CCR.

The Phase I ESA identified potential for the site to contain hazardous materials given its prior agricultural use, current and former onsite storage of hazardous materials in USTs, ASTs, and drums, and past use of a bus transportation facility as well as the presence of former sumps, trench drain, and “service shops”. Former onsite agricultural activities create the potential for residual chemicals used routinely in agricultural production such as pesticides, arsenic, and herbicides to remain onsite in the onsite soil and/or groundwater. Additionally, there is potential for agricultural products to have been transported via railcars/railroad tracks. Based on the previous uses of the site as a bus transportation facility along with sumps, trench drains, and “service shops”, there is also the potential for petroleum hydrocarbons, heavy metals, volatile organic compounds, and other vehicle fluids to be present in onsite soil or groundwater.

The Phase I ESA identified the onsite presence of three AST/USTs: a 6,000-gallon historic UST (which may remain onsite), a 3,000-gallon AST with secondary containment (and associated drum) for emergency overflow used oil, and an existing 1,800-gallon diesel UST. Spills or leaks from the USTs and AST have not been identified, however, an unreported release could have occurred that wasn’t captured in regulatory records. Given the potential for contaminated soils on the project site, there is a possible hazard for construction workers to be exposed to contaminants present in onsite soils and or groundwater. There is also a concern for potential off-site disposal of soils that may occur during project construction.

In addition, the Phase I ESA determined there is potential for hazardous building materials present in the existing warehouse structure such as lead based paint (LBP), asbestos containing materials (ACMs), and polychlorinated biphenyls (PCBs). These materials would likely be encountered during structure demolition for the project. Potential hazardous materials, such as fuel, paint products, lubricants, solvents, and cleaning products, may be used and/or stored on-site during the construction of the proposed project. However, due to the limited quantities of these materials to be used by the project, they are not considered hazardous to the public at large.

Given the potential for residual pesticides, hydrocarbons, metals, VOCs, contaminated soil and groundwater from AST and UST, and other potential contaminants to be present onsite, project construction has the potential to create a significant hazard to construction workers and/or the public and environment during routine activities such as excavation, soil transport, and off-site soil disposal, which would be a potentially significant impact. Adherence to recommendations identified in the ESA and mitigation measures HAZ-1 and HAZ-2 below, would reduce potential impacts to less than significant. Additionally, compliance with federal, State, and local laws, regulations, and Cal/OSHA training programs, would minimize potential impacts associated with the routine transport, use, or disposal of hazardous materials during construction.

Operation-Related Impacts

Generally, maintenance and upkeep of facilities on-site, including cleaning of workspaces, parking areas, restroom facilities and maintenance of landscaping occasionally require the use of various solvents, cleaners, paints, oils/fuels, and pesticides/herbicides. Transport, use, and storage of hazardous materials during the operation of the site would be conducted pursuant to all applicable local, State, and federal laws, including but not limited to Title 49 of the Code of Federal Regulations implemented by Title 13 of the California Code of Regulations, which describes strict regulations for the safe transportation of hazardous materials, and in cooperation with the County's Department of Environmental Health. As required by California Health and Safety Code Section 25507, a business shall establish and implement a Hazardous Materials Business Emergency Plan for emergency response to a release or threatened release of a hazardous material. As required, the hazardous materials would be stored in locations according to compatibility and in storage enclosures (i.e., flammable material storage cabinets and biological safety cabinets) or in areas or rooms specially designed, protected, and contained for such storage, in accordance with applicable regulations.

Adherence to Santa Barbara County Department of Environmental Health guidelines and regulations would reduce the potential for contamination from hazardous materials through proper cleanup, disposal, and remediation. The Santa Barbara County Office of the Fire Marshall regulates and enforces the provisions of the Uniform Fire Code relating to hazardous materials, including the use and storage of hazardous materials that are ignitable, reactive, corrosive, or toxic. Businesses using such materials are subject to permitting and inspection.

Given the above considerations, impacts associated with project operation would be less than significant through compliance with existing regulations.

Mitigation Measures

HAZ-1 Assessment, Removal, and Remediation

Prior to demolition or onsite grading/site disturbance or improvements, a soil, soil vapor, and/or groundwater sampling assessment shall be completed to identify and/or define hazardous material impacts in the areas of concern. The areas of concern and associated chemicals of concern include:

- Former agricultural use of the subject property – pesticides and arsenic;
- Adjacent presence of railroad tracks along the northern site boundary which transport and produce pesticides, heavy metals, petroleum hydrocarbons, herbicides, and SVOCs (including creosote, naphthalene);
- Former and current USTs/AST onsite - historic 6,000-gallon UST, existing 1,800-gallon diesel UST, and existing 3,000-gallon AST with secondary containment and associated drum that is utilized

to store emergency overflow used oil onsite - heavy metals, petroleum hydrocarbons, and VOCs; and

- Former use of a bus 'service shop' that includes underground sumps, trench drains and possibly other features - heavy metals, petroleum hydrocarbons, and VOCs.

A geophysical survey shall be conducted to locate the historical UST prior to sampling. The sampling assessment shall be performed under the supervision of a professional geologist or other qualified environmental professional. The analytical results shall be compared to the most current applicable environmental screening levels, as recommended by Santa Barbara County Environmental Health – Hazardous Materials Unit.

A Soil Management Plan (SMP) shall be prepared and followed by the demolition/grading contractor. The SMP will identify procedures to address the current onsite features and unidentified features (USTs, clarifiers, sumps or other underground features) that are uncovered during the redevelopment of the site. If the sampling assessment analytical results are greater than the environmental screening levels, the Santa Barbara County Environmental Health – Hazardous Materials Unit shall be contacted to review and oversee the SMP and any additional assessments, site remediation, and/or health risk assessments that are deemed necessary. The onsite USTs, AST, drum, trench drains, and sumps shall be removed in accordance with local permits and guidelines as identified and required by Santa Barbara County Environmental Health – Hazardous Materials Unit.

All necessary reports, regulations and permits shall be followed to achieve remediation of the site. The contaminated materials shall be remediated under the supervision of an environmental consultant licensed to oversee such remediation and under the direction of the lead oversight agency. The remediation program shall also be approved by a regulatory oversight agency, such as the Santa Barbara County Environmental Health – Hazardous Materials Unit. Alternatively, the Hazardous Materials Unit may determine that RWQCB or DTSC should be the lead agency for remediation oversight.

All proper waste handling and disposal procedures shall be followed. Upon completion of the remediation, the environmental professional shall prepare a report summarizing the project, the remediation approach implemented, and the analytical results after completion of the remediation (including all waste disposal or treatment manifests) and site closure by the lead agency will be obtained.

HAZ-2 Hazardous Building Material Survey and Demolition Plan

A hazardous building material survey shall be conducted prior to demolition or removal of any onsite structures. If any ACM, LBP, or PCBs are identified, the materials shall be removed in accordance with California and Federal OSHA as well as other state and federal regulations by licensed abatement contractors. All ACM, LBP, and PCB materials removed from the site shall be hauled and disposed of by a transportation company certified to handle these materials.

Significance After Mitigation

Impacts related to the routine transport, use, or disposal of hazardous materials, and risk of upset, would be less than significant with implementation of Mitigation Measures HAZ-1 and HAZ-2.

4.3.4 Cumulative Impact Analysis

Cumulative development in Goleta and the surrounding area would modify existing land use patterns through the development of vacant lots or through redevelopment. Development of the cumulative projects would cumulatively increase the potential for exposure of people to hazards and hazardous materials, including soil contamination, pesticides, LBP, asbestos, groundwater contamination of PCE, and upset risks along major transportation routes. The proposed project would incrementally contribute to this cumulative effect. However, as discussed throughout this section, such risks of exposure are reduced through adherence to existing federal, State, and local regulations. U.S. EPA and U.S. DOT laws regulate the safe interstate transportation of hazardous materials and waste. In addition, the project would be required to comply with Mitigation Measures HAZ-1 and HAZ-2, which would reduce impacts to less than significant.

Impacts associated with hazards and hazardous materials are generally site-specific. Accordingly, as required under applicable laws and regulations, potential impacts associated with cumulative developments would be addressed on a case-by-case basis and appropriate mitigation would be designed to mitigate impacts resulting from individual projects, depending upon the type and severity of hazards present. Enforcement of federal, State, and local laws and regulations would ensure that hazards to the public or environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment would remain less than significant. Therefore, cumulative impacts related to hazards and hazardous materials would be less than significant.

References

- California Department of Industrial Relations. 2012. Guide to California Hazard Communication Regulations. Revised May 2012.
https://www.dir.ca.gov/DOSH/dosh_publications/hazcom.pdf (accessed July 2020).
- Santa Barbara County Airport Land Use Commission (ALUC). 1993. Airport Land Use Plan. Adopted October 1993.

4.4 Noise

This section discusses the project's potential impacts relating to noise and groundborne vibration. The Initial Study determined the project would not have noise impacts related to the nearby Santa Barbara Airport. The purpose of this section is to analyze the project's noise and vibration impacts related to both temporary construction activity and long-term operation of the project. Sound level measurement data is included in Appendix E.

4.4.1 Setting

Environmental Noise

Sound is a vibratory disturbance created by a moving or vibrating source, which is capable of being detected by the hearing organs. Noise is defined as sound that is loud, unpleasant, unexpected, or undesired and may therefore be classified as a more specific group of sounds. The effects of noise on people can include general annoyance, interference with speech communication, sleep disturbance, and, in the extreme, hearing impairment (Caltrans 2013).

Noise levels are commonly measured in decibels (dB) using the A-weighted sound pressure level (dBA). The A-weighting scale is an adjustment to the actual sound pressure levels so that they are consistent with the human hearing response, which is most sensitive to frequencies around 4,000 Hertz and less sensitive to frequencies around and below 100 Hertz (Kinsler et al. 1999). Decibels are measured on a logarithmic scale that quantifies sound intensity in a manner similar to the Richter scale used to measure earthquake magnitudes. A doubling of the energy of a noise source, such as doubling of traffic volume, would increase the noise level by 3 dB; dividing the energy in half would result in a 3 dB decrease (Crocker 2007).

Human perception of noise has no simple correlation with sound energy: the perception of sound is not linear in terms of dBA or in terms of sound energy. Two sources do not "sound twice as loud" as one source. It is widely accepted that the average healthy ear can barely perceive changes of 3 dBA, increase or decrease (i.e., twice the sound energy); that a change of 5 dBA is readily perceptible (8 times the sound energy); and that an increase (or decrease) of 10 dBA sounds twice (half) as loud ([10.5x the sound energy] Crocker 2007).

Sound changes in both level and frequency spectrum as it travels from the source to the receiver. The most obvious change is the decrease in level as the distance from the source increases. The manner by which noise reduces with distance depends on factors such as the type of sources (e.g., point or line, the path the sound will travel, site conditions, obstructions, etc.). Noise levels from a point source typically attenuate, or drop off, at a rate of 6 dBA per doubling of distance (e.g., construction, industrial machinery, ventilation units, etc.). Noise from a line source (e.g., roadway, pipeline, railroad, etc.) typically attenuates at about 3 dBA per doubling of distance (Caltrans 2013). The propagation of noise is also affected by the intervening ground, known as ground absorption. A hard site, such as a parking lot or smooth body of water, receives no additional ground attenuation and the changes in noise levels with distance (drop-off rate) result from simply the geometric spreading of the source. An additional ground attenuation value of 1.5 dBA per doubling of distance applies to a soft site (i.e., soft dirt, grass, or scattered bushes and trees) (Caltrans 2013). Noise levels may also be reduced by intervening structures; the amount of attenuation provided by this "shielding" depends on the size of the object and the frequencies of the noise levels. Natural terrain features such as hills and dense woods, and man-made features such as buildings and walls, can

significantly alter noise levels. Generally, any large structure blocking the line of sight will provide at least a 5-dBA reduction in source noise levels at the receiver (Federal Highway Administration [FHWA] 2011). Structures can substantially reduce exposure to noise as well. The FHWA's guidelines indicate that modern building construction generally provides an exterior-to-interior noise level reduction of 20 to 35 dBA with closed windows.

The impact of noise is not a function of loudness alone. The time of day when noise occurs and the duration of the noise are also important factors of project noise impact. Most noise that lasts for more than a few seconds is variable in its intensity. Consequently, a variety of noise descriptors have been developed. One of the most frequently used noise metrics is the equivalent noise level (L_{eq}); it considers both duration and sound power level. L_{eq} is defined as the single steady A-weighted level equivalent to the same amount of energy as that contained in the actual fluctuating levels over time. Typically, L_{eq} is summed over a one-hour period. L_{max} is the highest root mean squared (RMS) sound pressure level within the sampling period, and L_{min} is the lowest RMS sound pressure level within the measuring period (Crocker 2007).

Noise that occurs at night tends to be more disturbing than that occurring during the day. Community noise is usually measured using Day-Night Average Level (L_{dn}), which is the 24-hour average noise level with a +10 dBA penalty for noise occurring during nighttime (10:00 p.m. to 7:00 a.m.) hours. It is also measured using CNEL, which is the 24-hour average noise level with a +5 dBA penalty for noise occurring from 7:00 p.m. to 10:00 p.m. and a +10 dBA penalty for noise occurring from 10:00 p.m. to 7:00 a.m. (Caltrans 2013). Noise levels described by L_{dn} and CNEL usually differ by about 1 dBA. The relationship between the peak-hour L_{eq} value and the L_{dn} /CNEL depends on the distribution of traffic during the day, evening, and night. Quiet suburban areas typically have CNEL noise levels in the range of 40 to 50 dBA, while areas near arterial streets are in the 50 to 60-plus CNEL range. Normal conversational levels are in the 60 to 65-dBA L_{eq} range; ambient noise levels greater than 65 dBA L_{eq} can interrupt conversations (FHWA 2018).

Groundborne Vibration

Groundborne vibration of concern in environmental analysis consists of the oscillatory waves that move from a source through the ground to adjacent structures. The number of cycles per second of oscillation makes up the vibration frequency, described in terms of Hz. The frequency of a vibrating object describes how rapidly it oscillates. The normal frequency range of most groundborne vibration that can be felt by the human body starts from a low frequency of less than 1 Hz and goes to a high of about 200 Hz (Crocker 2007).

While people have varying sensitivities to vibrations at different frequencies, in general they are most sensitive to low-frequency vibration. Vibration in buildings, such as from nearby construction activities, may cause windows, items on shelves, and pictures on walls to rattle. Vibration of building components can also take the form of an audible low-frequency rumbling noise, referred to as groundborne noise. Groundborne noise is usually only a problem when the originating vibration spectrum is dominated by frequencies in the upper end of the range (60 to 200 Hz), or when foundations or utilities, such as sewer and water pipes, physically connect the structure and the vibration source (Federal Transit Administration [FTA] 2018). Although groundborne vibration is sometimes noticeable in outdoor environments, it is almost never annoying to people who are outdoors. The primary concern from vibration is that it can be intrusive and annoying to building occupants and vibration-sensitive land uses.

Vibration energy spreads out as it travels through the ground, causing the vibration level to diminish with distance away from the source. High-frequency vibrations diminish much more rapidly than

low frequencies, so low frequencies tend to dominate the spectrum at large distances from the source. Discontinuities in the soil strata can also cause diffractions or channeling effects that affect the propagation of vibration over long distances (Caltrans 2020). When a building is impacted by vibration, a ground-to-foundation coupling loss will usually reduce the overall vibration level. However, under rare circumstances, the ground-to-foundation coupling may actually amplify the vibration level due to structural resonances of the floors and walls.

Vibration amplitudes are usually expressed in peak particle velocity (PPV) or RMS vibration velocity. The PPV and RMS velocity are normally described in inches per second (in/sec). PPV is defined as the maximum instantaneous positive or negative peak of a vibration signal. PPV is often used in monitoring of blasting vibration because it is related to the stresses that are experienced by buildings (Caltrans 2020).

Existing Ambient Noise Environment

The primary noise source in the project area is vehicular traffic and train movement on the UPRR. Existing noise levels at the project site were documented during two short-term (i.e., 15 minutes) ambient noise measurements. Ambient noise levels were primarily influenced by vehicular traffic from South La Patera Lane and U.S. 101. No nearby stationary sources of noise were detectable in the project area vicinity.

Noise measurements were conducted using an Extech 407780A integrating sound-level meter positioned at a height of approximately 5 feet above ground level. The short-term noise measurements were conducted at approximately 15 feet from the center line of South La Patera Lane, approximately 50 feet from the UPRR, and approximately 270 feet from the centerline of U.S. 101. Table 4.4-1 describes the short-term sound level measurement location and results. Figure 4.4-1 depicts the sound level measurement locations in the project area vicinity from existing road and rail noise sources.

The closest public airport to the project site is the Santa Barbara Airport, about 0.5 mile south of the project site. According to the Area of Influence and Noise Contour figure in the Santa Barbara County Airport Land Use Compatibility Plan, the project site is not within the 55, 60, or 65 dBA CNEL noise contours of the airport (SBCAG 1993). Therefore, aircrafts do not substantially contribute to the existing ambient noise conditions on the project site and vicinity.

Table 4.4-1 Summary of Measured Short-Term Ambient Noise Levels

Monitoring Location	Monitoring Period	Monitoring Location	Noise Level (dBA)	
			L _{eq}	L _{max}
NM-1	8:58-9:22 AM	North side of the existing building	64.8	87.5
NM-2	9:26-9:41 AM	North side of the existing building	60.8	75.6

Noise measurement survey was conducted on July 10, 2020 using a Larson Davis Laboratories, Type I, Model 820 integrating sound-level meter positioned at a height of approximately 5 feet above ground level. Refer to Figure 4.10-1 for noise measurement locations.

Figure 4.4-1 Ambient Noise Monitoring Location



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Fig. 4.4-1 Ambient Noise Monitoring Location

As indicated in Table 4.4-1, measured ambient noise levels in the project vicinity ranged from approximately 61 to 65 dBA L_{eq} during the daytime hours. Instantaneous noise levels measured during the daytime hours ranged from approximately 76 to 88 dBA L_{max} . The majority of the noise that occurred during the two measurements came from vehicles driving on U.S. 101. Secondary ambient noise sources include traffic on South La Patera Lane and noise generated from stationary sources in the project vicinity. Noise measurement 1 captured noise from a train on the UPRR. The train arrived at the depot at 9:18 AM and departed at 9:22 AM. The train was audible during its stop at the depot and was the loudest source of noise during the first noise measurement. Noise from the train included a train horn, bells, and noise generated from its operation. Sound level measurement data is included in Appendix E.

The site measurements were conducted during the COVID-19 pandemic. Many businesses and schools were closed at the time noise measurements were collected, and the number of vehicles on the local roadways was potentially reduced compared to typical conditions. Therefore, measured noise levels were estimated to be lower than under typical conditions.

Sensitive Noise Receivers

The General Plan Noise Element defines sensitive receivers as users or types of uses that are interrupted (rather than merely annoyed) by relatively low levels of noise. These include residential neighborhoods, schools, libraries, hospitals and rest homes, auditoriums, certain open space areas, and public assembly places. Uses in the immediate vicinity of the project site consist primarily of commercial and industrial development.

Sensitive receivers nearest to the project site consist of single-family residences 500 feet north of the project site across UPRR right-of-way and U.S. 101. The nearest school is La Patera Elementary School located approximately 0.7 mile to the north. The nearest park is the Los Carneros Park and associated hiking trails, which is located as close as 660 feet north from the project site across UPRR right-of-way and U.S. 101. Therefore, the nearest sensitive receptors to the proposed project are the residences located to the north across U.S. 101 from the project site.

4.4.2 Regulatory Setting

Federal

Federal Transit Administration Criteria

Sections 5 and 6 of the Transit Noise and Vibration Impact Assessment Manual, adopted by the FTA in September 2018, addresses the federal guidelines used to evaluate a project for potential vibration impacts. The vibration impact analysis is a multi-step process used for determining vibration analysis level, determining vibration impact criteria, and evaluating vibration impact. FTA guidelines state that the threshold of perception for humans is approximately 65 vibration decibels (VdB). A vibration level of 85 VdB can result in strong annoyance, and a vibration level of 100 VdB is the threshold of potential damage (FTA 2018). Construction activity can result in varying degrees of ground vibration depending on the equipment and methods employed, and older and more fragile buildings must receive special consideration. These guidelines are advisory and should be used to assess the impacts of ground borne vibrations created from transit and construction sources.

State

The State of California regulates freeway noise, sets standards for sound transmission, provides occupational noise control criteria, identifies noise standards, and provides guidance for local land use compatibility. State law requires each county and city to adopt a General Plan that includes a Noise Element prepared per guidelines adopted by the Governor's Office of Planning and Research. The purpose of the Noise Element is to limit the exposure of the community to excessive noise levels. The California Environmental Quality Act requires all known environmental effects of a project be analyzed, including environmental noise impacts.

California General Plan Guidelines

The California General Plan Guidelines, published by the Governor's Office of Planning and Research, indicate acceptable, specific land use types in areas with specific noise exposure. The guidelines also offer adjustment factors that may be used to arrive at noise acceptability standards that reflect the noise control goals of the community, the particular community's sensitivity to noise, and the community's assessment of the relative importance of noise pollution. These guidelines are advisory, and local jurisdictions, including the City of Goleta, have the responsibility to set specific noise standards based on local conditions.

California Noise Control Act of 1973

California Health and Safety Code Sections 46000 through 46080, known as the California Noise Control Act, find that excessive noise is a serious hazard to public health and welfare and that exposure to certain levels of noise can result in physiological, psychological, and economic damage. The act also finds that there is a continuous and increasing bombardment of noise in urban, suburban, and rural areas. The California Noise Control Act declares that the State of California has a responsibility to protect the health and welfare of its citizens by the control, prevention, and abatement of noise. It is the policy of the State to provide an environment for all Californians that is free from noise that jeopardizes their health or welfare.

The California Administrative Code (CAC), Title 24, Noise Insulation Standards

Interior noise levels for habitable rooms are regulated also by Title 24 of the California Code of Regulations (CCR), California Noise Insulation Standards. Title 24, Chapter 12, Section 1207.4, of the California Building Code requires that interior noise levels attributable to exterior sources not exceed 45 CNEL in any habitable room within a residential structure. A habitable room is a room used for living, sleeping, eating, or cooking. Bathrooms, closets, hallways, utility spaces, and similar areas are not considered habitable rooms for this regulation.

Local

City of Goleta Noise Element

The Noise Element of the Goleta General Plan establishes noise standards for various land use categories based on the U.S. Department of Housing and Urban Development Guidelines and standards from the California Office of Noise Control. The City recommends 50-70 dBA as the "normally acceptable" range and 70-75 dBA as the "conditionally acceptable" range for industrial uses. According to the Goleta General Plan, industrial uses within the "normally acceptable range" are deemed satisfactory, based upon the assumption that any buildings involved are of normal conventional construction, without any special noise insulation requirements. Development of

industrial uses within the “conditionally acceptable” range should be undertaken only after a detailed analysis of the noise reduction requirements is made and needed noise insulation features are included in the design (Goleta 2006). Table 4.4-2 shows the normally acceptable and conditionally acceptable ranges for each land use category. According to Noise Element Policy NE 1.1, the City requires mitigation for development that would subject proposed land uses to noise levels that exceed the acceptable levels shown in Table 4.4-2.

Table 4.4-2 Goleta Noise and Land Use Compatibility Criteria

Land Use Category	Community Noise Exposure Ldn or CNEL, dBA			
	Normally Acceptable	Conditionally Acceptable	Normally Unacceptable	Clearly Unacceptable
Residential – Low Density	50-60	60-65	65-75	75-85+
Residential – Multi-Family	50-60	60-65	65-75	75-85+
Transient Lodging – Motels, Hotels	50-65	65-70	70-80	80-85+
Schools, Libraries, Churches, Hospitals, Nursing Homes	50-60	60-65	65-80	80-85+
Auditoriums, Concert halls, Amphitheaters	NA	50-65	NA	65-85+
Sports Arena, Outdoor Spectator Sports	NA	50-70	NA	70-85+
Playgrounds, Neighborhood Parks	50-70	NA	70-75	75-85+
Golf Courses, Riding Stables, Water Recreation, Cemeteries	50-70	NA	70-80	80-85+
Office Buildings, Business Commercial and Professional	50-67.5	67.5-75	75-85+	NA
Industrial, Manufacturing, Utilities, Agriculture	50-70	70-75	75-85+	NA

Normally Acceptable – Specified land uses is satisfactory, based upon the assumption that any buildings involved are of normal conventional construction, without any special noise insulation requirements.

Conditionally Acceptable – new construction or development should be undertaken only after a detailed analysis of the noise reduction requirements is made, needed noise reduction requirements are made, and needed noise insulation features included in the design. Conventional construction, but with closed windows and fresh air supply systems or air conditioning will normally suffice.

Source: Goleta General Plan Noise Element, 2006

Noise Element Policy NE 6.4 restricts construction activities near or adjacent to residential buildings and other sensitive receivers to the hours of 8:00 AM to 5:00 PM Monday through Friday and 7:00 AM to 4:00 PM Monday through Friday for construction in nonresidential areas. Noise Element Policy NE 6.5 requires the following measures to be incorporated into grading and building plan specifications to reduce construction noise:

- All construction equipment shall have properly maintained sound-control devices, and no equipment shall have an unmuffled exhaust system.
- Contractors shall implement appropriate additional noise mitigation measures including but not limited to changing the location of stationary construction equipment, shutting off idling equipment, and installing acoustic barriers around significant sources of stationary construction noise.

- To the extent practicable, adequate buffers shall be maintained between noise-generating machinery or equipment and any sensitive receivers. The buffer should ensure that noise at the receiver site does not exceed 65 dBA CNEL. For equipment that produces a noise level of 95 dBA at 50 feet, a buffer of 1600 feet is required for attenuation of sound levels to 65 dBA.

Goleta Municipal Code Chapter 9.09

Goleta Municipal Code (GMC) Chapter 9.09 regulates noise in the City. The purpose of the chapter is to preserve public peace and comfort for citizens of Goleta from unwarranted noise and disturbances. The GMC prohibits loud and unreasonable noise from 10:00 PM to 7:00 AM Sunday through Thursday and 12:00 AM to 7:00 AM Friday and Saturday. Loud and unreasonable noise is defined as sound which is clearly discernible at a distance of 100 feet from the property line of the property upon which it is broadcast or sound which is above 60 dBA at the edge of the property line upon which the sounds is broadcast. The City does not have any code requirements related to noise from construction activities, but the GMC noise regulations would apply to construction noise.

4.4.3 Impact Analysis

a. Methodology and Significance Thresholds

Methodology

Construction Noise

Short-term noise impacts associated with construction activities were analyzed based on typical construction equipment noise levels derived from the FHWA's Roadway Construction Noise Model (RCNM) and the FTA's Transit Noise and Vibration Impact Assessment Manual. Typical equipment use for various phases of construction were based on default assumptions identified in the California Emissions Estimator Model (CAPCOA 2018) for representative development projects. Predicted average-hourly construction noise levels (in dBA L_{eq}) were calculated assuming the two loudest pieces of construction equipment operating simultaneously at 500 feet from the nearest sensitive receivers. Noise levels are predicted in RCNM based on an average noise-attenuation rate of 6 dB per doubling of distance from the source.

Vibration Levels Associated with Construction Equipment

Groundborne vibration levels associated with construction activities were estimated based on the 2020 Caltrans Transportation and Construction Vibration Guidance Manual. Potential vibration levels were identified for onsite and offsite locations that are sensitive to vibration, including nearby residences.

The project does not include any substantial vibration sources associated with operation. The project would not increase and change train operations which would lead to changes in vibration levels in the area. Thus, construction activities have the greatest potential to generate ground-borne vibration affecting nearby receivers, especially during grading and excavation of the project site. The greatest vibratory source during construction in the project vicinity would be a large bulldozer. Neither blasting nor pile driving would be required for construction of the project. Construction vibration estimates are based on vibration levels reported by Caltrans and the FTA (Caltrans 2020, FTA 2018). Table 4.4.3 shows typical vibration levels for various pieces of construction equipment used in the assessment of construction vibration (FTA 2018).

Table 4.4.3 Vibration Levels Measured during Construction Activities

Equipment	PPV at 25 ft (in/sec)
Large Bulldozer	0.089
Loaded Trucks	0.076
Small Bulldozer	0.003

Source: FTA 2018

Vibration limits used in this analysis to determine a potential impact to local land uses from construction activities, such as blasting, pile-driving, vibratory compaction, demolition, drilling, or excavation, are based on information contained in Caltrans' *Transportation and Construction Vibration Guidance Manual* and the Federal Transit Administration and the FTA *Transit Noise and Vibration Impact Assessment Manual* (Caltrans 2020; FTA 2018). Maximum recommended vibration limits by the American Association of State Highway and Transportation Officials (AASHTO) are identified in Table 4.4.4.

Table 4.4.4 AASHTO Maximum Vibration Levels for Preventing Damage

Type of Situation	Limiting Velocity (in/sec)
Historic sites or other critical locations	0.1
Residential buildings, plastered walls	0.2–0.3
Residential buildings in good repair with gypsum board walls	0.4–0.5
Engineered structures, without plaster	1.0–1.5

Source: Caltrans 2020

Based on AASHTO recommendations, limiting vibration levels to below 0.1 PPV in/sec for historic sites and 0.2 PPV in/sec at residential structures would prevent structural damage. These limits are applicable regardless of the frequency of the source. However, as shown in Table 4.4.5 and Table 4.4.6, potential human annoyance associated with vibration is usually different if it is generated by a steady state or a transient vibration source.

Table 4.4.5 Human Response to Steady State Vibration

PPV (in/sec)	Human Response
3.6 (at 2 Hz)–0.4 (at 20 Hz)	Very disturbing
0.7 (at 2 Hz)–0.17 (at 20 Hz)	Disturbing
0.10	Strongly perceptible
0.035	Distinctly perceptible
0.012	Slightly perceptible

Source: Caltrans 2020

Table 4.4.6 Human Response to Transient Vibration

PPV (in/sec)	Human Response
2.0	Severe
0.9	Strongly perceptible
0.24	Distinctly perceptible
0.035	Barely perceptible

Source: Caltrans 2020

As shown in Table 4.4.5, the vibration level threshold at which steady vibration sources are considered to be distinctly perceptible is 0.035 in/sec PPV. This is roughly equivalent to the FTA identified threshold of 78 VdB for assessing impacts to residential land uses from infrequent events. This threshold is used for assessing passing trains in the FTA Manual. However, as shown in Table 4.4.6, the vibration level threshold at which transient vibration sources (such as construction equipment) are considered to be distinctly perceptible is 0.24 in/sec PPV. This is roughly equivalent to 94 VdB. This analysis uses the distinctly perceptible threshold for purposes of assessing vibration impacts.

Although groundborne vibration is sometimes noticeable in outdoor environments, groundborne vibration is almost never annoying to people who are outdoors; therefore, the vibration level threshold for human perception is assessed at occupied structures (FTA 2018).

Traffic Noise

Noise levels affecting the proposed project site would be primarily influenced by traffic noise from South La Patera Lane and U.S. 101. The project would primarily generate additional traffic on South La Patera Lane, which abuts the project site to the north and east. Future noise levels affecting the compatibility of the project site were estimated using the FHWA's Traffic Noise Model (TNM). Project trip generation is based on a Traffic Impact Report (TIA) completed by Linscott, Law & Greenspan Engineers, included as Appendix F. Table 4.4-7 shows that existing uses around the project site generate 149 daily trip ends on South La Patera Lane. The proposed project would generate an additional 202 daily trip ends, for a total of 351 daily trip ends on South La Patera Lane.

Table 4.4-7 Project Trip Generation

Land Use	Size	Daily Trip Ends Volumes ²	AM Peak Hour Volumes ²			PM Peak Hour Volumes ²		
			In	Out	Total	In	Out	Total
Proposed Project								
Train Depot ³	126 Spaces	351	42	11	53	14	40	54
Subtotal Project Driveway Trips		351	42	11	53	14	40	54
Existing Site								
Warehouse ⁴	30,000 GSF	(52)	(4)	(1)	(5)	(2)	(4)	(6)
Office ⁵	10,000 GSF	(97)	(10)	(2)	(12)	(2)	(10)	(12)
Subtotal		(149)	(14)	(3)	(17)	(4)	(14)	(18)
Net Increase Driveway Trips		202	28	8	36	10	26	36

¹ Source: Linscott, Law & Greenspan Engineers. ITE "Trip Generation Manual", 10th Edition, 2017. Trips are one-way traffic movements, entering or leaving.

² Trips are one-way traffic movements, entering or leaving.

³ ITE Land Use Code 90 (Park-and-Ride Lot with Bus or Light Rail Service) trip generation average rates.

- Daily Trip Rate: 2.81 trips/parking space; 50% inbound/50% outbound
- AM Peak Hour Trip Rate: 0.42 trips/parking space; 79% inbound/21% outbound
- PM Peak Hour Trip Rate: 0.43 trips/parking space; 25% inbound/75% outbound

⁴ ITE Land Use Code 150 (Warehousing) trip generation average rates.

- Daily Trip Rate: 1.74 trips/1,000 SF of floor area; 50% inbound/50% outbound
- AM Peak Hour Trip Rate: 0.17 trips/1,000 SF of floor area; 77% inbound/23% outbound
- PM Peak Hour Trip Rate: 0.19 trips/1,000 SF of floor area; 27% inbound/73% outbound

⁵ ITE Land Use Code 710 (General Office Building) trip generation average rates.

- Daily Trip Rate: 9.74 trips/1,000 SF of floor area; 50% inbound/50% outbound
- AM Peak Hour Trip Rate: 1.16 trips/1,000 SF of floor area; 86% inbound/14% outbound
- PM Peak Hour Trip Rate: 1.15 trips/1,000 SF of floor area; 16% inbound/84% outbound

Significance Thresholds

The following criteria are based on Appendix G of the State CEQA Guidelines. An impact would be considered potentially significant if the project would result in one or more of the following conditions:

- Generation of a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies;
- Generation of excessive groundborne vibration or groundborne noise levels; or
- For a project located within the vicinity of a private airstrip or an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, exposure of people residing or working in the project area to excessive noise levels.

As discussed in the Initial Study (Appendix A), the project is located outside the Noise Exposure Range of the Santa Barbara Airport, Airport Land Use Plan and was determined to be less than significant. The analysis in this EIR evaluates the potential impacts of the project on the environment. The compatibility of future land uses within the project area with the existing noise environment would be addressed through compliance with applicable city noise regulations and the city's permit approval process.

Short-Term/Construction Noise

The City of Goleta Noise Element restricts construction activities near or adjacent to residential buildings and other sensitive receivers to the hours of 8:00 AM to 5:00 PM Monday through Friday and 7:00 AM to 4:00 PM Monday through Friday for construction in nonresidential areas. Construction activities would generally be considered to have a potentially significant noise impact if average daytime noise levels would exceed 65 dBA CNEL when averaged over an 8-hour period.

Long-Term Operational Noise Impacts

The GMC prohibits loud and unreasonable noise between the hours of 10:00 PM and 7:00 AM Sunday through Thursday and between 12:00 AM and 7:00 AM Friday and Saturday. Loud and unreasonable noise is defined as sound which is clearly discernible at a distance of 100 feet from the property line of the property upon which it is broadcast or sound which is above 60 dBA at the edge of the property line upon which the sounds is broadcast.

For traffic-related noise, impacts would be considered significant if project-generated traffic would result in exposure of sensitive receivers to an unacceptable increase in noise levels. For purposes of this analysis, a significant impact would occur if project-related traffic increases the ambient noise environment of noise-sensitive locations by 3 dBA or more if the locations are subject to noise levels in excess of the conditionally acceptable noise levels in Table 4.4-2, or by 5 dBA or more if the locations are not subject to noise levels in excess of the aforementioned standards.

Exposure to non-transportation noise sources would be considered potentially significant if noise levels at existing noise-sensitive receptors would exceed the City's noise exposure standards for stationary noise sources.

Groundborne Vibration Impacts

To minimize the potential for cosmetic damage to buildings, AASHTO has established vibration thresholds of 0.1 in/sec PPV for sensitive historic structures and 0.2 in/sec PPV for buildings of normal conventional construction. Additionally, the FTA has established a vibration threshold 0.24 in/sec PPV for human annoyance.

b. Project Impacts

Threshold: Would the project result in generation of a substantial temporary increase in ambient noise levels in the vicinity of the project in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies? (Construction)

Impact N-1 SHORT-TERM CONSTRUCTION OF THE PROJECT WOULD TEMPORARILY INCREASE LOCAL NOISE LEVELS. THE ANTICIPATED INCREASE IN CONSTRUCTION NOISE WOULD BE LESS THAN SIGNIFICANT TO NEARBY SENSITIVE RECEIVERS.

Construction Noise

Construction noise typically occurs intermittently and varies depending upon the nature or phase of construction (e.g., land clearing, grading, excavation, and paving). Noise generated by construction equipment, including earth movers, material handlers, and portable generators, can reach high levels and be disruptive at nearby noise-sensitive receptors. Although noise ranges are generally similar for all construction phases, the initial site preparation or grading phases tends to involve the most heavy-duty equipment having a higher noise-generation potential. Noise levels associated with individual construction equipment are summarized in Table 4.4-8.

Table 4.4-8 Construction Equipment Noise Levels

Equipment	Noise Level (dBA) at 50 feet from Source Center	
	L _{max}	L _{eq}
Air Compressor	78	74
Backhoe	78	74
Front End Loader	79	75
Compactor (Ground)	83	76
Concrete Mixer Truck	79	75
Concrete Saw	90	83
Crane	81	73
Dozer	82	78
Grader	85	81
Excavator	81	77
Scraper	84	80
Generator	81	78
Gradall	83	79
Hydraulic Break Ram	90	80
Jack Hammer	89	82
Impact Hammer/Hoe Ram (Mounted)	90	83
Roller	80	73
Paver	77	74

Equipment	Noise Level (dBA) at 50 feet from Source Center	
	L _{max}	L _{eq}
Pneumatic Tools	85	82
Tractor	84	80
Dump Truck	77	73

Based on measured equipment noise levels. Actual noise levels are typically lower, particularly if the equipment is fitted with exhaust mufflers and engine shrouds. Sources: FTA 2018, FHWA 2008

As shown in Table 4.4-8, maximum noise levels generated by individual pieces of construction equipment typically range from approximately 77 dBA L_{max} at 50 feet and average-hourly noise levels for individual construction equipment generally range from approximately 73 to 83 dBA L_{eq} (FTA 2018).

The nearest sensitive receptors to the project site are residential areas northwest 500 feet north of the project site across UPRR right-of-way and U.S. 101. A dozer and backhoe were analyzed together for construction noise impacts due to their likelihood of being used in conjunction with one another and therefore a reasonable scenario for the greatest noise generation during construction. At a distance of 500 feet, a dozer and a backhoe would generate a noise level of 59.1 dBA L_{eq}. Converting this noise level to CNEL would result in a lower estimate because construction noise would be restricted to an 8-hour day and would not occur during the evening and nighttime hours. Therefore, noise generated from construction would be below the threshold of 65 dBA CNEL for an 8-hour period. Additionally, noise levels at other nearby receivers would be lower than 59.1 dBA L_{eq} because they are farther away. In accordance with City of Goleta Noise Element Policy NE 6.5, Best Management Practices (BMPs) would also be implemented during the construction phase. Therefore, because construction would not occur outside of the allowed hours and noise levels would be below 65 dBA CNEL, impacts from construction equipment would be less than significant.

Mitigation Measures

No mitigation measures would be required.

Significance After Mitigation

Impacts would be less than significant without mitigation.

Threshold: Would the project generate a substantial permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies? (Operation)
--

Impact N-2 THE PROJECT WOULD INCLUDE STATIONARY SOURCES THAT WOULD INCREASE NOISE LEVELS. HOWEVER, NOISE LEVELS GENERATED BY THE PROJECT WOULD NOT EXCEED 60 DBA AT THE NEAREST PROPERTY LINE. IMPACTS WOULD BE LESS THAN SIGNIFICANT.

On-Site Operational Noise

On-site noise source would include general conversations, landscape maintenance, waste hauling, and heating, ventilation, air conditioning (HVAC) equipment. Due to the distances and low noise levels associated with general site activities, on-site traffic, and landscape maintenance, these sources are not considered substantial and are not analyzed further. The primary noise source of concern would be associated with the project's mechanical equipment.

Based on combined data from Trane, Carrier, and Rheem HVAC manufacturing companies, noise from HVAC equipment would typically generate a noise level of 70 dBA L_{eq} at a reference distance of three feet from the source (Carrier Corp 2010). The GMC states that sound over 60 dBA between the hours of 10:00 PM and 7:00 AM Sunday through Thursday and between 12:00 AM and 7:00 AM Friday and Saturday would be considered significant. The shortest distance between the project building and the property line is approximately 25 feet. At this distance, noise levels from HVAC equipment would be approximately 51.6 dBA. Additionally, rooftop HVAC units would be shielded from surrounding land uses with parapets and roofs that block line-of-sight to sensitive receivers would typically provide at least a 5-dBA noise reduction. Therefore, rooftop-mounted equipment would generate approximate noise levels of 46.6 dBA at the nearest property line. Therefore, operational noise impacts associated with HVAC equipment would be less than significant.

Mitigation Measures

No mitigation measures would be required.

Significance After Mitigation

Impacts would be less than significant without mitigation.

Threshold: Would the project generate a substantial permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies? (Operation)

Impact N-3 THE PROJECT WOULD GENERATE NEW VEHICLE TRIPS THAT WOULD INCREASE NOISE LEVELS ON NEARBY ROADWAYS. HOWEVER, AMBIENT NOISE WOULD NOT EXCEED THE CONDITIONAL NOISE LEVELS FOR THE SITE OR AFFECTED RECEPTORS, AND PROJECT-RELATED CHANGES IN NOISE LEVELS WOULD NOT EXCEED 5 DBA. IMPACTS WOULD BE LESS THAN SIGNIFICANT.

Off-Site Traffic Noise

The project would generate new vehicle trips that would increase noise levels on nearby roadways. These trips would occur on South La Patera Lane. As shown in Table 4.4-7, the proposed project would increase the number of trip ends on South La Patera Lane from 149 to 351, an increase of 202 daily trip ends. As shown in the Table 4.4-9, noise levels related to the additional trips would increase of 3.8 dBA.

Table 4.4-9 Predicted Increases in Traffic Noise Levels – Existing Conditions

Roadway Segment	Noise Level (dBA CNEL/L _{dn}) at 50 Feet from Near-Travel-Lane Centerline			Significant Impact? ¹
	Existing	Existing Plus Project	Change	
South La Patera Ln., Lindmar Dr. to Dead End	45.9	49.7	3.8	No

¹ A significant impact would occur if project-related traffic increases the ambient noise environment of noise-sensitive locations by 3 dBA or more if the locations are subject to noise levels in excess of 75 dBA, or by 5 dBA or more if the locations are not subject to noise levels in excess of 75 dBA.

Note: Traffic noise levels were calculated using the FHWA roadway noise prediction model based on traffic data obtained from the traffic analysis prepared by Linscott, Law & Greenspan Engineers.

The project site is not located near a noise-sensitive location. In addition, ambient noise measured on the project site does not exceed the City Noise Land Use Compatibility Criteria for conditionally compatible noise level of 75 dBA for commercial and industrial uses, as detailed in Table 4.4-2. Therefore, a noise increase of more than 5 dBA would be considered significant for the area. As shown in Table 4.4-9, the project would result in an increase of approximately 3.8 dBA, which would be less than significant.

Mitigation Measures

No mitigation measures would be required.

Significance After Mitigation

Impacts would be less than significant without mitigation.

Threshold: Would the project generate excessive groundborne vibration or groundborne noise levels?

Impact N-4 THE PROJECT WOULD RESULT IN GROUNDBORNE VIBRATION IN THE PROJECT AREA VICINITY, DURING THE CONSTRUCTION PHASE. VIBRATION LEVELS DURING PROJECT CONSTRUCTION WOULD NOT CAUSE DAMAGE TO NEARBY STRUCTURES OR SUBSTANTIALLY IMPACT RESIDENTS IN NEARBY DWELLINGS. THIS IMPACT WOULD BE LESS THAN SIGNIFICANT.

Construction activities known to generate excessive ground-borne vibration, such as pile driving, would not be conducted by the project. The greatest anticipated source of vibration during general project construction activities would be from a dozer which would be used as close as 150 feet during construction from nearby land uses and buildings, including the historic Daniel Hill Adobe. A dozer would create a vibration level of approximately 0.089 PPV in/sec. at a distance of 25 feet (Caltrans 2020). This would equal a vibration level of approximately 0.012 PPV in/sec. at a distance of 150 feet.¹ The nearest residential structures are located 500 feet north across U.S. 101 and would experience a lower vibration level, which would be lower than what is considered a distinctly perceptible impact for humans at 0.24 PPV in/sec. In addition, 0.012 PPV in/sec. would be lower than the structural damage impact to historic structures of 0.1 PPV in/sec. Therefore, temporary impacts associated with the dozer (and other potential equipment) would be less than significant.

Mitigation Measures

No mitigation measures would be required.

Significance After Mitigation

Impacts would be less than significant without mitigation.

4.4.4 Cumulative Impacts

Planned, proposed, and approved projects in and around the city would expose additional people and property to noise and groundborne vibration. Noise impacts from individual projects would depend upon the location, type, and size of development and the proposed uses, and would be primarily addressed through compliance with the City's land use compatibility requirements and enforcement of the city's maximum noise exposure standards for stationary noise sources. Cumulatively, increasing traffic noise is the primary noise concern associated with continued long-term development in Goleta. The project's contribution to cumulative traffic noise in the Project area vicinity is evaluated quantitatively in Impact N-3 above and has been determined to be less than significant. Therefore, the project's overall contribution to long-term cumulative noise impacts would not be cumulatively considerable.

Construction and operation of other projects in the vicinity of the project area would not generate noise levels in excess of existing measured noise levels and would not affect sensitive receptors in the Project area vicinity. As described in Impact N-1, the nearest residences are located 500 feet to the north of the project area. Construction and operational noise is localized and generally does not contribute to cumulative noise impacts. None of the projects in the cumulative project list in Section 3, *Environmental Setting*, are located adjacent to the project site and would lead to cumulative noise impacts.

¹ $PPV_{Equipment} = PPV_{Ref} (25/D)^n$ (in/sec), PPV_{Ref} = reference PPV at 25 feet, D = distance, and $n = 1.1$

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4.5 Transportation

This section evaluates the potential transportation impacts of the project. The analysis in this section is based on the Transportation Impact Study (TIS) prepared by Linscott, Law, & Greenspan engineers (LLG) included as Appendix F. The analysis approach used in the TIS was developed based on the City of Goleta's City Council Resolution No. 20-44, which identifies vehicle miles traveled (VMT) as the primary metric for evaluating a project's transportation impacts in addition to a Level of Service (LOS) analysis at the local level. LOS analysis is provided for informational purposes only.

4.5.1 Setting

This section describes the existing transportation system and current operating conditions in the study area shown in Figure 4.5-1.

Regional Road Network

Regional access to the Project Site is provided by the State Route 217 (SR 217) and U.S. 101, which are detailed below:

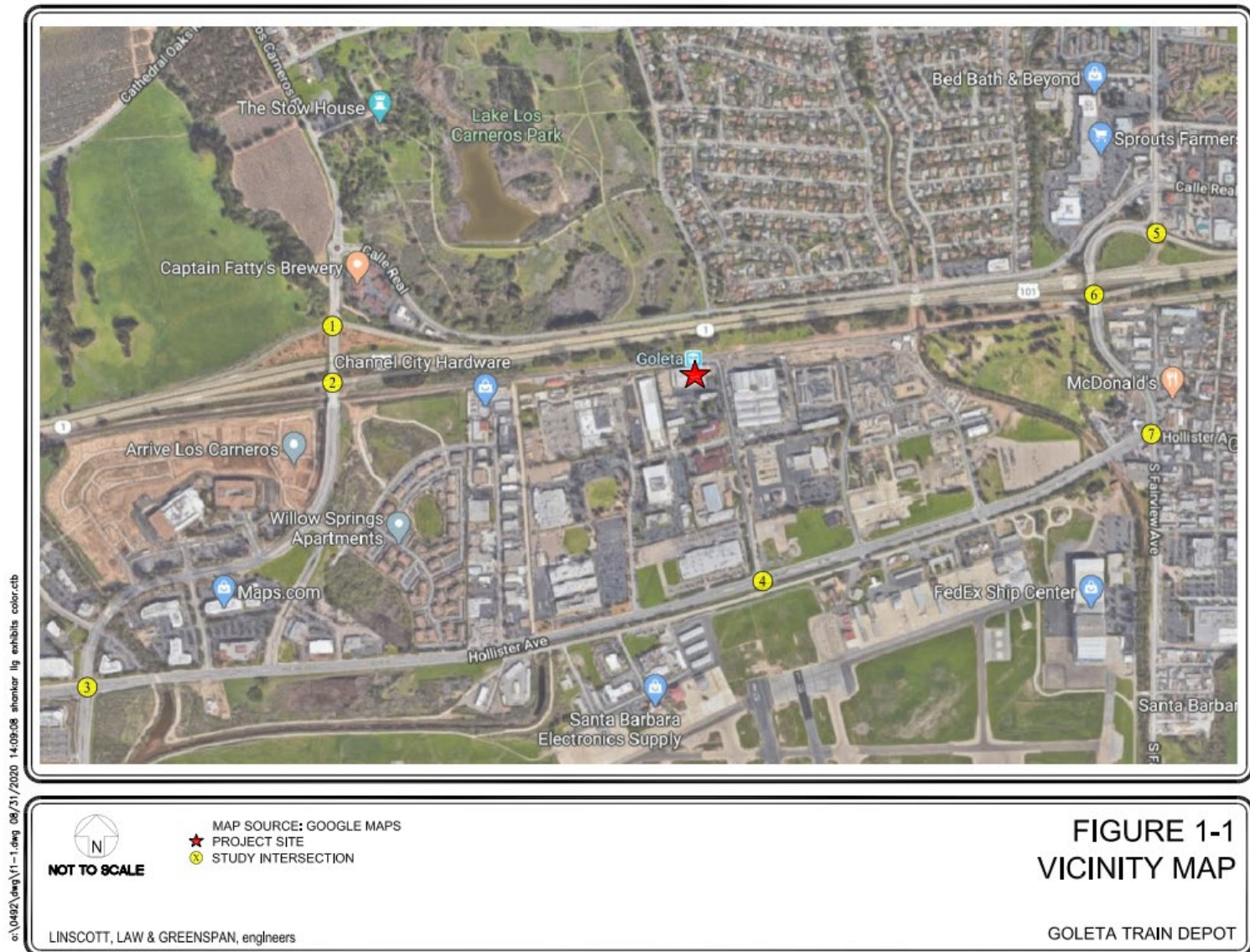
- SR 217 is an east-west state highway connecting the U.S. 101 to UCSB. In the project vicinity, two mixed-flow lanes are generally provided in each direction on SR 217. Eastbound and westbound ramps are provided on SR 217 at Hollister Avenue in the and are located approximately 1.5 miles east of the project site.
- U.S. 101 is a north-south oriented freeway that extends across northern and southern California. In the project area, two to three mixed-flow lanes are generally provided in each direction on the U.S. 101 with auxiliary merge/weave lanes provided between some interchanges. Northbound and southbound ramps are provided on the U.S. 101 at Los Carneros Road and Fairview Avenue, and are located approximately 0.6 miles west and 0.7 miles east of the project site, respectively

Local Roadway Network

The project study area includes seven roadway facilities which have the potential to be impacted by the project. Three of the facilities are within the City of Goleta jurisdiction and four are within the California Department of Transportation (Caltrans) jurisdiction, as detailed below:

1. Los Carneros Road/Hollister Avenue (City of Goleta)
2. South La Patera Lane/Hollister Avenue (City of Goleta)
3. Fairview Avenue/Hollister Avenue (City of Goleta)
4. Los Carneros Road/U.S. 101 Northbound ramps (Caltrans)
5. Los Carneros Road/U.S. 101 Southbound ramps (Caltrans)
6. Fairview Avenue/U.S. 101 Northbound ramps (Caltrans)
7. Fairview Avenue/U.S. 101 Southbound ramps (Caltrans)

Figure 4.5-1 Project Study Area and Analysis Locations



Roadway Descriptions and Operations

The City of Goleta utilizes the roadway categories recognized by regional, state, and federal transportation agencies. There are four categories in the roadway hierarchy, ranging from freeways, with the highest capacity, to two-lane undivided roadways, with the lowest capacity. The roadway categories are summarized as follows:

- Freeways are limited-access and high-speed travel ways included in the state and federal highway systems. Their purpose is to carry regional through-traffic. Access is provided by interchanges with typical spacing of 1 mile or greater. No local access is provided to adjacent land uses.
- Arterial roadways are major streets that primarily serve through-traffic and provide access to abutting properties as a secondary function. Arterials are generally designed with two to six travel lanes and their major intersections are signalized. This roadway type is divided into two categories: major and minor arterials. Major arterials are typically four-or-more lane roadways and serve both local and regional through-traffic. Minor arterials are typically two to-four lane streets that service local and commuter traffic.
- Collector roadways are streets that provide access and traffic circulation within residential and non-residential (e.g., commercial and industrial) areas. Collector roadways connect local streets to arterials and are typically designed with two through-travel lanes (i.e., one through-travel lane in each direction) that may accommodate on-street parking. They may also provide access to abutting properties.
- Local roadways distribute traffic within a neighborhood, or similar adjacent neighborhoods, and are not intended for use as through-streets or as links between higher capacity facilities such as collector or arterial roadways. Local streets are fronted by residential uses and do not typically serve commercial uses.

Los Carneros Road is a north-south oriented roadway located west of the project site. Within the project study area, Los Carneros Road is designated as a Principal Arterial by the City of Goleta. Two through lanes are generally provided in each direction on Los Carneros Road. Separate exclusive left-turn lanes are provided in each direction on Los Carneros Road at the Hollister Avenue intersection, and a separate exclusive left-turn lane is provided in the northbound direction at the US 101 Northbound ramps intersection. Los Carneros Road is posted for a speed limit of 45 miles per hour within the project study area.

South La Patera Lane is a north-south oriented roadway that borders the project site to the east. Within the project area, South La Patera Lane is designated as a Major Collector by the City of Goleta. One through travel lane is provided in each direction on South La Patera Lane within the project area. A separate exclusive left-turn lane is provided in the southbound direction on South La Patera Lane at the Hollister Avenue intersection. There is no speed limit posted on South La Patera Lane within the project area, thus a prima facie speed limit of 25 miles per hour is assumed, consistent with the State of California Vehicle Code Section 22352(b)(1).

Fairview Avenue is a north-south oriented roadway located east of the project site. North of Hollister Avenue, Fairview Avenue is designated as Principal Arterial by the City of Goleta. South of Hollister Avenue, Fairview Avenue is designated as a Major Collector by the City of Goleta. Two through travel lanes are generally provided in each direction on Fairview Avenue within the project study area. Separate exclusive left-turn lanes are provided in each direction on Fairview Avenue at the Hollister Avenue intersection. Separate exclusive left-turn lanes are provided in the northbound

direction at the U.S. 101 Northbound ramps intersection and in the southbound direction at the U.S. 101 Southbound ramps intersection. Fairview Avenue is posted for a speed limit of 35 miles per hour within the project area.

Hollister Avenue is an east-west oriented roadway located south of the project site. Within the project area, Hollister Avenue is designated as a Principal Arterial by the City of Goleta. Two through travel lanes are generally provided in each direction on Hollister Avenue within the area. Separate exclusive left-turn lanes are provided in each direction on Hollister Avenue at the Los Carneros Road intersection and at the Fairview Avenue intersection. A separate exclusive left-turn lane is provided in the eastbound direction at the South La Patera Lane intersection. West of Fairview Avenue, Hollister Avenue is posted for a speed limit of 45 miles per hour within the project study area. East of Fairview Avenue, Hollister Avenue is posted for a speed limit of 25 miles per hour.

Pedestrian and Bicycle Facilities

Pedestrian facilities include sidewalks, crosswalks, multi-use paths, and pedestrian signals at signalized intersections. Bicycle facilities consist of Class I, II, and III bikeways. Class I shared-use paths or bike paths are facilities with a separate right-of-way with crossflows by vehicles minimized. Class II bike lanes provide a striped lane for one-way bicycle travel on the side of the street adjacent to vehicle traffic. Class III bike routes consist of a roadway that is shared between bicycle and vehicle traffic with supplemental bike signage. The pedestrian and bicycle facilities near the project site include:

- La Patera Lane: Intermittent sidewalk on the east and west side of this road and no bicycle facilities.
- Hollister Avenue: Continuous sidewalk on the north side of the road near South La Patera Lane with a signalized intersection and crosswalk at the Hollister Avenue/South La Patera Lane intersection. Class II bike lanes exist in each direction on Hollister Avenue.

Transit Services

The Santa Barbara Metropolitan Transit District (MTD) provides public bus transit services in the City and throughout Santa Barbara County. MTD operates 24 lines throughout the County with three of these lines being express lines. The nearest stop to the project site is located at Hollister Avenue and La Patera Lane, which is served by MTD Route 6 and Route 12x.

The Ventura County Transportation Commission (VCTC) also operates public transit services within the City through its Coastal Express service on Routes 85, 85C, 86, and 88. The nearest stops of these routes to the project site are located at Hollister Avenue/Nectarine Avenue and Hollister Avenue/Cremona Drive, located approximately one mile southeast and southwest respectively.

Vehicle Miles Traveled

“Vehicle miles traveled” refers to the amount and distance of automobile travel “attributable to a project.” VMT re-routed from other origins or destinations as the result of a project would not be attributable to a project except to the extent that the re-routing results in a net increase in VMT. Daily VMT per resident is the average number of vehicle miles that a resident in a given area travels per day. One factor that leads to a higher relative daily VMT per resident is an imbalance of jobs and housing availability in an area. Existing VMT in the project area was estimated in the City of Goleta VMT Threshold Study. On average, each resident near the project site drives 19.8 miles per day to

and from their home and each employee drives 16.8 miles per day to and from their work (Goleta 2020).

Existing Level of Service

Due to the COVID-19 pandemic, traffic count data could not be collected at the study intersections to determine existing traffic conditions at the study area roadway facilities. In consultation with City staff, historical data (2007 and 2019 data) at the study intersections was utilized to represent current (pre-pandemic) traffic volume conditions. Field observations were conducted to observe traffic operating conditions and signal timings. A detailed explanation of the traffic count methodology and the traffic count sheets are included in Appendix F.

The existing operation of the City intersections were measured based on methodologies established in the Intersection Capacity Utilization (ICU) method. The existing operations of the Caltrans intersections were established using the Highway Capacity Manual (HCM 6th Edition). Existing operations used the historical data to determine more accurate existing conditions than would be determined during the COVID-19 pandemic. LOS is a qualitative measure of traffic operating conditions ranging from LOS A to LOS F. LOS A is the highest functioning and LOS F is the lowest functioning. Existing traffic flow analyses focus on operating conditions of critical intersections and segments during peak travel periods, which are typically the AM and PM peak hours. The AM peak hour is defined as the highest one hour of traffic flow counted between 7:00 AM and 9:00 AM on a typical weekday, the PM peak hour is defined as the highest one hour of traffic flow counted between 4:00 PM and 6:00 PM on a typical weekday. Table 4.5-1 and Table 4.5-2 presents the existing study area intersection operations for the City and Caltrans study intersections, respectively.

Table 4.5-1 Existing City of Goleta Intersection Level of Service (LOS)

Intersection	Peak Hour	V/C ¹	Level of Service
1. Los Carneros Road/Hollister Avenue	AM	0.406	A
	PM	0.587	A
2. South La Patera Lane/Hollister Avenue	AM	0.441	A
	PM	0.599	A
3. Fairview Avenue/Hollister Avenue	AM	0.545	A
	PM	0.633	B

¹ Volume to Capacity ratio

Source: TIS, Appendix F

Table 4.5-2 Existing Caltrans Intersection Level of Service (LOS)

Intersection	Peak Hour	Delay (sec/veh)	Level of Service
1. Los Carneros Road/U.S. 101 Northbound ramps	AM	18.0	B
	PM	20.3	C
2. Los Carneros Road/U.S. 101 Southbound ramps	AM	13.9	B
	PM	14.8	B
3. Fairview Avenue/U.S. 101 Northbound ramps	AM	10.0	A
	PM	13.4	B
4. Fairview Avenue/U.S. 101 Southbound ramps	AM	15.8	B
	PM	21.6	C

Source: TIS, Appendix F

As shown in Table 4.5-1, the three study intersections located within the City are presently operating at LOS B or better during the weekday AM and PM peak hours under existing conditions. As shown in Table 4.5-2, the four study intersections located within Caltrans jurisdiction are presently operating at LOS C or better during the weekday AM and PM peak hours under existing conditions.

4.5.2 Regulatory Setting

State Regulations

California Department of Transportation

Caltrans manages the operation of state highways, including U.S. 101 and SR 217, which pass through the City.

Senate Bill (SB) 743

To further the state’s commitment to the goals of SB 375, Assembly Bill (AB) 32, and AB 1358, SB 743 adds Chapter 2.7, Modernization of Transportation Analysis for Transit-Oriented Infill Projects, to Division 13 (Section 21099) of the Public Resources Code. Key provisions of SB 743 include reforming CEQA analysis for aesthetics and parking for urban infill projects and replacing the measurement of automobile delay with vehicle miles traveled (VMT) as a metric that can be used for measuring environmental impacts. Under SB 743, the focus of the environmental impacts of transportation shifts from driver delay to reduction of GHG emissions, creation of multimodal networks, and promotion of a mix of land uses, and LOS standards become local policy thresholds as adopted among individual agencies.

Regional

Santa Barbara County Association of Governments Regional Transportation Plan and Sustainable Community Strategy (SBCAG RTP and SCS)

The SBCAG RTP and SCS, titled Fast Forward 2040, is a long-range planning document for the region’s transportation system. The RTP analyzes the transportation needs of the region into the future and identifies project priorities in order to improve the transportation system. The Plan offers

a mix of mobility options and commits to a more sustainable transportation system through investments in public transportation, active transportation, highways, streets, and roads, and system efficiency. SBCAG is currently preparing its updated RTP/SCS Connected 2050 with anticipated completion August 2021.

Local Regulations

City of Goleta General Plan

The City of Goleta General Plan is intended to guide the land use and transportation networks by providing goals, policies, and action items to specify how the transportation system in the City will grow and improve into the future. Policies and Action Items that are applicable to the project in relation to transportation include:

Policy TE 1: Integrated Multi-Modal Transportation System

TE 1.1 Alternative Modes. The City's intent shall be to achieve a realistic and cost-effective balance between travel modes, including bikeways, pedestrian circulation, and bus transit. The City shall encourage the use of alternative modes of transportation, such as bus transit, bicycling, and walking, which have the additional beneficial effect of reducing consumption of non-renewable energy sources.

TE 1.2 Transportation and Land Use. The design of the City's transportation infrastructure and services, and investments in future improvements, shall be supportive of the land use plan set forth in the Land Use Element and responsive to the transportation impacts of development located in nearby areas outside the city boundary. The design of and improvements to the City's transportation system should accommodate not only existing conditions, but also projected growth based on the Land Use Element of this plan and planned growth in adjacent jurisdictions, including UCSB, the County, and the City of Santa Barbara.

TE 1.3 Improved Connectivity in Street, Pedestrian, and Bikeway Systems. In developing the future transportation system, the City will place priority on creating one or more additional non-interchange crossings of U.S. 101 to connect the community from north to south. The intent shall be to facilitate cross-town traffic, improve bicycle and pedestrian flow and safety, and to relieve traffic congestion on cross-routes with freeway interchanges.

TE 1.5 Multimodal Transportation Center. The City supports consideration of a multimodal transportation center in the city to facilitate interconnection and transfers between express bus routes, automobile, bicycle and pedestrian circulation, and potentially commuter and other passenger rail services. While a proposed area in the vicinity of the current Amtrak terminal should be studied, alternative sites should also be explored; the ultimate location will depend on the results of such study.

TE 2.2 Land Use Strategies to Reduce Automobile Travel Demand. The City supports the following land use strategies, as provided in the Land Use and Housing Elements, which may enable greater reliance by commuters, shoppers, and others, on alternative modes of travel:

- d. The provision of onsite commercial services for employees in new non-residential development, such as but not limited to cafeterias, childcare, financial services, convenience retail services, concierge services, and others as appropriate.

TE 2.3 Diversion of Automobile Trips to Alternative Modes. The City encourages investment in alternative modes of travel that will make those modes more competitive with auto travel in terms of convenience, accessibility, costs, and safety. These may include, but are not limited to, improvements in the bus transit system, the bikeway system, pedestrian circulation system, and potentially commuter rail services, if the region should determine to pursue this option.

Policy TE 4: Target Level of Service Standards

TE 4.1 General Level of Service Standard. A traffic LOS standard C shall apply citywide to major arterials, minor arterials, and collector roadways and signalized and unsignalized intersections, except as provided in TE 4.2. The standard shall apply to daily traffic volumes and both AM and PM peak hours for intersections, and to average daily traffic volumes (ADT) for roadway segments.

Policy TE 7: Public Transit (Bus Transportation)

TE 7.3 Intermodal Transportation Center/Bus Transfer Areas. There are significant opportunities for transfer from one route to another. Two bus transfer locations are identified:

- (1) Hollister Avenue in Old Town and
- (2) Adjacent to the Camino Real Marketplace.

The City, MTD, and other transit providers should identify and plan for facilities in these areas to facilitate and accommodate such transfers. In addition to these designated areas the City shall also consider potential opportunities for park-and-ride facilities, especially any opportunities that offer shared parking facilities with other uses. The public transportation plan map designates a generalized location for an intermodal transportation center near the existing Amtrak station. The purpose of the transportation center would be to provide a convenient and safe hub for transfers between bus, shuttle, train, automobile, bicycle, and pedestrian modes. The specific site selected for a transportation center should allow convenient and safe drop-off and pick-up areas without adversely affecting surrounding traffic flows.

TE 7.8 Hollister Avenue Transit Corridor. Hollister Avenue from the eastern city boundary west to Pacific Oaks Road is designated as the Hollister Avenue Transit Corridor. The highest concentration of transit routes and greatest frequency of service occur in this area. The land areas along this corridor include existing and planned future retail commercial and employment centers as well as higher-density housing. These higher-intensity uses are transit oriented; the City supports efforts by MTD and other providers to expand express and local bus services along this corridor as ridership levels warrant.

Policy TE 8: Rail Transportation

TE 8.1 Commuter Rail Service. If the region should determine that it is cost effective to implement commuter rail service along the UPRR corridor, the City shall consider new facilities, such as (but not limited to) track sidings or a turnaround, as may be appropriate to accommodate the service. Any improvements should be limited to areas within the existing railroad right-of-way to the extent feasible.

TE 8.2 Rail Terminal. Figure 7-4 identifies the location of the existing Amtrak terminal as of 2005. The City, in cooperation with Amtrak and any future commuter rail service provider, should actively explore and promote the development of an expanded multimodal transportation center that includes a rail station in the city as referenced in TE 7.3. As of 2005, facilities were limited to a passenger platform. The City supports regional funding and construction of a terminal facility that includes a building with an indoor waiting area, ticketing, information kiosks, restrooms, and other appropriate amenities; parking; and drop-off and pick-up areas. Small-scale ancillary commercial services, such as a small restaurant, may also be permitted as integral to the terminal facility.

TE 8.3 Coordination of Bus Service with Commuter Rail. If the region should determine to implement commuter rail service along the UPRR corridor, the City encourages MTD, private providers, and/or employers to consider scheduled and/or demand-responsive shuttle bus service between the train station and local employment centers, including but not limited to UCSB.

TE 8.4 Linkage of Land Use With Potential Commuter Rail. The land-use plan map designates land areas along and near the railroad corridor in the mid-Hollister area for business park and medium-density multi-family residential development. It is the intent that these higher-intensity uses support and not prevent potential passenger rail service as well as support existing and potential expanded bus commute services along the Hollister Corridor.

TE 8.5 Amtrak and Caltrans-Supported Passenger Rail Services. The City encourages that existing Amtrak services and Caltrans supported passenger rail services be maintained, with expansion or increased frequency of service when warranted by ridership levels.

TE 8.7 Retention of Railroad Right-of-Way. In the event that any portion of the existing railroad right-of-way is proposed to be abandoned by UPRR in the future, the City supports efforts to secure an ownership interest by a regional or local entity. The intent shall be to reserve the right-of-way for future use, including but not limited to commuter rail service, park-and-ride lots, or other appropriate transportation facilities.

4.5.3 Impact Analysis

a. Methodology and Significance Thresholds

To implement SB 743, the CEQA Guidelines have been updated to change the criteria for determining what constitutes a significant traffic-related environmental impact to rely upon quantification of vehicle miles traveled (VMT) instead of LOS. As of July 1, 2020, the VMT-based approach in Section 15064.3 of the CEQA Guidelines applies statewide for the purpose of assessing traffic-related impacts under CEQA. As a result, this analysis uses the metric of VMT to determine the project's traffic-related impact.

On July 7, 2020, the Goleta City Council adopted Resolution No. 20-44 which set locally applicable CEQA thresholds of significance for VMT (Goleta 2020). Under SB 743, cities can retain automobile LOS as a local policy, unrelated to CEQA, to measure a project's effect of local traffic operations. Pursuant to Resolution No. 20-44, the City continues to utilize LOS standards outlined in General Plan Policy TE 4 and the City's Environmental Review Guidelines, and will retain discretion to impose conditions of approval as necessary to bring a project into consistency with adopted LOS policies. However, exceedances of LOS standards are no longer considered an impact under CEQA.

Methodology

Project VMT

The VMT assessment criteria for the project were determined in consultation with City of Goleta staff, in accordance with the technical advisory issued by the Governor’s Office of Planning and Research, and the VMT thresholds and methodology adopted in Resolution No. 20-44.

Transit Facilities

The study area roadway facilities were evaluated under the following scenarios:

- Existing Conditions reflect recent traffic counts and the existing transportation network.
- Existing Condition plus Project adds project generated traffic to existing volumes.
- Future Cumulative Baseline.
- Future Cumulative Baseline plus Project.

Vehicle Trip Generation

The Institute of Transportation Engineers (ITE) Trip Generation Manual 10th Edition was used to estimate project trip generation. ITE Land Use Code 90 (Park-and-Ride Lot with Bus or Light Rail Service) trip generation average rates were used to forecast the traffic volumes expected to be generated by the project. An adjustment was made to the trip generation forecast based on the existing warehouse structure on-site. ITE Land Use Code 150 (Warehousing) and ITE Land Use Code 710 (General Office Building) trip generation average rates were used to estimate the trip reduction related to the removal of the existing structure from the project site. While the existing warehouse structure is only partially occupied, the analysis assumed typical capacity of the structure that could occur under the existing development conditions of the site. As shown in Table 4.5-3, the project is expected to generate 36 net new vehicle trips during AM and PM peak hour and 202 daily new trips.

Table 4.5-3 Goleta Train Depot Trip Generation

Land Use	Size	Unit ¹	Daily	AM			PM		
				In	Out	Total	In	Out	Total
Proposed Use									
Train Depot ²	125	spaces	351	42	11	53	14	40	54
Existing Uses									
Warehouse ³	30,000	sf	52	4	1	5	2	4	6
Office ⁴	10,000	sf	97	10	2	12	2	10	12
Total Net Increase Trips			202	28	8	36	10	26	36

¹ DU – dwelling unit; sf = square foot of gross leasable area.

² ITE Land Use Code #90

³ ITE Land Use Code #150

⁴ ITE Land Use Code #710

Source: TIS; Appendix F

Trip Distribution and Assignment

The project traffic volumes both entering and exiting the site have been distributed and assigned to the adjacent street system based on the following considerations:

- The site's proximity to major traffic corridors (i.e., Los Carneros Road, Fairview Avenue, Hollister Avenue, U.S. 101 Freeway, etc.);
- Expected localized traffic flow patterns based on adjacent roadway channelization and presence of traffic signals;
- Existing intersection traffic volumes;
- Ingress/egress availability at the Project Site assuming the site access and circulation scheme described in Section 3.0;
- The location of existing and proposed parking areas;
- Nearby population and employment centers as well as adjacent residential neighborhoods;
- Input from City staff

Future Cumulative Baseline

To forecast future cumulative conditions, City staff were consulted, and an ambient traffic growth factor was applied. The existing traffic volumes were increased at an annual rate of 2.0 percent per year to the year 2024, which is the anticipated year of project build-out. The ambient growth factor was estimated from existing 2019 peak hour traffic volumes and future 2022 peak hour traffic volumes for a related transportation project. The traffic growth projections are derived from the Goleta Travel Model, which forecasts future year 2042 traffic volumes based on build out of the Goleta General Plan, buildout of the County of Santa Barbara's adjacent specific and community plans, buildout of the UCSB Long Range Plan, and buildout of the Santa Barbara Airport Master Plan. The approximate annual traffic growth on the streets located in the project study area is expected to be one percent per year. Therefore, the use of a two percent annual traffic growth factor would be a conservative estimate.

Significance Thresholds

The following thresholds are based on Appendix G of the State CEQA Guidelines. Impacts would be significant if the project would:

- Conflict with program, plan, ordinance or policy addressing the circulation system, including transit, roadway, bicycle, and pedestrian facilities;
- Conflict or be inconsistent with CEQA Guidelines Section 15064.3, subdivision (b);
- Substantially increase hazards because of a geometric design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment); or
- Result in inadequate emergency access.

VMT

Based on the City's recently adopted VMT guidelines, the following are the recommended VMT thresholds for the City:

- Work daily VMT per employee: 14.3
- Residential daily VMT per capita: 16.8

In addition, the following development projects are presumed to have a less than significant impact on VMT:

- Small projects that are consistent with the Sustainable Communities Strategy (SCS) or General Plan and generate or attract fewer than 110 daily trips.
- Residential and office projects located in low VMT areas.
- Projects within ½ mile of an existing major transit stop or an existing stop along a high quality transit corridor, if they meet screening criteria standards.
- Affordable housing infill projects meeting screening criteria.
- Locally serving retail projects typically less than 10,000 square feet.
- Transportation project that would not likely lead to a measurable or substantial increase in VMT.

Transit Facilities

CITY OF GOLETA

For informational purposes, the potential effects of project-generated traffic on the City of Goleta intersections were evaluated using the traffic operations criteria set forth in the City of Goleta Environmental Review Guidelines. The operations criteria would be exceeded if the project-related increase in the v/c ratio or number of peak hour trips is equal to or exceeds the thresholds presented in Table 4.5-4 for intersections located within the City.

Table 4.5-4 City of Goleta Intersection Operations Criteria

Final v/c	LOS	Project-Related v/c Increase	Project-Related Peak Hour Trip Increase
<= 0.60	A	Equal to or greater than 0.20	–
0.61-0.70	B	Equal to or greater than 0.15	–
0.71-0.80	C	Equal to or greater than 0.10	–
0.81-0.90	D	–	Equal to or greater than 15 trips
0.91-1.00	E	–	Equal to or greater than 10 trips
> 1.00	F	–	Equal to or greater than 5 trips

STATE FACILITIES

For informational purposes, for intersections located within Caltrans jurisdiction, traffic effects were assessed based on the target LOS (i.e., the transition between stable and unstable flow) established by the Caltrans Guide for the Preparation of Traffic Impact Studies. Table 4.5-5 provides the LOS criteria, type of flow, and thresholds of significance for study intersections under Caltrans jurisdiction.

Table 4.5-5 Caltrans LOS and Intersection Operations Criteria

Control Delay (sec/veh)	Type of Flow	LOS	Project-Related Increase in Delay
<= 10	Stable Flow	A	–
10-20	Stable Flow	B	–
20-25	Stable Flow	C	–
35-55	Approaching Unstable Flow	D	–
55-80	Unstable Flow	E	Equal to or greater than 5 seconds
>80	Forced Flow	F	Equal to or greater than 5 seconds

b. Project Impacts and Mitigation Measures

Threshold 1: Would the project conflict with a program, plan, ordinance or policy addressing the circulation system, including transit, roadway, bicycle and pedestrian facilities?

Impact T-1 THE PROJECT’S TRAFFIC WOULD NOT AFFECT TRANSPORTATION FACILITIES IN A WAY WHICH WOULD CONFLICT WITH ANY CIRCULATION PLANS OR POLICIES. IMPACTS WOULD BE LESS THAN SIGNIFICANT.

Roadway Facilities

As discussed above under Methodology, pursuant to SB 743, automobile delay is no longer a metric that can be used for measuring environmental impacts under CEQA. However, for informational purposes and consistent with Resolution No. 20-44, a LOS analysis is included pursuant to Policy TE-4 of the City’s General Plan. The TIS estimated the effect of project-generated vehicle trips on traffic volumes and LOS at the study area intersections using the ICU method of analysis for intersections under City of Goleta jurisdiction. The analysis used the project’s trip generation shown in Table 4.5-3 and the City’s current policy for evaluating changes to intersection operations criteria discussed in Table 4.5-4. Table 4.5-6 summarize the vehicle AM and PM peak hour intersection operations for City of Goleta intersections with the addition of traffic generated by the proposed project. As shown, traffic from the project would not exceed City of Goleta intersection operation criteria and would not exceed LOS criteria at the three City of Goleta intersections.

Table 4.5-6 Existing Plus Project City of Goleta Intersection LOS

Intersection	Peak Hour	LOS	Change in V/C ¹	Criteria Exceeded?
1. Los Carneros Road/Hollister Avenue	AM	A	0.003	No
	PM	A	0.003	No
2. South La Patera Lane/Hollister Avenue	AM	A	0.016	No
	PM	B	0.014	No
3. Fairview Avenue/Hollister Avenue	AM	A	0.007	No
	PM	B	0.001	No

¹ Volume to Capacity ratio

Source: TIS, Appendix F

The TIS also estimated the effect of project-generated vehicle trips on traffic volumes and LOS at the study area intersections using the HCM 6th Edition for intersections under Caltrans jurisdiction. Table 4.5-7 summarizes the vehicle AM and PM peak hour intersection operations for Caltrans intersections with the addition of traffic generated by the proposed project.

Table 4.5-7 Existing Plus Project Caltrans Intersection LOS

Intersection	Peak Hour	LOS	Change in Delay	Criteria Exceeded?
4. Los Carneros Road/U.S. 101 Northbound ramps	AM	B	0.0	No
	PM	C	0.0	No
5. Los Carneros Road/U.S. 101 Southbound ramps	AM	B	0.0	No
	PM	B	0.0	No
6. Fairview Avenue/U.S. 101 Northbound ramps	AM	A	0.0	No
	PM	B	0.1	No
7. Fairview Avenue/U.S. 101 Southbound ramps	AM	B	0.0	No
	PM	C	0.1	No

Source: TIS, Appendix F

As shown in Table 4.5-7, traffic from the project would not exceed targeted LOS established by the Caltrans Guide for the Preparation of Traffic Impact Studies and would not exceed operational criteria for the four Caltrans intersections.

Transit Facilities

The project involves the construction of a train depot, which would be a new transit facility in the City. SBCAG RTP and SCS includes the Goleta Train Depot as a local project supported by SBCAG (SBCAG 2017). According to the RTP and SCS, the proposed project would enhance trail service as well as provide an improved means of ground connections for passengers flying from the Santa Barbara Airport. Construction of the project would not impact train schedule or stops at the adjacent Amtrak Station. Therefore, the project would not impact any plans related to transit facilities.

Bicycle and Pedestrian Facilities

There are no bicycle facilities located South La Patera Lane near the project site that would be impacted by the proposed project. In addition, South La Patera Lane has intermittent sidewalks from Hollister Avenue to the project site. According to the City’s Bicycle and Pedestrian Master Plan, Capital Improvement Project 9073 would include infilling missing sidewalk areas and implementing bicycle facilities on South La Patera Lane to the terminus near the project site (Goleta 2018). The project would replace existing sidewalks and driveways near the project site. In addition, the project would include a crosswalk near the relocated turnaround at the terminus of South La Patera Lane. The project would not inhibit the planned sidewalk and bicycle improvements from occurring along South La Patera Lane.

Therefore, the project would not conflict with a program, plan, ordinance, or policy addressing transit, roadway, bicycle, and pedestrian facilities.

Mitigation Measures

No mitigation measures would be required.

Significance After Mitigation

Impacts would be less than significant without mitigation.

Threshold 2: Would the project conflict or be inconsistent with CEQA Guidelines section 15064.3, subdivision (b)?

Impact T-2 THE PROJECT WOULD DEVELOP A NEW TRAIN DEPOT, A PRIMARY OBJECTIVE OF WHICH IS TO REDUCE REGIONAL VEHICLE MILES TRAVELED (VMT). IMPACTS WOULD BE LESS THAN SIGNIFICANT.

The project site currently generates VMT from the use of the existing warehouse. The proposed project may increase VMT over existing conditions. However, any VMT increase to the project site would be fully offset by the reduction of regional VMT by the project through increasing train ridership. According to SCBAG's Transit and Capital Rail Program application, it is estimated that approximately 5.8 million VMT will be displaced as a result of the proposed project (SBCAG 2018).

Also, in accordance with the City's adopted VMT guidelines and thresholds and OPR's Technical Advisory, certain projects would not result in a substantial VMT increase and may be screened from requiring a VMT analysis based on location, or other characteristics anticipated to result in low rates of VMT (OPR 2018). The City's VMT guidelines specifies that Transit and Active Transportation Projects would not likely lead to a measurable or substantial increase in VMT and therefore are presumed to cause a less than significant impact. The proposed project consists of the development of a train depot with a main objective of reducing regional GHG emissions through reducing VMT, as discussed above and in Section 2, *Project Description*. Therefore, in accordance with the State of California's technical advisory and the City of Goleta's VMT guidelines presented in Resolution No. 20-44, the project would not result in a substantial increase in VMT. Therefore, impacts would be less than significant.

Mitigation Measures

No mitigation measures would be required.

Significance After Mitigation

Impacts would be less than significant without mitigation.

Threshold 3: Would the project substantially increase hazards due to a geometric design feature (e.g., sharp curves or dangerous intersections) or incompatible use (e.g., farm equipment)?

Impact T-3 CONSTRUCTION OR OPERATION OF THE PROJECT WOULD NOT RESULT IN A SIGNIFICANT INCREASE IN TRANSPORTATION HAZARDS IN THE AREA OR ON THE PROJECT SITE. IMPACTS WOULD BE LESS THAN SIGNIFICANT.

Construction of the project would include construction-related traffic and equipment. The project could require up to 15,000 square-foot of material exported off-site, which would require large haul trucks traveling from the project site on City roadways. However, construction equipment and operations would be typical of construction projects throughout the City and would be temporary. In addition, the site is located at the terminus of South La Patera Lane and not near a major roadway or land use that could be in conflict with construction.

The project would relocate the existing turnaround at the northern terminus of South La Patera Lane southward out of UPRR right-of-way and into alignment with the entrance and exit driveways of the proposed Depot, as shown in Figure 2-5 in Section 2, *Project Description*. The turnaround would not increase hazards in the area and would be designed to accommodate the turnaround for large vehicles, buses, and trucks. In addition, crosswalks would be provided near the turnaround and throughout the Depot parking lot for train passengers accessing or leaving the Depot and Amtrak Station. All site plans, access points, parking areas, and roadway improvements would be developed in compliance with roadway standards and reviewed by the Public Works Department. Impacts would be less than significant.

Mitigation Measures

No mitigation measures would be required.

Significance After Mitigation

Impacts would be less than significant without mitigation.

Threshold 4: Would the project result in inadequate emergency access?

Impact T-4 IMPLEMENTATION OF THE PROJECT WOULD NOT RESULT IN INADEQUATE EMERGENCY ACCESS. THIS IMPACT WOULD BE LESS THAN SIGNIFICANT.

Construction of the project would not result in the closure of local roadways which would impede emergency access. A portion of South La Patera Lane would be reconfigured, but the area is at the terminus of the road and would not impact emergency access to other adjacent properties or areas of the City. The relocated turnaround at the northern terminus of South La Patera Lane would be designed to provide an adequate area for arriving emergency vehicles. Vehicle access to the project site would be reconfigured from its existing ingress/egress pattern and would include a one-way entrance driveway and a one-way exit driveway, which would be located off South La Patera Lane at the northeastern and southeastern corners of the site. The driveway widths and parking lot accessway would comply with emergency access standards and be reviewed by the Santa Barbara County Fire Department for consistency with applicable fire safety codes and emergency access requirements. Therefore, impacts would be less than significant.

Mitigation Measures

No mitigation measures would be required.

Significance After Mitigation

Impacts would be less than significant without mitigation.

4.5.4 Cumulative Impacts

VMT

As discussed in Impact T-2, the project would have a less than significant impact related to VMT because the project consists of the development of a train depot, which is a transit facility that would reduce VMT by discouraging regional trips by motor vehicles. Therefore, it would not have a considerable contribution to a cumulative VMT impact. In addition, cumulative VMT from projects listed in Table 3-1 in Section 3, *Environmental Setting*, would be reduced by the project because the project would reduce regional VMT by approximately 5.8 million VMT due to increases in train ridership.

Roadway Facilities

Pursuant to General Plan Policy TE 4 and the City’s Environmental Review Guidelines, the project’s impacts on roadway facilities were analyzed for informational purposes under Future Cumulative Plus Project conditions based on growth in traffic due to the combined effects of continuing development, intensification of existing developments, and ambient growth factors from the Goleta Travel Model. The TIS estimated the effect of project-generated vehicle trips on City of Goleta and Caltrans intersection under Future Cumulative Plus Project conditions, which are summarized in Table 4.5-8 and Table 4.5-9 below.

Table 4.5-8 Future Cumulative Plus Project City of Goleta Intersection LOS

Intersection	Peak Hour	LOS	Change in V/C ¹	Criteria Exceeded?
1. Los Carneros Road/Hollister Avenue	AM	A	0.003	No
	PM	B	0.003	No
2. South La Patera Lane/Hollister Avenue	AM	A	0.015	No
	PM	B	0.014	No
3. Fairview Avenue/Hollister Avenue	AM	A	0.007	No
	PM	B	0.001	No

¹ Volume to Capacity ratio

Source: TIS, Appendix F

Table 4.5-9 Future Cumulative Plus Project Caltrans Intersection LOS

Intersection	Peak Hour	LOS	Change in Delay	Criteria Exceeded?
1. Los Carneros Road/U.S. 101 Northbound ramps	AM	B	0.1	No
	PM	C	0.0	No
2. Los Carneros Road/U.S. 101 Southbound ramps	AM	B	0.1	No
	PM	C	0.0	No
3. Fairview Avenue/U.S. 101 Northbound ramps	AM	B	0.0	No
	PM	B	0.1	No
4. Fairview Avenue/U.S. 101 Southbound ramps	AM	B	0.0	No
	PM	C	0.2	No

Source: TIS, Appendix F

As shown in Table 4.5-8 and Table 4.5-9, traffic from the project would not exceed City of Goleta or Caltrans intersection operation criteria under Future Cumulative plus Project conditions. Also, the objective of the project is to increase train ridership and reduce regional VMT, which would improve cumulative traffic conditions in the City and region.

References

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- Governor's Office of Planning and Research (OPR). 2018. Technical Advisory on Evaluating Transportation Impacts in CEQA. December 2018.
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4.6 Tribal Cultural Resources

This section analyzes the effects of the proposed project on tribal cultural resources. The following discussion and analysis include findings about tribal cultural resources from the Initial Study, included in its entirety as Appendix A. This analysis is based on the Phase I Cultural Resources Assessment, which is appended to the Initial Study and included in Appendix A. Additionally, the discussion and analysis contained herein is informed by comments received during the NOP public review period and by Tribal discussions completed between the City and Native American tribes in the vicinity of the project site.

4.6.1 Setting

Existing Tribal Resource Setting

The project site lies within Chumash ethnographic territory, which extends from the current city of Malibu, north beyond San Luis Obispo, and inland as far as 68 kilometers (42 miles) (Glassow 1996). The Cultural Resources Assessment (Appendix A) provide an ethnographic overview of the Chumash.

Review of previously recorded resources and results of a pedestrian field survey by an archaeologist did not reveal findings of significant tribal cultural resources present on the project site (Appendix A). Though there are no known tribal cultural resources present on the project site, the project requires discretionary review by the City of Goleta and includes a request for a General Plan land use designation amendment. Therefore, notification of Native American tribes in the vicinity of the project site was required for this project under both Senate Bill (SB) 18 and Assembly Bill (AB) 52.

In present day, there are 7 Native American tribes in the vicinity of the project site, including:

- Barbareno/Ventureno Band of Mission Indians
- Chumash Council of Bakersfield
- Coastal Band of the Chumash Nation
- Northern Chumash Tribal Council
- San Luis Obispo County Chumash Council
- Santa Ynez Band of Chumash Indians
- Yak tityu tityu yak tilhini - Northern Chumash Tribe

4.6.2 Regulatory Setting

Federal

Native American Involvement

Several federal and state laws address Native American involvement in the development review process. The most notable of these are the federal Native American Graves Protection and Repatriation Act (1990) and the California Native American Graves Protection and Repatriation Act (2001). These acts ensure that Native American human remains and cultural items be treated with respect and dignity.

State

Senate Bill 18

Enacted on March 1, 2005, SB 18 (California Government Code Sections 65352.3 and 65352.4) requires cities and counties to notify and consult with California Native American tribal groups and individuals regarding proposed local land use planning decisions for the purpose of protecting traditional tribal cultural places (sacred sites), prior to adopting or amending a General Plan or designating land as open space. Tribal groups or individuals have 90 days to request consultation following the initial contact.

Assembly Bill 52

California AB 52 of 2014 was enacted in 2015, expanding the California Environmental Quality Act (CEQA) by defining a new resource category: "tribal cultural resources." AB 52 establishes that "a project with an effect that may cause a substantial adverse change in the significance of a tribal cultural resource is a project that may have a significant effect on the environment" (Public Resource Code [PRC] Section 21084.2). It further states the lead agency shall establish measures to avoid impacts that would alter the significant characteristics of a tribal cultural resource, when feasible (PRC Section 21084.3). PRC Section 21074 (a)(1)(A) and (B) defines tribal cultural resources as "sites, features, places, cultural landscapes, sacred places, and objects with cultural value to a California Native American tribe" and that are either:

- Listed or eligible for listing in the California Register of Historical Resources, or in a local register of historical resources as defined in Public Resources Code section 5020.1(k)
- A resource determined by the lead agency, in its discretion and supported by substantial evidence, to be significant pursuant to criteria set forth in subdivision (c) of PRC Section 5024.1. In applying the criteria set forth in subdivision (c) of PRC Section 5024.1, the lead agency shall consider the significance of the resource to a California Native American tribe.

In recognition of California Native American tribal sovereignty and the unique relationship of California local governments and public agencies with California Native American tribal governments, and to respect the interests and roles of project proponents, it is the intent of AB 52 to:

- Recognize that California Native American prehistoric, historic, archaeological, cultural, and sacred places are essential elements in tribal cultural traditions, heritages, and identities.
- Establish a new category of resources in CEQA called "tribal cultural resources" that considers the tribal cultural values in addition to the scientific and archaeological values when determining impacts and mitigation.
- Establish examples of mitigation measures for tribal cultural resources that uphold the existing mitigation preference for historical and archaeological resources of preservation in place, if feasible.
- Recognize that California Native American tribes may have expertise with regard to their tribal history and practices, which concern the tribal cultural resources with which they are traditionally and culturally affiliated. Because CEQA calls for a sufficient degree of analysis, tribal knowledge about the land and tribal cultural resources at issue should be included in environmental assessments for projects that may have a significant impact on those resources.

- In recognition of their governmental status, establish a meaningful consultation process between California Native American tribal governments and lead agencies, respecting the interests and roles of all California Native American tribes and project proponents, and the level of required confidentiality concerning tribal cultural resources, at the earliest possible point in CEQA environmental review process, so that tribal cultural resources can be identified, and culturally appropriate mitigation and mitigation monitoring programs can be considered by the decision making body of the lead agency.
- Recognize the unique history of California Native American tribes and uphold existing rights of all California Native American tribes to participate in, and contribute their knowledge to, the environmental review process pursuant to CEQA.
- Ensure that local and tribal governments, public agencies, and project proponents have information available, early in CEQA environmental review process, for purposes of identifying and addressing potential adverse impacts to tribal cultural resources and to reduce the potential for delay and conflicts in the environmental review process.
- Enable California Native American tribes to manage and accept conveyances of, and act as caretakers of, tribal cultural resources.
- Establish that a substantial adverse change to a tribal cultural resource has a significant effect on the environment.

AB 52 also establishes a formal consultation process for California tribes regarding those resources. The consultation process must be completed before a CEQA document can be certified. AB 52 requires lead agencies to “begin consultation with a California Native American tribe that is traditionally and culturally affiliated with the geographic area of the proposed project.” Native American tribes to be included in the process are those that have requested notice of projects proposed within the jurisdiction of the lead agency.

Local

City of Goleta General Plan

The City of Goleta does not currently have a historic preservation/historic resources ordinance. The City of Goleta’s 2006 General Plan describes objectives pertaining to historic resources, lists current historic resources in the City, and describes the criteria which should be used to evaluate a resource for local significance.:

Policy VH 5.2 Locally Significant Historic Resources: Structures or sites, including landscaping, having special historic, aesthetic, or cultural value to Goleta shall be designated as *locally significant historic resources*. A locally significant historic resource may include those resources listed, or eligible for listing, in the National Register for Historic Places, State Historic Landmarks, or the Santa Barbara County Landmarks/Places of Historical Merit inventories, as well as resources designated by the City. The City shall use the following eligibility criteria when considering a site or structure, including landscaping, for designation as a locally significant historic resource:

- a. It exemplifies or reflects special elements of the city’s cultural, social, economic, political, aesthetic, architectural, landscape architectural, or natural history.
- b. It is identified with persons or events of local, state, or national history.

Goleta Train Depot Project

- c. It embodies distinctive characteristics of a style, type, period, or method of construction or is an example of the use of indigenous materials or craftsmanship.
- d. It represents works of a notable builder, designer, architect, or landscape architect.
- e. It includes a geographically definable area possessing a concentration of historic, prehistoric, or scenic properties that are unified aesthetically.
- f. It has a location with unique physical characteristics, including landscaping, or is a view or vista representing an established visual feature of a neighborhood or community.
- g. It embodies elements of design, detail, materials, or craftsmanship representing a significant structural, architectural, or landscape architectural achievement.
- h. It reflects significant geographical patterns associated with different eras of settlement and growth.
- i. It is one of a few remaining examples possessing distinguishing characteristics of an architectural, landscape architectural, or historical type.
- j. It includes rare or specimen plant materials associated with a particular period or style of landscape history

Policy VH 5.7 New Construction: Development approved in proximity to an identified historic resource shall respect and be aesthetically compatible with the structures or sites in terms of scale, materials, and character.

4.6.3 Impact Analysis

a. Methodology and Significance Thresholds

Methodology

Potential impacts on tribal cultural resources are analyzed based on the potential for the project to impact any tribal cultural resources during construction or operation. The significance of a tribal cultural resource and subsequent significance of any impact is determined by, among other things, consideration of whether or not that resource has heritage value to California Native Americans. Further, this impact analysis is also based on consultations with the interested tribe leaders.

Rincon Archaeologist Mary Pfeiffer, BA, contacted the Native American Heritage Commission (NAHC) on December 10, 2019, to request a search of the Sacred Lands File (SLF) and a contact list of Native Americans culturally affiliated with the project site. A response was received from the NAHC on December 17, 2019, stating the SLF search had been completed with “positive” results. The NAHC did not give a specific tribe to contact and recommended Rincon contact all the tribes on the list the NAHC provided. The NAHC identifies sacred lands by quadrangle and although the SLF results were positive, sacred lands could exist anywhere within the Goleta quadrangle. Sacred lands within the project site were not clarified by any of the listed tribal contacts.

On December 19, 2019, Rincon sent letters to the ten Native American contacts identified by the NAHC in the area to request information on potential cultural resources in the project vicinity that may be impacted by project development. This outreach was not intended to constitute formal Assembly Bill (AB) 52 consultation as required by CEQA. AB 52 consultation is performed between the lead government agency and California Native American tribes who have requested notification of projects in their traditional area. Appendix G provides the results of the outreach effort.

On January 9, 2020, Chairperson Freddie Romero of the Santa Ynez Band of Chumash Indians (on the behalf of Kenneth Kahn) stated the project site is located within an extremely sensitive archaeological area. Chairperson Romero requested construction plans for the project and recommended archaeological and Native American monitoring during ground disturbing activities.

On January 15, 2020, Ms. Pfeiffer replied to Chairperson Romero via email and stated that the construction plans had not yet been prepared and design options were still being considered.

In February 2020, the City of Goleta distributed AB 52 consultation letters for the proposed project, which included project information, a draft site plan, and a map, to seven tribes and tribal representatives listed by NAHC as having interest in the project area (Appendix G). During the 30-day period to request consultation, no tribes requested consultation.

On May 25, 2020, the City posted the Notice of Preparation to the Office of Planning and Research State Clearinghouse to notify the public and agencies on the scope and content of the EIR. During this time, a number of tribes or members of tribes reached out to the City asking about the project, expressed concerns, and provided recommendations to avoid impacting potential tribal resources. The tribal representatives or tribal members were from the following tribes:

- Santa Ynez Band of Chumash Indians
- Barbareno/Ventureno Band of Mission Indians

The information and recommendations which resulted from discussions from these tribes is included in the analysis below.

Significance Thresholds

In accordance with Appendix G of the *State CEQA Guidelines*, an impact to Tribal Cultural Resources from the proposed project would be significant if the project would:

1. Cause a substantial adverse change in the significance of a tribal cultural resource, defined in Public Resources Code Section 21074 as either a site, feature, place, cultural landscape that is geographically defined in terms of the size and scope of the landscape, sacred place, or object with cultural value to a California Native American tribe, and that is:
 - a. Listed or eligible for listing in the California Register of Historical Resources, or in a local register of historical resources as defined in Public Resources Code Section 5020.1(k)
 - b. A resource determined by the lead agency, in its discretion and supported by substantial evidence, to be significant pursuant to criteria set forth in subdivision (c) of Public Resources Code Section 5024.1. In applying the criteria set forth in subdivision (c) of Public Resource Code Section 5024.1, the lead agency shall consider the significance of the resource to a California Native American tribe

The Initial Study concluded there could be potentially significant impacts to tribal cultural resources because the origin of potential resources is unknown. Grading and ground-disturbing activity could impact currently unknown subsurface cultural resources of tribal or Native American importance. Therefore, impacts associated with the thresholds above are analyzed below.

b. Impacts and Mitigation Measures

Threshold 1: Would the project cause a substantial adverse change in the significance of a tribal cultural resource, defined in PRC Section 21074 as either a site, feature, place, cultural landscape that is geographically defined in terms of the size and scope of the landscape, sacred place, or object with cultural value to a California Native American tribe, and that is:

Listed or eligible for listing in the California Register of Historical Resources, or in a local register of historical resources as defined in PRC Section 5020.1(k), or

A resource determined by the lead agency, in its discretion and supported by substantial evidence, to be significant pursuant to criteria set forth in subdivision (c) of PRC Section 5024.1. In applying the criteria set forth in subdivision (c) of Public Resource Code Section 5024.1, the lead agency shall consider the significance of the resource to a California Native American tribe.

Impact CR-1 GRADING AND OTHER GROUND-DISTURBING ACTIVITIES ON THE PROJECT SITE COULD RESULT IN IMPACTS TO PREVIOUSLY UNIDENTIFIED TRIBAL CULTURAL RESOURCES. THEREFORE, THIS IMPACT WOULD BE SIGNIFICANT BUT MITIGABLE.

The site has been previously developed and ground disturbing activities have already occurred. As of the date of this EIR, no tribal cultural resources have been identified on the project site. However, additional grading and other ground-disturbing activities on the project site may encounter previously undiscovered cultural resources of Native American origin that could be considered tribal cultural resources, which was identified as a major concern by tribal representatives. Ground disturbance activities during construction include demolition of the on-site warehouse, clearing and grubbing, grading and excavation of existing UST, revegetation, and installation of signs and other project features. These activities resulting from implementation of the project, including construction-related and earth-disturbing actions, could damage or destroy undiscovered tribal cultural resources on-site. As a result, impacts to tribal cultural resources would be potentially significant, requiring mitigation to ensure documentation of known archaeological sites, monitoring for unknown sites during construction, and continued consultation with local Native Americans if resources of Native American origin are unearthed during construction.

Mitigation Measures

The following measure would reduce potential impacts to tribal cultural resources to a less than significant level.

TCR-1 Archaeological and Native American Monitoring

Prior to the issuance of a Grading Permit, or ground-disturbing activities, the developer shall obtain a qualified archaeological and Native American monitor for the ground disturbing activities of the project. Archaeological monitoring should be performed under the direction of the qualified archaeologist, defined as an archaeologist meeting the Secretary of the Interior's Professional Qualifications Standards for archaeology (NPS 1983). The qualified archaeologist, in consultation with the City of Goleta and the Native American monitor, may recommend the reduction or termination of monitoring depending upon observed conditions (i.e., no resources encountered within the first 50 percent of ground disturbance).

TCR-2 Unanticipated Discovery of Tribal Cultural Resources

In the event that cultural resources of Native American origin are identified during construction activity all work shall be halted in the vicinity of the discovery until the significance of the resource can be assessed. The city shall begin or continue Native American consultation procedures, in coordination with a qualified archaeologist, if appropriate. If the city, in consultation with local Native Americans, determines that the resource is a tribal cultural resource and thus significant, a mitigation plan shall be prepared and implemented in accordance with state guidelines and in consultation with local Native American group(s). The mitigation plan may include but would not be limited to capping and avoidance, excavation and removal of the resource, interpretive displays, sensitive area signage, or other mutually agreed upon measure.

Significance After Mitigation

Implementation of Mitigation Measure TCR-1 and TCR-2 would reduce potential impacts to tribal cultural resources to a less than significant level.

4.6.4 Cumulative Impacts

Past, present, and reasonably foreseeable projects in and around the City would contribute to loss of tribal cultural resources. Impacts to tribal cultural resources are generally site-specific. For other projects in the vicinity of the project area that would impact tribal cultural resources, similar conditions and mitigation measures described herein would be required through site-specific investigations and surveys as well as the consultation with tribal groups, assessment of potential impacts, and prescription of appropriate mitigation. As with the project, other cumulative development that would result in potential impacts to tribal cultural resources would be subject to applicable federal and state laws, and local goals and policies. Accordingly, as required under applicable laws and regulations, potential impacts associated with cumulative developments would be addressed on a case-by-case basis.

As described in Section 4.6.3, the project would not result in the loss of any historic resources; however, the project could incrementally contribute to the cumulative loss of tribal cultural resources if resources are found on-site during construction. Implementation of Mitigation Measure TCR-1 and TCR-2 would reduce potential impacts if resources are discovered. With the implementation of these measures the project would not contribute substantially to the cumulative loss of tribal cultural resources in the vicinity. Therefore, the project would result in a less than significant cumulative impact to cultural resources.

References

Glassow, Michael A. 1996. Purisimeño Chumash Prehistory: Maritime Adaptations along the Southern California Coast. Fort Worth, Texas: Harcourt Brace College Publishers.

Goleta, City of. 2006. City of Goleta Visual and Historic Resources Element. Available at: <https://www.cityofgoleta.org/home/showdocument?id=580>

4.7 Utilities and Service Systems

This section analyzes the proposed project's potential to impact water supplies as it relates to utilities and service systems. Water estimates are included in the Estimated Water Use Memorandum, included as Appendix H. Impacts related to stormwater and stormwater facilities, solid waste and wastewater were determined to be less than significant and are discussed in Section 1, *Introduction*, and in the Initial Study (Appendix A).

4.7.1 Setting

Water Supply

The Goleta Water District (GWD) provides water service in the south coast portion of Santa Barbara County. The service area encompasses approximately 29,000 acres, which includes the City of Goleta, University of California Santa Barbara, the Santa Barbara Airport, and unincorporated areas of Santa Barbara County. The GWD has approximately 16,125 municipal water connections throughout its service area, which services a population of 87,000 (GWD 2017a). GWD has multiple sources of water supply, which are detailed below.

Water Supply Sources

CACHUMA PROJECT (LAKE CACHUMA)

The Cachuma Project consists of Bradbury Dam, Tecolote Tunnel, South Coast Conduit, Lake Cachuma, and various water conveyance facilities. Lake Cachuma captures seasonal flows from the Upper Santa Ynez River system, which originates in the San Rafael Mountains in the Los Padres National Forest and is fed by local precipitation. Lake Cachuma has an estimated capacity of approximately 190,000 acre-feet (AF) and is operated by the Cachuma Operation and Maintenance Board (COMB) under contract with the United States Bureau of Reclamation (USBR) (GWD 2017a).

Water is provided to Cachuma Project Member Units for irrigation, domestic, and municipal and industrial water uses, which include the GWD, City of Santa Barbara, Montecito Water District, Carpinteria Valley Water District, and Santa Ynez River Water Conservation District Improvement District #1. There are three categories of Cachuma Project water: regular entitlement water, carryover water from unused entitlement water from the previous year, and spill water. GWD's regular entitlement water yield is 9,322 acre-feet per year (AFY) for the Cachuma Project. When Lake Cachuma spills, GWD can use as much water as it needs (GWD 2017b).

STATE WATER PROJECT

Treated water from the State Water Project (SWP) is delivered to GWD by the Central Coast Water Authority (CCWA) using the Coastal Branch of the California Aqueduct, which terminates into Lake Cachuma. GWD has an SWP allocation of 7,000 AFY and a drought buffer amount of 450 AFY for a total of 7,450 AF of SWP water entitlement available per year. However, the GWD only purchased 4,500 AFY of capacity in the Coastal Branch of the California Aqueduct and is limited to this amount in any given year.

The amount of SWP water delivered to the GWD in each year depends on several factors, including the demand for the supply, rainfall, snowpack, runoff, water in storage, pumping capacity from the Delta, and legal/regulatory constraints on SWP operation.

GROUNDWATER

The Goleta Groundwater Basin is divided into three sub-basins: the Central sub-basin, where the majority of the extractions occur; the West sub-basin, which is generally shallower and has the least extractions; and the North sub-basin (GWD 2016).

The GWD has a current adjudicated, appropriative right to extract and use up to 2,350 AFY of groundwater from the Goleta Groundwater Basin under the terms of a court judgment that determined the relative rights to the groundwater in the Basin known as the “Wright Judgment (GWD 2017a).” The Wright Judgment also provides the District with the right to inject surface water supplies and claim the recharged water as the District's stored water, in addition to its annual entitlement. GWD currently has eleven operational groundwater production wells located in the North and Central sub-basins, which can be used for extraction or injection.

RECYCLED WATER

The GWD provides recycled water to customers produced by the Goleta Wastewater Treatment Plant for landscape irrigation uses as well as a minor amount for toilet flushing. The recycled water production capacity at the plant operated by Goleta Sanitary District (GSD) is approximately 3,300 AFY based upon the tertiary treatment plant capacity of 3.0 million gallons per day (GWD 2017a). The ability to fully utilize recycled water is limited by outdoor irrigation recycled water demand patterns and infrastructure. Currently, GWD is delivering approximately 1,000 to 1,150 AFY to customers and would require additional infrastructure to deliver more.

Water Demand

Water use or demand in the GWD is characterized by deliveries made to each sector, which include single family residential, multifamily residential, commercial, institutional, landscape and agricultural irrigation. In addition, GWD has historically participated in the use of excess surface water from Lake Cachuma spill events by injecting and storing those wet year seasonal supplies in the Goleta Groundwater Basin for later use. In 2015 potable and raw water demand comprised of 46 percent residential, 30 percent agricultural irrigation, 22 percent commercial and institutional, and less than one percent landscape irrigation (GWD 2017a).

Water demand projections for the GWD were developed in the 2015 Urban Water Management Plan (UWMP) using population projections, long range plans for various jurisdictions, including the City of Goleta, commercial area specific plans, and University of California, Santa Barbara Long Range Development Plan. Normal baseline demand was determined using 2011 to 2013 totals because of significant demand reduction requirements in 2014 and 2015 due to drought conditions. The 2015 UWMP and the 2017 Water Supply Management Plan analyzed available supplies and water demand for GWD's service area under three scenarios: a normal water year, single-dry year, and multiple-dry years. Table 4.7-1 shows GWD's estimated water supply and demand under these three scenarios. The demand for groundwater and SWP water is lower in average years and increases in dry years to make up for reductions in Cachuma Project water. The normal year supply projections are based on annually available supplies while the single-dry year and multiple-dry year supply values are based on an optimized water supply strategy that meets dry year demand.

Table 4.7-1 GWD's Projected Demands and Supply Projections

	2020	2025	2030	2035
Normal Year				
Water Demand (AFY)	15,069	15,700	16,096	16,391
Water Supply (AFY) ^{1,2}	15,171	15,755	16,137	16,391
Difference	102	55	41	0
Single Dry Year				
Water Demand (AFY)	16,033	16,731	17,169	17,495
Water Supply (AFY)	16,033	16,731	17,169	17,495
Difference	0	0	0	0
Multiple Dry Year				
Year 1 Water Demand (AFY)	16,033	16,731	17,169	17,495
Year 1 Water Supply (AFY)	16,033	16,731	17,169	17,495
Difference	0	0	0	0
Year 1 Water Demand (AFY)	16,033	16,731	17,169	17,495
Year 2 Water Supply (AFY)	16,033	16,731	17,169	17,495
Difference	0	0	0	0
Year 3 Water Demand (AFY)	16,033	16,731	17,169	17,495
Year 3 Water Supply (AFY)	14,155	14,901	15,369	15,717
Difference	-1,878	-1,830	-1,800	-1,778

¹ While the GWD's annual entitlement to Cachuma Project Water is 9,322 AFY, the long-term average reflected in the water supply above includes unused carryover supplies from previous years and excess water that becomes available when Cachuma Reservoir spills.

² Total supplies projected for use in a normal year is lower than the average supply discussed under Water Supply above, since a portion of some supplies are reserved for dry years.

Source: GWD 2017a; 2017b

As shown in Table 4.7-1, the GWD is projecting a shortfall in water supply during the third year of a dry spell. GWD's 2015 UWMP contains demand reduction strategies and measures to be implemented to reduce demand and maintain adequate water supply during drought conditions. On August 13, 2019 the GWD terminated its Stage I Water Shortage Emergency and required reduction strategies in response to receiving their full allocation of surface water from Lake Cachuma (GWD 2019).

4.7.2 Regulatory Setting

State

Urban Water Management Planning Act (Water Code Section 10610 et seq.)

The Urban Water Management Planning Act was developed to address concerns regarding potential water supply shortages throughout California. It requires urban water suppliers (providing water for municipal purposes to more than 3,000 customers or supplying more than 3,000 AFY of water) to adopt and submit an UWMP at least once every five years to the Department of Water Resources. The city's most recent UWMP was adopted on June 14, 2016, to help guide the city's water management efforts for the following 20 years. The 2015 UWMP was prepared in accordance with

the requirements of the Urban Water Management Planning Act (California Water Code Sections 10608 – 10656) and the Water Conservation Act of 2009, commonly referred to as SB X7-7 (California Water Code Sections 10608 - 10608.64). The UWMP details the water provider's service area, demographics, multi-source water supply, water treatment, water conveyance and distribution facilities, as well as the GWD's historic and future water demand based on population projections and development and land use plans prepared by the City of Goleta, County of Santa Barbara, and University of California, Santa Barbara.

Senate Bill X7-7

California adopted Senate Bill (SB) X7-7, or the Water Conservation Act of 2009, in November 2009. The legislation requires urban water retailers to set urban water use targets to achieve a 20 percent reduction in per capita urban water use by December 31, 2020. Additionally, the law requires agricultural water suppliers to prepare, adopt, and regularly update agricultural water management plans. Agricultural and urban water providers are ineligible for certain state grants and loans if they do not adhere to water conservation requirements outlined in the law.

Senate Bills 610 and 221

In 2001, California adopted SB 610 and SB 221, thereby amending the California Water Code. Under these new laws, certain types of development projects are now required to provide detailed water supply assessments (WSAs) to planning agencies. Thresholds requiring the preparation of a WSA include residential developments of more than 500 dwelling units, shopping centers or business establishments employing more than 1,000 persons or having more than 500,000 square feet of floor space, commercial office buildings employing more than 1,000 persons or having more than 250,000 square feet of floor space, and projects that would demand an amount of water equivalent to, or greater than, the amount of water required by a 500 dwelling unit project. The proposed project does not meet these thresholds and is not required to prepare a WSA.

The primary purpose of a WSA is to determine if the identified water supply or water supplier will be able to meet projected demands for the project, in addition to existing and planned future uses, over a 20-year projection and with consideration to normal, dry, and multi-dry water years. A WSA was not required to be prepared for the project.

Regional Water Management Planning Act

Adopted by the state legislature in 2002, the Regional Water Management Planning Act, or SB 1672, authorizes preparation of integrated regional water management plans. Such plans are developed by regional water management groups, defined as three or more local public agencies, at least two of which have statutory authority over water supply. Integrated regional water management plans address qualified programs and projects relating to water supply, water quality, flood protection, or other water-related topics undertaken by the participating public agencies. Qualified projects, as detailed in the legislation, include but are not limited to groundwater, urban, and agricultural water management planning efforts, levee or flood control infrastructure maintenance or construction, water recycling projects, and water conservation programs. The City of Goleta and the GWD are both cooperating partners in the Santa Barbara County Regional Water Management Group and party to the Santa Barbara County Integrated Regional Water Management Plan (updated in 2019).

Sustainable Groundwater Management Act

During the 2014 drought the California Legislature passed the Sustainable Groundwater Management Act (SGMA). The primary function of this law was to establish a more uniform statewide program aimed at sustainable groundwater management. Provisions in the law to accomplish this goal included:

- Requiring the development and reporting of data necessary to support sustainable management
- Allowing the state to develop and implement an interim sustainable groundwater management plan until local agencies can assume management of a basin or sub-basin/subarea
- Granting the authority to local and regional agencies to develop and implement sustainable groundwater management plans

Specific deadlines for local agencies to manage groundwater basins under a groundwater sustainability plan (GSP) depend on the status of each basin, as defined in the prioritization by the DWR in Bulletin 118. For basins considered subject to critical overdraft, the plan adoption deadline is January 31, 2020. For basins designated as high or medium priority basins, the deadline is January 31, 2022. For other basins (low and very low priority), local agencies are encouraged to manage groundwater under a groundwater sustainability plan, but no specific mandate or deadline for management is established in the SGMA. Due to the Goleta Groundwater Basin's adjudication under the Wright Judgment described in Section 4.14.1a, *Water Supply*, the basin is identified as a very low priority basin by the Department of Water Resources (DWR 2020) and will not require preparation of a GSP pursuant to SGMA.

The SGMA did not alter existing proprietary rights to groundwater consistent with Section 1200 of the Water Code (addressing certain sub-surface flows associated with riparian waters) and did not affect groundwater in adjudicated basins. The SGMA also recognized the authority of local governments to manage groundwater consistent with their police powers (through local ordinances).

California Green Building Standards Code (2019) - California Code of Regulations Title 24, Part 11

California's Green Building Code, referred to as CALGreen, was developed to provide a consistent approach to green building in the state. The CEC adopted updates to the 2016 CALGreen Standards in 2019 that will take effect on January 1, 2020. These changes include indoor water conservation measures for fixtures.

Regional/Local

Santa Barbara County Integrated Water Management Plan (IWMP)

The IWMP for Santa Barbara County is a water management plan with cooperative partners of cities, special districts, and other entities, and is intended to increase the level of coordination among agencies and districts responsible for water resources planning, nongovernmental organizations, and interested members of the public to facilitate the optimal management of water resources within Santa Barbara County over the next 20 years.

GWD 2015 Urban Water Management Plan

The California Water Code requires any municipal water supplier serving over 3,000 connections or 3,000 AFY to prepare a UWMP. Water suppliers are required to update their UWMPs every five years. GWD's 2015 UWMP forecasts demand through 2035 and details normal, dry year, and multiple dry year supplies needed to meet demand. Additionally, the UWMP describes water supply reliability, conservation and demand management strategies, and GWD's current and anticipated water infrastructure projects.

GWD Goleta Groundwater Basin Groundwater Management Plan

The Groundwater Management Plan was adopted by the GWD and La Cumbre Water Company, which details current adjudication and voter-passed components of groundwater management, addresses Basin hydrogeography and groundwater elevation, and analyzes groundwater quality in the Basin. In addition, the Groundwater Management Plan outlines management strategies for the Basin, and recommends future strategies and timelines for implementation, which includes recommendations regarding GWD implementation of the SGMA.

GWD SAFE Water Supply Ordinance (SAFE Ordinance)

In 1991 voters of the GWD passed the SAFE Water Supplies Ordinance, which sets forth conditions the District must meet in order to approve new or additional water connections. The SAFE Ordinance directs how the GWD manages groundwater and specifies under what conditions groundwater is either pumped or stored. In addition, the SAFE Ordinance establishes an Annual Storage Commitment, which is a groundwater recharge requirement when the Central sub-basin of the Goleta Groundwater Basin drops below 1972 levels.

The SAFE Ordinance prohibits the District from releasing potable water to new or additional service connections except when all of the following conditions are met:

1. The District is receiving 100% of its deliveries normally allowed from the Cachuma Project
2. The District has met legal obligations in the Wright Judgment
3. There is no water rationing
4. The District has met its obligation to the Annual Storage Commitment to the Drought Buffer

Currently, the GWD is unable to make its annual commitment of water to the Drought Buffer in the groundwater basin. Therefore, the GWD remains prohibited from providing new or additional potable service connections under the SAFE Ordinance.

Pursuant to the SAFE Water Supplies Ordinance, the District was directed to deny applications for new water service allocations unless the project falls within one of the following exceptions:

1. Customers who are currently receiving water from the District and who are not seeking to expand or change the use or development on their property
2. Customers with preexisting water use history that is recognized in the District Code and that is equal to or greater than the water use that is needed for the Proposed Project
3. Customers who have already paid a new water supply charge for a Proposed Project
4. Customers with a pre-existing water service contract or agreement with the District.

Goleta General Plan

The Goleta General Plan guides land use, development, and strategic planning decision-making in the City. The Conservation Element includes goals policies intended to support water supply and water conservation in the City. Goals and policies applicable to water service and supply are presented below:

CE 15.3 Water Conservation for New Development: In order to minimize water use, all new development shall use low water use plumbing fixtures, water-conserving landscaping, low flow irrigation, and reclaimed water for exterior landscaping, where appropriate.

4.7.3 Impact Analysis

a. Significance Thresholds

In accordance with Appendix G of the CEQA Guidelines, the project would result in a significant impact to city utilities and/or service systems if it would result in any of the following conditions:

1. Require or result in the relocation or construction of new or expanded water, wastewater treatment or storm water drainage, electric power, natural gas, or telecommunications facilities, the construction or relocation of which could cause significant environmental effects?
2. Have insufficient water supplies available to serve the project and reasonably foreseeable future development during normal, dry and multiple dry years?
3. Result in a determination by the wastewater treatment provider which serves or may serve the project that it has inadequate capacity to serve the project's projected demand in addition to the provider's existing commitments?
4. Generate solid waste in excess of state or local standards, or in excess of the capacity of local infrastructure, or otherwise impair the attainment of solid waste reduction goals?
5. Comply with federal, state, and local management and reduction statutes and regulations related to solid waste?

The Initial Study (Appendix A) determined the proposed project would have a less than significant impact on wastewater treatment and facilities, stormwater, and solid waste (Thresholds 1 and 3-5). The Initial Study concluded the project could result in potentially significant impacts related to Threshold 2. Impacts pertaining to water supplies (Threshold 2) are analyzed in this section of the EIR. All other thresholds are discussed in the Initial Study and summarized in Table 1-2 in Section 1, *Introduction*.

b. Project Impacts and Mitigation Measures

Threshold 2: Would the project have insufficient water supplies available to serve the project and reasonably foreseeable future development during normal, dry and multiple dry years?

Impact U-1 THE GWD HAS ADEQUATE SUPPLIES AND WATER DEMAND REDUCTION STRATEGIES TO SERVE THE PROJECT AND FORESEEABLE DEVELOPMENT UNDER NORMAL AND DRY YEARS. THE WATER USE FROM THE DEPOT WOULD NOT EXCEED AVAILABLE ON-SITE CREDITS AND WOULD COMPLY WITH THE SAFE WATER SUPPLIES ORDINANCE. IMPACTS ON WATER SUPPLIES WOULD BE LESS THAN SIGNIFICANT.

The project site currently uses potable water for operations within the existing on-site warehouse. Because only a portion of the warehouse is occupied by low-demand uses such as the local food bank, the proposed project would increase potable water use on-site for restrooms, the on-site café area, and landscaping. All plants and landscaping would use drought-tolerant, low-water usage plant varieties, and restroom and café facilities would comply with California Code of Regulations, Title 24, Part 11, referred to as CALGreen, which would require water conservation fixtures for indoor water use.

As shown in Table 4.7-1 above, the GWD has sufficient water supplies to meet existing and future water demands under normal and dry years but is projecting a shortfall in water supply during the third year of a dry spell. The GWD's 2015 UWMP contains demand reduction strategies and measures to be implemented to reduce demand and maintain adequate water supply during drought conditions (GWD 2017a). In addition, the GWD Drought Preparedness and Water Shortage Contingency Plan adds a stage of water shortage and demand reduction measures (GWD 2014). In addition to demand reduction strategies in the UWMP that would occur during a drought or water shortage, the SAFE Water Supplies Ordinance would prohibit allocating new or additional water connections if water supply conditions are not met. This would limit increases in water demand from new development or growth in addition to measures in the UWMP during a water shortage.

As discussed above under Water Demand setting, as of August 2019 the GWD is not under any stage of water shortage emergency. The GWD is currently not meeting all of the conditions needed in order to approve new or additional water connections, pursuant to the SAFE Water Supplies Ordinance. However, the project site has a preexisting water use history associated with the on-site warehouse and, therefore, would be allowed water service under Exception 2: customers with preexisting water use history that is recognized in the District Code and that is equal to or greater than the water use that is needed for the Proposed Project. According to the GWD, the available water credit for the project site per the District Code Section 5.16.041 is 0.96 AFY. The Estimated Water Use Memorandum prepared for the project determined the Depot building would require approximately 0.6 AFY, which is below the available water credit (Appendix H). The project would also require water for on-site landscaping, which is estimated to be approximately 0.3 AFY (Appendix H). Combined with the Depot water demand, overall water demand would not exceed 0.96 AFY. Additionally, water demand for on-site landscaping could be met by water trucks, which are available through the GWD Recycled Water Hauling Program. The recycled water would not impact available water supplies and would provide additional flexibility for water demand in the Depot building.

The project would also be required to submit an Application for Water Service with the GWD for the proposed new use on-site, which would be reviewed and approved by the GWD for compliance with their available water credit. Once the GWD is meeting all of the conditions under the SAFE Water

Supplies Ordinance, the GWD would have sustainable water supplies available for additional water credits for the project site if needed.

Because the GWD has sufficient water supplies and demand reduction measures to meet existing and projected growth under normal, dry, and multiple-dry years, the estimated water use for the Depot building would not exceed the existing water credits for the site under the SAFE Water Supplies Ordinance, and recycled water is available to supplement landscaping water demand, there are sufficient water supplies to serve the project and foreseeable development. Impacts would be less than significant.

Mitigation Measures

No mitigation measures are required.

Significance After Mitigation

Impacts would be less than significant without mitigation.

4.7.4 Cumulative Impacts

Planned and pending development would increase water demand in the City. As described in Table 3-1 of Section 3, *Environmental Setting*, planned and pending projects in the City would add residential units, commercial and industrial space, educational facilities, oil facilities, and hotels. Large-scale residential, commercial, office, industrial, and mixed-use developments subject to the requirements of SB 610 would be required to prepare project-specific WSAs to ensure adequate water availability. This level of project-specific analysis would be required prior to approval of the largest planned and pending projects described in Section 3, *Environmental Setting*, and would compare anticipated water demand to the most currently-available GWD supply and demand projections.

The GWD's UWMP shows a deficit in multiple-dry year 3, as shown in Table 4.7-1. However, the 2015 UWMP includes a water shortage contingency plan which includes stages of supply reduction, demand reduction measures, penalties, and financial actions that would be taken during a water shortage. The project and other planned and pending development would be subject to these measures if there is a water shortage or need. In addition, projects would be subject to GWD's SAFE Water Supplies Ordinance, which includes specific criteria for allocation of new water service to ensure GWD will maintain a drought buffer and ensure adequate available water supplies to meet projected demand prior to granting new water service. As discussed above, the GWD 2015 UWMP demonstrates there are adequate supplies to meet anticipated demand into the future and identifies specific supplies and strategies to meet existing and anticipated demand. In addition, the project site has existing water credits of 0.96 AFY available and would be required to remain within the existing credits.

Given the information in GWD's 2015 UWMP, the requirements of the SAFE Water Supplies Ordinance, and because there are sufficient water supplies available to serve the project, the project's contribution to cumulative impacts would be less than significant.

References

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- Santa Barbara County. 2019. Integrated Regional Water Management Plan. Available here:
<https://www.cityofgoleta.org/home/showdocument?id=21698>

5 Other CEQA Required Discussions

This section discusses growth-inducing impacts, irreversible environmental impacts, and energy impacts that would be caused by the proposed project.

5.1 Growth Inducement

Section 15126(d) of the CEQA Guidelines requires a discussion of a proposed project's potential to foster economic or population growth, including ways in which a project could remove an obstacle to growth. Growth does not necessarily create significant physical changes to the environment. However, depending upon the type, magnitude, and location of growth, it can result in significant adverse environmental effects. The proposed project's growth inducing potential is therefore considered significant if project-induced growth could result in significant physical effects in one or more environmental issue areas.

5.1.1 Population Growth

As discussed in Section 13, Population and Housing, of the Initial Study (Appendix A), the proposed project would not directly generate population growth because it does not include residential uses. Also, the project would not indirectly generate population growth because the proposed train depot would serve existing residents in Goleta and residents throughout California that utilize Amtrak's Pacific Surfliner passenger rail service. Therefore, the project would not induce a substantial unplanned population growth in the area either directly or indirectly.

Moreover, as discussed in Section 4.1 and 4.2, *Air Quality* and *Greenhouse Gas Emissions*, of the EIR, development and operation of the project would not generate air quality or GHG emissions that would result in a significant impact. Additionally, the project involves redevelopment within a fully urbanized area that lacks significant scenic resources, native biological habitats, known cultural resource remains, surface water, or other environmental resources. Therefore, the project would not result in significant long-term physical environmental effects.

5.1.2 Economic Growth

The proposed project would generate temporary employment opportunities during construction. Because construction workers would be expected to be drawn from the existing regional work force, construction of the project would not be growth-inducing from a temporary employment standpoint. The operation of the proposed train depot would not create significant long-term employment growth. The Depot could require on-site Amtrak staff to assist with ticketing and passenger needs and would be maintained and upkept by either an Amtrak caretaker or City staff. A limited number of new employees may be needed for the required maintenance and to staff the on-site amenities, but these employees would also be expected to be drawn from the existing regional workforce and would not create a significant increase in jobs in the area.

The proposed project would not be expected to induce substantial economic expansion to the extent that direct physical environmental effects would result. Moreover, the environmental effects associated with any future development in or around Goleta and Santa Barbara County would be addressed as part of the CEQA environmental review for such development projects.

5.1.3 Removal of Obstacles to Growth

The proposed project is located in a fully urbanized area that is well served by existing infrastructure. As discussed in Section 18, *Utilities and Service Systems*, of the Initial Study (Appendix A) and Section 4.5, *Transportation* of this EIR, existing infrastructure in Goleta would be adequate to serve the project. Minor improvements to water, sewer, and drainage connection infrastructure could be needed, but would be sized to specifically serve the proposed project. Although the proposed project would relocate an existing turnaround at the end of South La Patera Lane to the south, as discussed in Section 2, *Project Description*, the new location would not present a significant change to existing circulation and is intended to relocate the turnaround outside UPRR right-of-way and provide site access for vehicles to the proposed train depot. No new roads would be required. Because the project constitutes redevelopment within an urbanized area and does not require the extension of new infrastructure through undeveloped areas, project implementation would not remove an obstacle to growth.

5.2 Irreversible Environmental Effects

The CEQA Guidelines require that EIRs contain a discussion of significant irreversible environmental changes. This section addresses non-renewable resources, the commitment of future generations to the proposed uses, and irreversible impacts associated with the proposed project.

The proposed project involves infill development on a currently developed lot in the City of Goleta. Construction and operation of the project would involve an irreversible commitment of construction materials and non-renewable energy resources. The project would involve the use of building materials and energy, some of which are non-renewable resources, to construct the approximately 9,000 square-foot Depot structure (not including parking areas or operating equipment or machinery). Consumption of these resources would occur with any development in the region and are not unique to the proposed project. In addition, the project be designed and constructed to meet LEED Silver standards, as discussion in Section 2.0, *Project Description*.

The proposed project would also irreversibly increase local demand for non-renewable energy resources such as petroleum products and natural gas. However, increasingly efficient building design would offset this demand to some degree by reducing energy demands of the project. As discussed in Section 2.0, *Project Description*, the proposed project's design features would meet LEED Silver or equivalent standards, using less water and energy and reducing greenhouse gas emissions when compared to a commercial building that is not built to LEED standards. In addition, the project would be subject to the energy conservation requirements of the California Energy Code (Title 24, Part 6, of the California Code of Regulations, *California's Energy Efficiency Standards for Residential and Nonresidential Buildings*) and the California Green Building Standards Code (Title 24, Part 11 of the California Code of Regulations). The California Energy Code provides energy conservation standards for all new and renovated commercial and residential buildings constructed in California, and the Green Building Standards Code requires solar access, natural ventilation, and stormwater capture. Consequently, the project would not use unusual amounts of energy or construction materials and impacts related to consumption of non-renewable and slowly renewable resources would be less than significant. Consumption of these resources would occur with any development in the region and is not unique to the proposed project.

Additional vehicle trips associated with the proposed project would incrementally increase local traffic and regional air pollutant and GHG emissions. However, as discussed in Section 4.1, *Air*

Quality, and Section 4.2, *Greenhouse Gas Emissions*, development and operation of the proposed Train Depot would not generate air quality or GHG emissions that would result in a significant impact. Additionally, one of the main objectives of the project is to reduce regional GHG emissions and vehicle miles traveled by increasing train ridership and the use of alternative transit.

The project would also require a commitment of law enforcement, fire protection, water supply, wastewater treatment, and solid waste disposal services. However, as discussed in *Public Services*, and *Utilities and Service Systems* in the Initial Study, impacts to these service systems would not be significant.

CEQA requires decision makers to balance the benefits of a proposed project against its unavoidable environmental risks in determining whether to approve a project. The analysis contained in this EIR concludes that the proposed project would not result in significant and unavoidable impacts. All project impacts were determined to be less than significant, or less than significant with mitigation.

5.3 Energy Effects

Public Resources Code Section 21100(b)(2) and Appendix F of the CEQA Guidelines require that EIRs include a discussion of the potential energy consumption and/or conservation impacts of proposed projects, with particular emphasis on avoiding or reducing inefficient, wasteful or unnecessary consumption of energy. The project's less than significant impacts on energy resources are discussed in Section 5, *Energy*, in the Initial Study included in Appendix A.

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6 Alternatives

As required by Section 15126.6 of the *CEQA Guidelines*, this EIR examines a range of reasonable alternatives to the proposed project that would attain most of the basic project objectives (stated in Section 2.0 of this EIR) but would avoid or substantially lessen the significant adverse impacts.

As discussed in Section 2.0, *Project Description*, the objectives for the proposed project, are as follows:

- Build a full-service, multi-modal train depot for the Goleta Rail Station that provides sufficient amenities for train riders.
- Develop a Depot that creates civic pride and identity through design and community education.
- Increase train ridership along the Pacific Surfliner train corridor, especially during peak rail service, to help implement State and regional transit plans.
- Reduce regional greenhouse gas emissions from transportation sources by improving transit use and reducing vehicle miles travelled.
- Improve connectivity with the local transit system and the Depot to connect passengers with their destinations and create a regional transit hub.

Included in this analysis are two alternatives, including the CEQA-required “No Project” alternative, that involve changes to the project that may reduce the project-related environmental impacts as identified in this EIR. Alternatives have been developed to provide a reasonable range of options to consider that would help decision makers and the public understand the general implications of revising or eliminating certain components of the proposed project.

The following alternatives are evaluated in this EIR:

- Alternative 1: No Project/Existing Warehouse
- Alternative 2: Reduced Depot Footprint and On-site Amenities

Detailed descriptions of the alternatives are included in the impact analysis for each alternative. The potential environmental impacts of each alternative are analyzed in Sections 6.1 through 6.2.

6.1 Alternative 1: No Project/Existing Warehouse Alternative

6.1.1 Description

The No Project Alternative assumes that the proposed depot building with indoor waiting areas, café, and restroom facilities, parking lot area, and City and Amtrak signage are not constructed. Current uses on the project site consist of a mostly vacant warehouse structure, with only a portion occupied by a local food bank, a parking lot, and an outdoor storage area. The existing site and uses would remain under this alternative. However, the No Project Alternative would not fulfill any Project Objectives because the existing warehouse would not provide a train depot to improve train ridership or City identity, improve transit connectivity, or reduce greenhouse gas emissions. This Alternative is feasible as the existing structure has remained and the site has not been redeveloped since 1967.

6.1.2 Impact Analysis

a. Air Quality

As discussed in Section 4.1, Air Quality, the proposed project would generate emissions during construction and operational activities of the proposed project. Construction and operational emissions would not exceed established thresholds and would be less than significant. Under the No Project alternative, there would be no construction activities which would impact air quality or release toxic air contaminants (TACs). In addition, there would be no additional vehicle trips to the project site which would increase emissions in the area. Therefore, the No Project Alternative would impact air quality **less than** the proposed project.

b. Greenhouse Gas Emissions

As detailed in Section 4.2, Greenhouse Gas Emissions, construction of the proposed project would generate greenhouse gas (GHG) emissions during the construction and operation of the project. Construction and operational GHG emissions were determined to be less than significant as the project would not exceed the appropriate GHG thresholds and because the proposed project would reduce regional GHG emissions by encouraging and increasing train ridership and reducing passenger vehicle use. The proposed project was also determined to not impact policies or regulations established to reduced GHG emissions. The No Project Alternative would not generate any construction GHG emissions or increase operational GHG emissions over existing conditions. However, the No Project Alternative would not seek to increase train ridership. Impacts to GHG emissions under the No Project Alternative GHG emissions would be **greater than** those of the proposed project.

c. Hazards and Hazardous Materials

As discussed under Section 4.3, the project site has the potential to contain hazardous materials given its prior agricultural use, current and former onsite storage of hazardous materials in storage tanks and drums, past use as a bus transportation facility, adjacent railroad tracks, and hazardous building materials. Project construction could result in the release of these hazardous materials. Implementation of Mitigation Measures HAZ-1 and HAZ-2 would reduce potential impacts to less than significant.

Under the No Project Alternative, there would be no ground disturbance in the project site which would potentially uncover contaminated soils or hazardous material. Therefore, the No Project Alternative would have hazardous impacts that are **less than** the proposed project.

d. Noise

The No Project Alternative would not include any form of construction noise and would not increase operational noise associated with the use of the warehouse or traffic accessing the warehouse. Although the proposed project's impacts related to temporary construction and vibration and long-term operation would be less than significant, the No Project Alternative's noise impacts would be **less than** those of the proposed project.

e. Transportation

Under the No Project Alternative, transportation and traffic would remain at current conditions. Temporary traffic associated with construction activities and the increase in average daily trips from

the operation of the project would be eliminated. However, as discussed in Section 2, *Project Description*, and Section 4.5, *Transportation*, one of the main objectives of the project is to reduce regional VMT through increasing train ridership. The No Project Alternative would seek to reduce regional VMT. Therefore, overall traffic impacts under the No Project Alternative would be **greater than** under the proposed project

f. Tribal Cultural Resources

Construction of the proposed project would involve ground-disturbing activities with the potential to unearth or adversely impact previously unidentified tribal cultural resources. Implementation of Mitigation Measures TCR-1 and TCR-2 would reduce potential impacts to less than significant through construction monitoring and tribal resource treatment requirements. However, the No Project Alternative would have no ground-disturbing activities and there would be no potential for adversely impacting tribal cultural resources and implementation of mitigation measures would not be required. The No Project Alternative would have **less** impact than the proposed project.

g. Utilities

As discussed in Section 4.7, *Utilities and Service Systems*, the proposed project would increase water use on-site over the existing use from the on-site warehouse. However, the project site has an existing water credit of 0.96 AFY, which the project would be required to comply with. Under the No Project Alternative, there would be no increase in water use over existing water use from the on-site warehouse. Therefore, the No Project Alternative would have **less** impacts than to proposed project.

6.2 Alternative 2: Reduced Depot Footprint and On-site Amenities

6.2.1 Description

Similar to the proposed project, this alternative would involve demolition of the existing warehouse to develop the site with a train depot which would support the adjacent Amtrak passenger train platform. However, the depot under this alternative would be reduced in size to approximately 2,000 square feet and would not include a café or kitchen area, meeting room, or formal lobby. The size of the Depot under Alternative 2 was estimated using the waiting area space requirements in Amtrak's Station Programs and Planning Guidelines (Amtrak 2013). The alternative would still provide on-site parking, passenger drop-off areas, bicycle parking, and landscaping. Alternative 2 would meet most of the project objective, except for providing a full-service train depot since the amenities on site would be reduced and limited under this alternative. This Alternative is feasible as the existing Amtrak Train Station has no Depot structure and a 2,000 square-foot structure would improve on-site amenities and still meet most of the objectives of the project.

6.2.2 Impact Analysis

a. Air Quality

Construction air quality impacts would be similar to the proposed project during demolition, site preparation, grading and paving construction activities. Emissions related to building construction would be reduced due to the reduction in size of the depot structure and reduction of amenities

within the depot. Operational air quality impacts would also be similar to the proposed project as the number of train riders and vehicle trips to the station is not expected to be substantially reduced compared to the proposed project. Therefore, it is anticipated that air quality impacts under Alternative 2 would be **similar to** the proposed project.

b. Greenhouse Gas Emissions

Similar to the air quality discussion, construction GHG emissions would be similar to the proposed project because demolition, site preparation, grading and paving construction activities would be similar. GHG emissions related to building construction would be reduced due to the reduction in size of the depot structure and time it would take to building the depot. Therefore, construction GHG emissions would be less than significant, similar to the proposed project. Operational GHG emissions would also be similar to the proposed project as the number of train riders is not expected to be substantially reduced compared to the proposed project. Therefore, vehicle trip mobile emissions, which are the predominant emissions generated by the project, would be similar. In addition, development under Alternative 2 would also seek to improve train ridership and reduce regional GHG emissions, similar to the proposed project. Therefore, it is anticipated that GHG emission impacts under Alternative 2 would be **similar to** the proposed project.

c. Hazards and Hazardous Materials

Alternative 2 would involve the redevelopment of the same project site as the proposed project. Therefore, the potential hazardous materials on the proposed project site which consist of pesticides and heavy metals associated with the historic agriculture use of the site, remaining traces of chemicals from the previous and current use of the site, the presence of a historic underground storage tank (UST) along with the presence of an existing 1,800-gallon diesel UST, hazardous building materials in the existing warehouse structure, and chemicals or compounds along the adjacent railroad tracks, would also be a potential hazard under Alternative 2. Therefore, Mitigation Measures HAZ-1 and HAZ-2 would also be required for Alternative 2, which would reduce potential impacts to less than significant. Impacts would be **similar to** the proposed project.

d. Noise

Construction noise impacts would effectively be the same as the proposed project. The length of construction noise impacts may be reduced due to the smaller depot building under Alternative 2, but noise levels during construction would be similar. Noise on local roadways generated from traffic under Alternative 2 would also be similar to the proposed project because a smaller depot footprint and reduced amenities would not necessarily reduce people driving to the Amtrak station since Alternative 2 would still provide on-site parking and drop-off areas. Impacts would be **similar to** the proposed project.

e. Transportation

Alternative 2 would develop the project site with a similar site plan as the proposed project but with fewer on-site amenities. The reduction in amenities could reduce train ridership over the proposed project. This reduction in train riders would generate fewer daily trips to the project site as the proposed project because less passengers would be accessing the site. However, Alternative 2 would not reduce regional VTM to as great of an extent as the proposed project because it would generate fewer train riders. Overall, Alternative 2 would have no significant transportation impacts and transportation impacts would be **similar to** the proposed project.

f. Tribal Cultural Resources

Development under Alternative 2 would involve ground-disturbing activities, such as grading and surface excavation, with the potential to unearth or adversely impact unidentified tribal cultural resources. Similar to the proposed project, Alternative 2 would be subject to Assembly Bill 52. Therefore, because Alternative 2 is on the same project site and would involve similar amounts of ground disturbing activities, it is presumed that similar mitigation measures as the proposed project would arise from consulting with local tribes under Alternative 2. Impacts under Alternative 2 would be **similar to** the proposed project.

g. Utilities

As discussed in Section 4.7, Utilities and Service Systems, the proposed project would increase water demand on site but would not exceed the existing GWD credit of 0.96 AFY. Development under Alternative 2 would not include the development of a café or, meeting room, or formal lobby area. Therefore, Alternative 2 would have a reduced water demand than the proposed project and impacts would be **less than** the proposed project.

6.3 Alternatives Considered but Rejected

Other alternatives considered include the potential to relocate a train depot to another location in the City. However, a different train depot location was not feasible because the City had already purchased the project site and the depot should be adjacent to the Amtrak platform. Because the project does not include the Amtrak platform, which is in UPRR right-of-way, changes or new locations of the platform is not feasible. Therefore, this scenario was rejected from further consideration.

Redevelopment of the project site with a light industrial or research and development office use was also considered as an alternative to the proposed project. However, this alternative would likely worsen any environmental impacts compared to the proposed project and would not meet any of the project objectives which are tied to increasing train ridership and reducing greenhouse gas emissions. Therefore, this option was not included as an alternative in the analysis.

6.4 Environmentally Superior Alternative

CEQA requires the identification of the environmentally superior alternative among the options studied. The environmentally superior alternative must be an alternative to the proposed project that reduces some of the environmental impacts of the proposed project, regardless of the financial costs associated with that alternative. Identification of the environmentally superior alternative is an informational procedure and the alternative identified as environmentally superior may not be the one that best meets the goals or needs of the proposed project.

Table 6-1 indicates whether each alternative's environmental impact is greater than, less than, or similar to that of the proposed project for each of the issue areas studied. Based on the alternatives analysis provided above, Alternative 1: No Project Alternative, would be the environmentally superior alternative. The No Project Alternative would either lessen the severity of five out of seven environmental issue areas, while Alternative 2: Reduce Footprint and On-site Amenities would have similar impacts on all issue areas. However, the No Project Alternative would not fulfill the objectives of the proposed project.

When the “No Project” alternative is determined to be environmentally superior, State CEQA Guidelines also requires identification of the environmentally superior alternative among the development options. Since no significant and unavoidable impacts were identified in the proposed project or Alternative 2: Reduce Footprint and On-site Amenities, either the proposed project or alternative could be considered environmentally superior. In addition, Alternative 2 would have a reduced water demand and its impacts would be less than the proposed project. Therefore, Alternative 2: Reduce Footprint and On-site Amenities, is determined to be the environmentally superior alternative. However, this alternative would not meet all of the project objectives, including objectives established under SBCAG grant funding for the proposed project. Since Alternative 2 would not meet objectives needed to meet funding requirements of the project, Alternative 2 would likely not have the funds needed to complete the project and would not be feasible.

Table 6-1 Impact Comparison of Alternatives

Issue	Proposed Project Impact Classification	Alternative 1: No Project/Existing Warehouse	Alternative 2: Reduced Depot Footprint and On-site Amenities
Air Quality	Less than Significant	+	=
Greenhouse Gas Emissions	Less than Significant	-	=
Hazards and Hazardous Materials	Less than Significant with Mitigation Incorporated	+	=
Noise	Less than Significant	+	=
Transportation	Less than Significant	-	=
Tribal Cultural Resources	Less than Significant with Mitigation Incorporated	+	=
Utilities		+	+

+ Superior to the proposed project (reduced level of impact)
 - Inferior to the proposed project (increased level of impact)
 = Similar level of impact to the proposed project

References

Amtrak. 2013. Station Program and Planning Guidelines. May 1, 2013.

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7 Responses to Comments

This section includes responses to comments received during the circulation of the Draft Environmental Impact Report (Draft EIR) prepared for the Goleta Train Depot (project).

The Draft EIR was circulated for a 45-day public review period that began on June 3, 2021 and ended on July 19, 2021. In addition, the City held a public hearing by the Environmental Hearing Officer on June 30, 2021 to gather comments on the Draft EIR.

There were no comments provided by the public during the June 30, 2021 public hearing. The City of Goleta received one comment letter on the Draft EIR during the public review period. The commenter and the page number on which the commenter's letter appears is listed in Table 7-1.

Table 7-1 Comment Letters Received

Letter No. and Commenter	Page No.
1 Michael T. Bennett	7-2

The comment letter and responses follow. Each separate issue raised by the commenter, if more than one, has been assigned a number. The responses to each comment identify first the number of the comment letter, and then the number assigned to each issue (Response 1.2, for example, indicates that the response is for the second issue raised in comment Letter 1).

Revisions to the Draft EIR necessary in light of the comments received and responses provided, or necessary to amplify or clarify material in the Draft EIR, are included in the responses. Underlined text represents language that has been added to the Draft EIR; text with ~~strikeout~~ has been deleted from the Draft EIR. Page numbers cited in this section correspond to the page numbers of the Final EIR where the change was made.

Ryan Russell

Sent: Monday, July 19, 2021 7:01 PM
To: Ryan Russell
Cc: Gerald Comati; Gerald Comati - COM3 Consulting Inc. [REDACTED]
Subject: [EXT] DEIR Comments received via phone

CAUTION: This email originated from outside of Rincon Consultants. Be cautious before clicking on any links, or opening any attachments, until you are confident that the content is safe .

Ryan,

I received the following comments from Michael T. Bennett, a retired Santa Barbara County Fire Department employee and former City of Goleta Council member and mayor. He provided the following via phone on 6/29/2021:

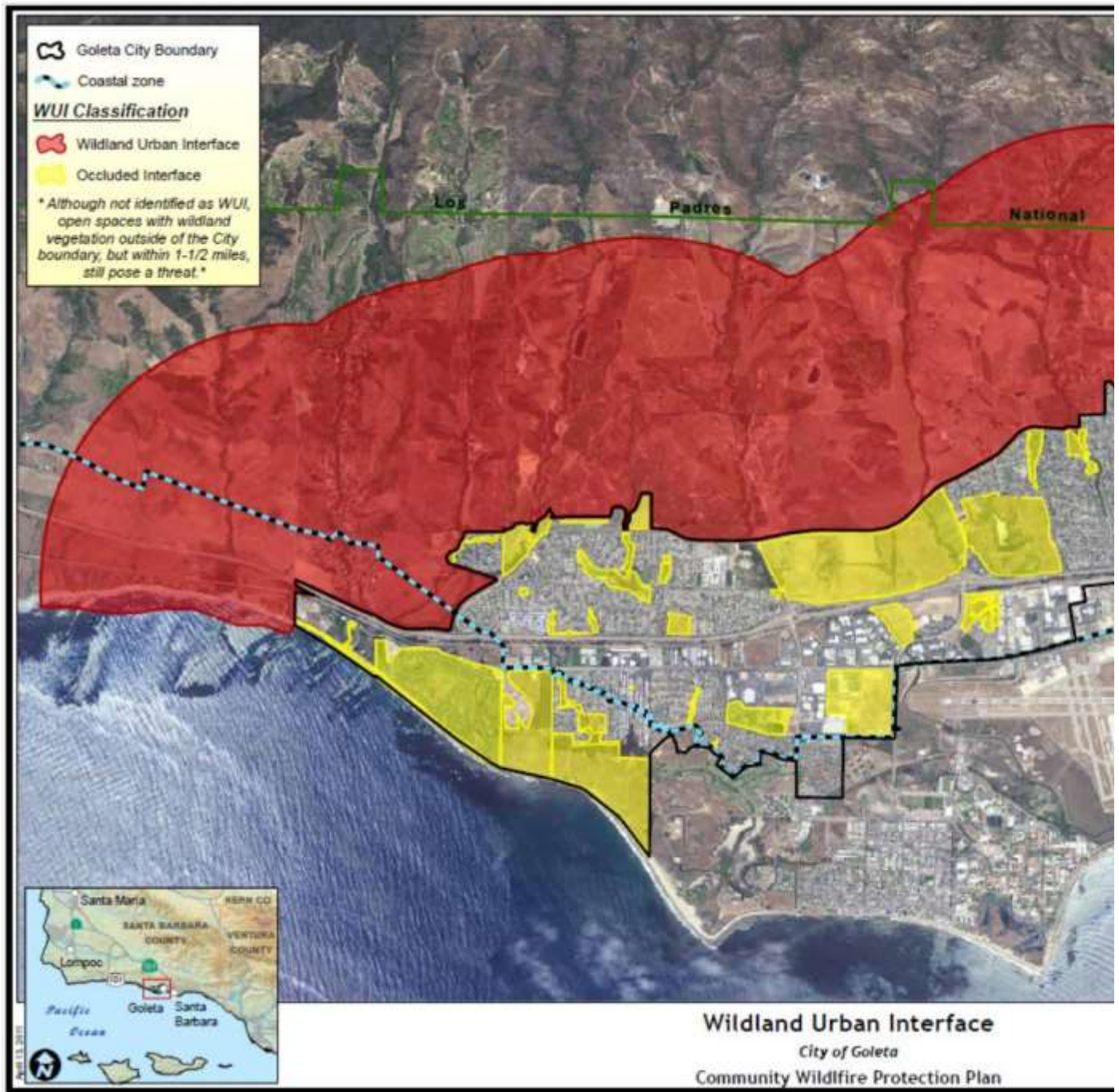
Page 1-5, "Hazards and Hazardous Materials" EIR indicates Fire Station 11 is the closest fire station to the Train Depot. He disagrees and believes it is Fire Station 14 on Los Carneros that is the closest fire station to the Train Depot. How is the determination made (as the crow fly's or expected drive time)?

Page 1-7, "Wildfire" EIR states "...with the nearest high fire zone being approximately 0.9 miles to the southwest. Therefore, there would be no potentially significant impact to the risk of wildfire." Southwest of the site would put the fire risk in the Santa Barbara airport. Did you mean 0.9 miles due north (north of Cathedral Oaks Road) which would make sense as that is where the wildland urban interface lands.

1.1

1.2

Figure 5 City of Goleta Wildland Urban Interface



1.2

Section 2.5.8 "Utilities". Why is Law Enforcement *and* Fire Services in the utilities section? Neither are a utility and both are listed under "Public Services" on page 1-7. Also, the City does not contract with SBCFD for fire services. Fire services are provided via Santa Barbara County Fire Department through the Santa Barbara County Fire Protection District which covers the City of Goleta—we do not "contract" for services it is provided through property taxes.

1.3

2.5.8 Utilities

Electricity to the project site would continue to be provided by Southern California Edison (SCE) and natural gas would continue to be provided by the Southern California Gas Company (SoCalGas). Potable water would be supplied by the GWD and sanitary sewer services would be provided by the Goleta Sanitary District (GSD). Law enforcement would be provided by the Santa Barbara County Sheriff's Department, which is contracted by the City to provide police services. Fire services would be provided by Santa Barbara County Fire Department (SBCFD), which is also contracted by the City to provide fire emergency services.

In general, the project would connect to and use all of the different existing utilities, infrastructure, and other facilities that are currently providing services to the project site and other surrounding development.

The project site and surrounding area are served by existing internet, telephone, and television providers operating in the City. Due to the nature of the proposed project, internet services would be the main need for the project. There are a number of internet providers that can serve the project site, including but not limited to Frontier, Spectrum, Cox Communications, and Viasat. The internet provider would be chosen at a later date.

1.3

Best,

Jaime A. Valdez

Interim Neighborhood Services and Public Safety Director
Department of Neighborhood Services & Public Safety
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Letter 1

COMMENTER: Michael T. Bennett

DATE: June 29, 2021

Response 1.1

The commenter states that the Draft EIR incorrectly listed the closest fire station, which would be Fire Station 14 on Los Carneros.

In response to this comment, Table 1-2 on Page 1-5 in Section 1, *Introduction*, of the Draft EIR is revised as follows:

The project site is located within a 5-minute response time of Fire Station #~~1411~~. Additionally, the site is not located near areas designated to have risks to wildland fires. Therefore, there would be no impacts related to wildland fires.

This comment and the subsequent revision to the Draft EIR do not affect the analysis completed or conclusions provided in the Draft EIR.

Response 1.2

The commenter states that the Draft EIR incorrectly identified that nearest high fire zone to the southwest when it should be north.

In response to this comment, Table 1-2 on Page 1-7 in Section 1, *Introduction*, of the Draft EIR is revised as follows:

The proposed project site is located within an urbanized area of the City of Goleta and is surrounded by existing urban development, including industrial, commercial, interstate highway, and railway development. The project is not located within a high fire hazard severity zone with the nearest high fire zone being approximately 0.9 miles to the north ~~southwest~~. Therefore, there would be no potentially significant impact to the risk of wildfire.

This comment and the subsequent revision to the Draft EIR do not affect the analysis completed or conclusions provided in the Draft EIR.

Response 1.3

The commenter notes that law enforcement and fire services do not belong in the utilities section of the project description. The commenter also notes that the fire services discussion incorrectly lists services contracted with the County of Santa Barbara, when services are in fact provided by Santa Barbara County Fire Department through the Santa Barbara County Fire Protection District.

In response to this comment, Page 2-10 in Section 2, *Project Description*, of the Draft EIR is revised as follows:

2.5.4 Lighting and Safety Features

On-site lighting would be low intensity, hooded, directed downward, and fully cut-off. The proposed lighting would be installed throughout the project site within the parking lot, along pedestrian walkways, and outside the Train Depot building in order to improve on-site wayfinding and public safety. Lighting would be designed in compliance with the City's General Plan policies and development standards within Title 17, Zoning Ordinance relating to outdoor lighting. In addition to on-site lighting, the project would also provide designated crosswalk areas between the Depot's parking lot and the proposed Train Depot building, as shown in Figure 2-5.

Law enforcement would be provided by the Santa Barbara County Sheriff's Department, which is contracted by the City to provide police services. Fire services would be provided by Santa Barbara County Fire Department (SBCFD).

In addition, Page 2-11 in Section 2, *Project Description*, of the Draft EIR is revised as follows:

2.5.8 Utilities

Electricity to the project site would continue to be provided by Southern California Edison (SCE) and natural gas would continue to be provided by the Southern California Gas Company (SoCalGas). Potable water would be supplied by the GWD and sanitary sewer services would be provided by the Goleta Sanitary District (GSD). ~~Law enforcement would be provided by the Santa Barbara County Sheriff's Department, which is contracted by the City to provide police services. Fire services would be provided by Santa Barbara County Fire Department (SBCFD), which is also contracted by the City to provide fire emergency services.~~



South La Patera Lane Improvement Project

Categorical Exemption Report

prepared by

City of Goleta

Planning and Environmental Review Department
130 Cremona Drive, Suite B
Goleta, California 93117

prepared with the assistance of

Rincon Consultants, Inc.

209 East Victoria Street
Santa Barbara, California 93101

March 2022



EXHIBIT "L" (SLP Lane Categorical Exemption Report)

South La Patera Lane Improvement Project

Categorical Exemption Report

prepared by

City of Goleta

Planning and Environmental Review Department
130 Cremona Drive, Suite B
Goleta, California 93117

prepared with the assistance of

Rincon Consultants, Inc.

209 East Victoria Street
Santa Barbara, California 93101

March 2022



RINCON CONSULTANTS, INC.

Environmental Scientists | Planners | Engineers

rinconconsultants.com

EXHIBIT "L" (SLP Lane Categorical Exemption Report)

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Categorical Exemption Report

This report serves as the technical documentation of an environmental analysis performed by Rincon Consultants, Inc. for the South La Patera Lane Improvement Project in the City of Goleta. The intent of the analysis is to document whether the project is eligible for a Class 1 Categorical Exemption (CE). The report provides an introduction, project description, and evaluation of the project's consistency with the requirements for a Class 1 exemption. The report concludes that the project is eligible for a Class 1 CE.

Introduction

The City of Goleta proposes to adopt a Class 1 CE for a proposed project at South La Patera Lane. The State CEQA Guidelines Section 15301 states that a Class 1 CE applies to the operation, repair, maintenance, permitting, leasing, licensing, or minor alteration of existing public or private structures, facilities, mechanical equipment, or topographical features, involving negligible or no expansion of existing or former use. This includes the following:

Existing highways and streets, sidewalks, gutters, bicycle and pedestrian trails, and similar facilities (this includes road grading for the purpose of public safety), and other alterations such as the addition of bicycle facilities, including but not limited to bicycle parking, bicycle-share facilities and bicycle lanes, transit improvements such as bus lanes, pedestrian crossings, street trees, and other similar alterations that do not create additional automobile lanes)

Additionally, State CEQA Guidelines Section 15300.2 provides exceptions to a categorical exemption as follows:

- a. **Location.** Classes 3, 4, 5, 6, and 11 are qualified by consideration of where the project is to be located – a project that is ordinarily insignificant in its impact on the environment may in a particularly sensitive environment be significant. Therefore, these classes are considered to apply all instances, except where the project may impact on an environmental resource of hazardous or critical concern where designated, precisely mapped, and officially adopted pursuant to law by federal, state, or local agencies.
- b. **Cumulative Impact.** All exemptions for these classes are inapplicable when the cumulative impact of successive projects of the same type in the same place, over time is significant.
- c. **Significant Effect.** A categorical exemption shall not be used for an activity where there is a reasonable possibility that the activity will have a significant effect on the environment due to unusual circumstances.
- d. **Scenic Highways.** A categorical exemption shall not be used for a project which may result in damage to scenic resources, including but not limited to, trees, historic buildings, rock outcroppings, or similar resources, within a highway officially designated as a state scenic highway. This does not apply to improvements which are required as mitigation by an adopted negative declaration or certified EIR.
- e. **Hazardous Waste Sites.** A categorical exemption shall not be used for a project located on a site which is included on any list compiled pursuant to Section 65962.5 of the Government Code.

- f. **Historical Resources.** A categorical exemption shall not be used for a project which may cause a substantial adverse change in the significance of a historical resource.

Rincon Consultants, Inc. evaluated the project's consistency with the above requirements for the Class 1 CE and exceptions to the exemption to confirm the project's eligibility for the Class 1 exemption. None of the exceptions would apply to the project. Therefore, the project is eligible for a Class 1 CE.

Project Description

The project site is located at South La Patera Lane, between Hollister Avenue to the south and Union Pacific Railroad (UPRR) and U.S. 101 to the north, in the City of Goleta, Santa Barbara County. The project site includes an approximately 1,600-foot-long portion of South La Patera Lane, located within the public right-of-way of the City of Goleta. The project site is developed with an existing paved, two-lane road with partial sidewalks on west of the street and non-standard sidewalks on the east side. Figure 1 shows the location of the project site.

The proposed project consists of bicycle and sidewalk infrastructure improvements along portions of 1,600-foot-long South La Patera Lane to provide safer bicycle and pedestrian access from Hollister Avenue to the Goleta Train Depot. The improvements will enhance connectivity between the Metropolitan Transit District (MTD) bus stop on Hollister Avenue and the future Goleta Train Depot located at the northern terminus of South La Patera Lane. The proposed infrastructure improvements along South La Patera Lane include the addition of Class 2 bike lanes, which are lanes within the existing roadway defined by painted stripes, new/reconstructed sidewalk, installation of sidewalk-light pedestals, and landscaped parkway pockets with street trees along both sides of the street. The proposed sidewalk-light pedestals would be installed along the west side of the entirety of South La Patera Lane within the project site to provide energy efficient pedestrian and street lighting. The site plan for the proposed roadway improvements is shown in Figure 2.

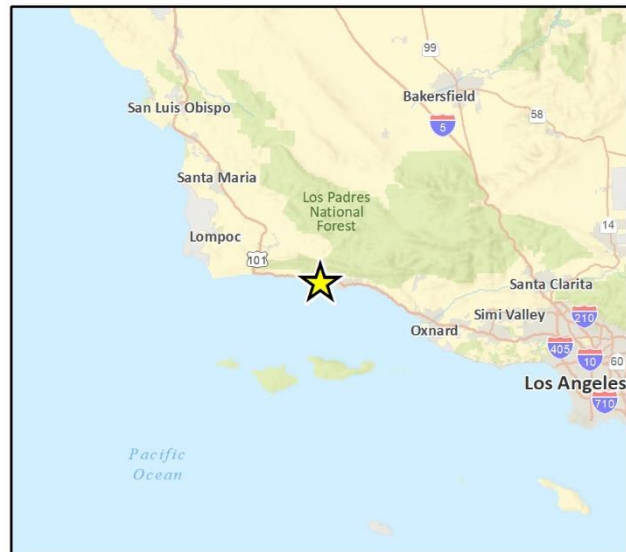
The proposed project would be considered minor alterations of existing facilities because the site consists of an existing street with partial sidewalks which will be altered with the addition of bicycle lanes, connected sidewalks, and landscaping and street trees. No additional automobile lanes will be created. Figure 3, Figure 4 , Figure 5 show the proposed site plan.

Figure 1 Regional Location



Imagery provided by Esri and its licensors © 2022.

★ Project Location N



BI04Fig 1 Regional Location

Figure 2 Project Site



Figure 3 Proposed Site Plan – Southernmost Portion of Project Site

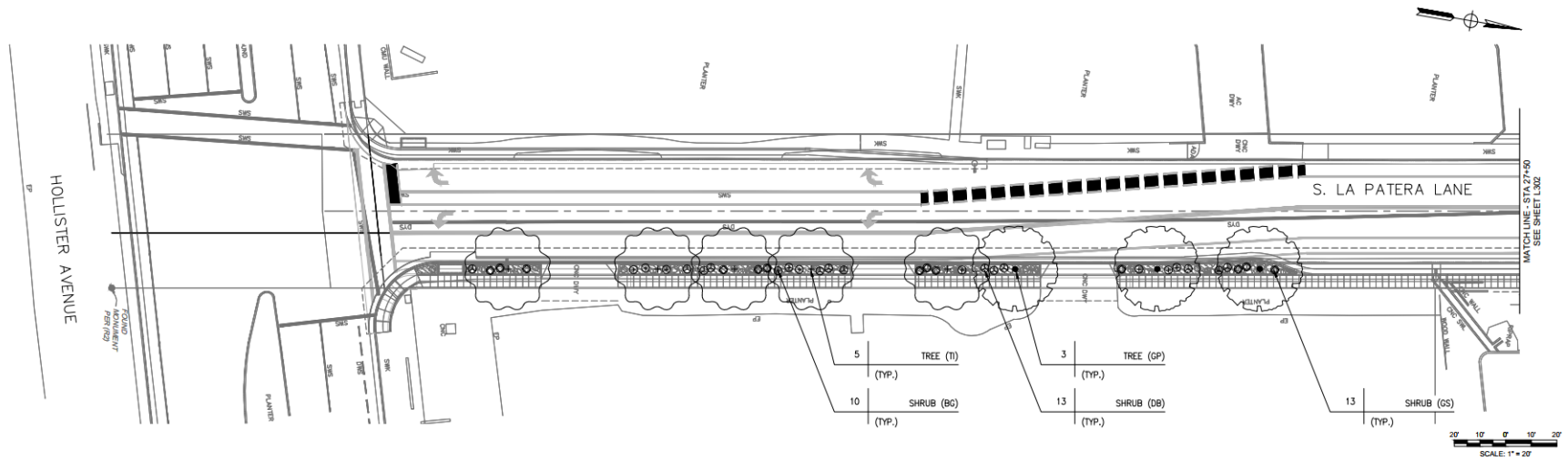


Figure 4 Proposed Site Plan – Middle portion of Project Site

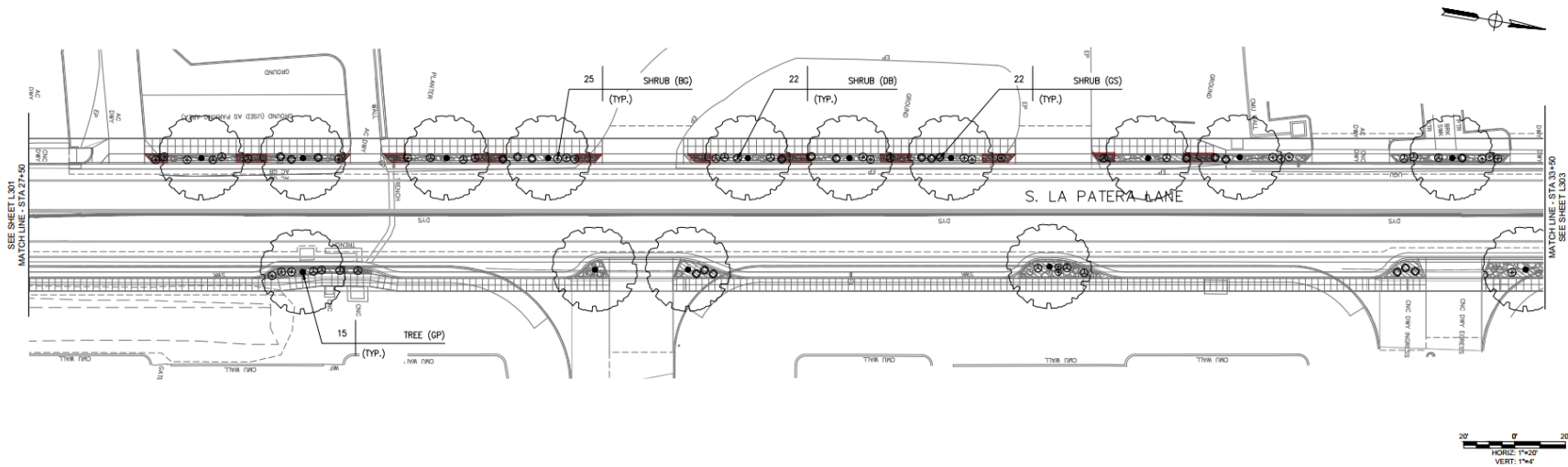
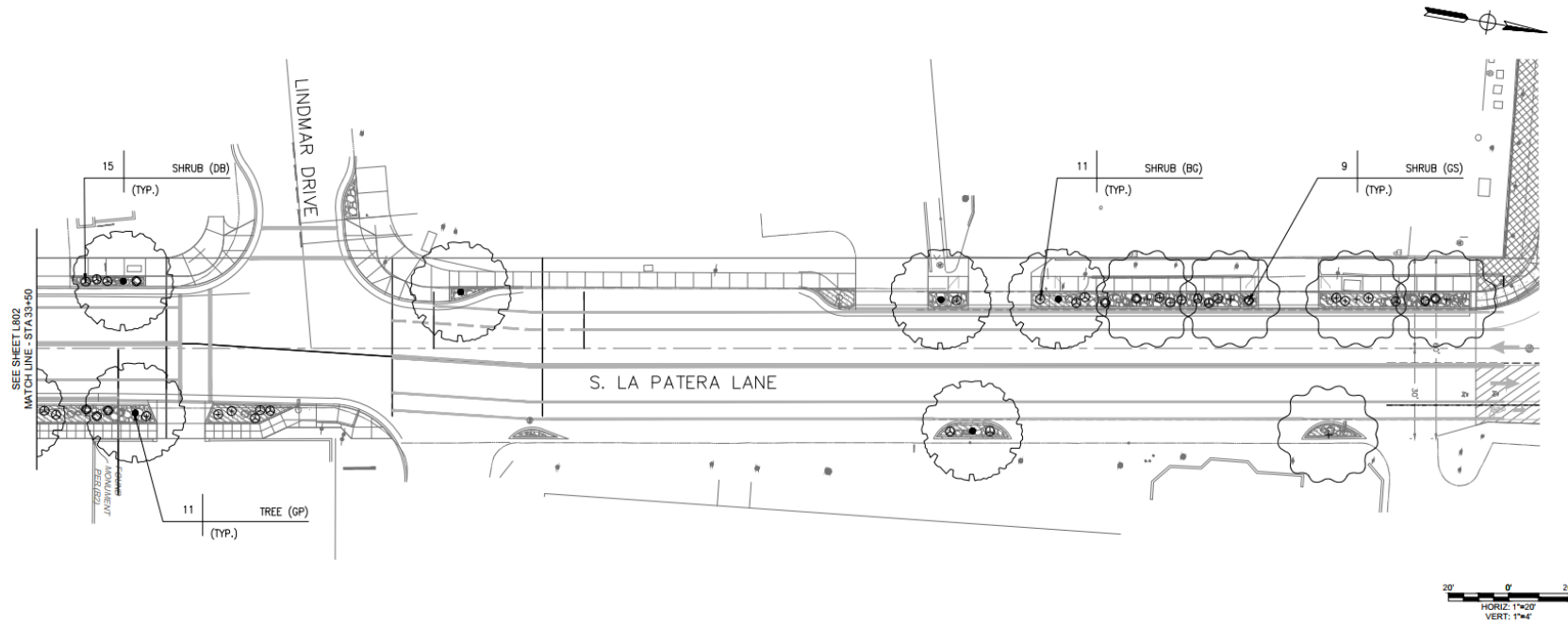


Figure 5 Proposed Site Plan – Northmost Portion of Project Site



Existing Site Conditions

Figure 6 and Figure 7 include photos of the project site which show the existing site conditions. The project site is generally flat, consisting of a paved two-lane road with partial and non-standard sidewalks. The site is located adjacent to properties zoned business park with light industrial uses to the east and west, and the Santa Barbara Airport Industrial Area Specific Plan to the east, U.S. 101 and the UPRR tracks and station to the north, and Santa Barbara Municipal Airport to the south.

The project site is located in an urbanized area, surrounded by surface parking lots and commercial retail and light industrial uses. Table 1 provides a summary of existing land uses in the immediate vicinity of the project site.

Table 1 Existing Land Use

Location		Existing Use	Jurisdiction	Zoning District	General Plan Designation
Project Site		Paved, two lane road with partial and non-standard sidewalks	City of Goleta	N/A	N/A
Surrounding Properties	East	Light Industrial	City of Goleta City of Santa Barbara	Business Park Santa Barbara Airport Industrial Area Specific Plan	Business Park Airport
	West	Light Industrial	City of Goleta	Business Park	Business Park
	North	U.S. 101, proposed Goleta Train Depot, UPRR	City of Goleta, UPRR	Public/Quasi Public	Public/Quasi Public
	South	Santa Barbara Municipal Airport	City of Santa Barbara	N/A	N/A

Figure 6 Photographs of the Project Site



Photograph 1. South La Patera Lane Looking Northeast



Photograph 2. South La Patera Lane Looking South

Figure 7 Photographs of the Project Site



Photograph 1. South La Patera Lane Looking South – With Sidewalk



Photograph 2. South La Patera Lane Looking North – Without Sidewalk

Consistency Analysis

Class 1 CE Applicability

Section 15301 of the CEQA Guidelines states that a Class 1 CE applies to the operation, repair, maintenance, permitting, leasing, licensing, or minor alteration of existing public or private structures, facilities, mechanical equipment, or topographical features, involving negligible or no expansion of existing or former use. CEQA Guidelines Section 15301(c) provides examples of Class 1 project types, which include “existing highways and streets, sidewalks, gutters, bicycle and pedestrian trails, and similar facilities, and other alterations such as the addition of bicycle facilities, including but not limited to bicycle parking, bicycle-share facilities and bicycle lanes, transit improvements such as bus lanes, pedestrian crossings, street trees, and other similar alterations that do not create additional automobile lanes.”

The project includes improvements to an approximately 1,600-foot-long portion of South La Patera Lane, a paved, two-lane road with partial and non-standard sidewalks. The proposed improvements consist of the addition of bike lanes, sidewalks, sidewalk-light pedestals, landscaped parkway pockets, and street trees. The project would enhance the safety and pedestrian and bicycle connectivity between Hollister Avenue and the future Goleta Train Depot.

The project site consists of an approximately 1,600-foot-long portion of South La Patera Lane roadway located within the public right-of-way, between Hollister Avenue and South La Patera Lane. The project site is generally flat and has been developed with a paved road, gutters, curbs, and sidewalks. The project site is located in an urbanized area and has no value as a habitat area for endangered, rare, or threatened species due to the small size and urban context. Additionally, based on aerial imagery and site visits (see Figure 2), there are no wetlands, streams, aquatic or riparian habitat, scenic vistas, or other environmentally sensitive resources on the project site. Therefore, the project site is not located in an environmentally sensitive area. The project site also does not contain any scenic resources and does not contain characteristics which would qualify as an unusual circumstance.

The key consideration for applicability of a Class 1 CE is whether the project involves negligible or no expansion of the use. The minor alterations to the existing street, sidewalks, and gutters would not expand the existing use of the road, which would remain a two-lane road. The project would replace or connect existing features, including sidewalks and curbs, to meet current ADA standards and increase accessibility to the future Goleta Train Depot. The project would also add bike lane striping along La Patera Lane, street trees, and sidewalk-light pedestals. Therefore, the additions and alterations to existing facilities would meet the applicability requirements for a Class 1 CE pursuant to Section 15301 of the CEQA Guidelines.

Exceptions to CE Applicability

The applicability of CEs is qualified by the exceptions listed in Section 15300.2(a) through (f) of the CEQA Guidelines. In the discussion below, each exception (in italics) is followed by an explanation of why the exception does not apply to the proposed project.

15300.2(a) Location. *Classes 3, 4, 5, 6, and 11 are qualified by consideration of where the project is to be located – a project that is ordinarily insignificant in its impact on the environment may in a particularly sensitive environment be significant. Therefore, these classes are considered to apply all instances, except where the project may impact on an environmental resource of hazardous or*

critical concern where designated, precisely mapped, and officially adopted pursuant to law by federal, state, or local agencies.

The proposed project does not include a Class 3, 4, 5, 6, or 11 CE. Therefore, this exception to a CE does not apply to the project.

15300.2(b) Cumulative Impact. *All exemptions for these classes are inapplicable when the cumulative impact of successive projects of the same type in the same place, over time is significant.*

There are no planned bike lane or pedestrian projects nearby. The Goleta Train Depot project could be under construction concurrently with this project. However, according to the Environmental Impact Report prepared for the project, there would be no significant environmental effects during construction. As discussed below, the proposed project would not result in significant environmental impacts. Therefore, the project would not result in a cumulatively considerable contribution to potential impacts.

In addition, cumulative projects in the city would similarly be subject to environmental review on a project-by-project basis. Therefore, exception criterion 'b' does not apply to this project.

15300.2(c) Significant Effect. *A categorical exemption shall not be used for an activity where there is a reasonable possibility that the activity will have a significant effect on the environment due to unusual circumstances.*

The project site is generally flat and has been developed with a paved road, gutters, curbs, and sidewalks. The project site is located in an urbanized area and has no value as a habitat area for endangered, rare, or threatened species due to the small size and urban context. The project site also does not contain any scenic resources and does not contain characteristics which would qualify as an unusual circumstance.

All construction activity would be required to incorporate the Santa Barbara County Air Pollution Control District requirements pertaining to standard dust control measures which would minimize construction-related emissions and demolition of existing structures. The City of Goleta also requires implementation of standard emission and dust control techniques for all construction. The project would not create new roadway lanes which would increase vehicle trips to the area. Therefore, the project would not result in significant impacts to air quality, greenhouse gas emissions, or vehicle miles traveled.

During construction, project would comply with the City of Goleta Municipal Code Section 15.09.290, which requires an Erosion and Sediment Control Plan which would outline project-specific Best Management Practices (BMPs) to control erosion, sediment release, and otherwise reduce the potential for discharge of pollutants in stormwater. The project would not create substantial new impervious surfaces, and new sidewalks and gutters would comply with City of Goleta standards. Therefore, the project would not result in significant water quality impacts. The project would involve temporary noise and vibration during construction; however, there are not adjacent sensitive uses, and these effects are localized, would comply with City of Goleta construction hours, and would cease after construction activities.

No known circumstances at the project site or related to project operations create a reasonable possibility of significant effects to the environment. Therefore, exception criterion 'c' would not apply to the project.

15300.2(d) Scenic Highways. *A categorical exemption shall not be used for a project which may result in damage to scenic resources, including but not limited to, trees, historic buildings, rock*

outcroppings, or similar resources, within a highway officially designated as a state scenic highway. This does not apply to improvements which are required as mitigation by an adopted negative declaration or certified EIR.

The project site is located approximately 150 feet south of U.S. 101, an eligible State scenic highway. The project site is relatively flat and is not visible from the U.S 101. The project would improve sidewalks and roadway infrastructure and would not impact views from U.S. 101. Furthermore, this portion of U.S. 101 is not an officially designated state scenic highway; therefore, exception criterion 'd' would not apply to the project.

15300.2 (e) Hazardous Waste Sites. *A categorical exemption shall not be used for a project located on a site which is included on any list compiled pursuant to Section 65962.5 of the Government Code.*

The project site is not listed as a hazardous waste site on a list compiled pursuant to Section 65962.5 of the Government Code, according to EnviroStor and GeoTracker databases. There are multiple hazardous waste sites in proximity to the project site. However, the project is located within the public right of way and will not impact any of those sites. Therefore, exception criterion 'e' does not apply to the project.

15300.2 (f) Historical Resources. *A categorical exemption shall not be used for a project which may cause a substantial adverse change in the significance of a historical resource.*

There are no buildings or structures of historic significance on the project site. There are several historic resources located in the vicinity of the project site according to General Plan Figure 6-2 Historic Resources, including Shrode Produce Company, Goleta lemon Association Packing House, Daniel Hill Adobe, and James G. Williams Tomato Packing Shed all located on South La Patera Lane. However, the project is located within the public right-of-way and no work would occur outside the public-right-way. Completion of the project would not impact views or access to these resources. Therefore, the project will not impact any historic structures or views of resources. Exception criterion 'e' does not apply to the project.

Summary

Based on this analysis, the proposed South La Patera Lane Improvement Project meets all criteria for a Class 1 Categorical Exemption pursuant to Section 153001 of the State CEQA Guidelines. Furthermore, exceptions to the applicability of a CE, as specified in Section 15300.2(a) through (f) of the CEQA Guidelines, do not apply to the project. Therefore, the proposed project is exempt from CEQA.

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State of California - Department of Fish and Wildlife
2022 ENVIRONMENTAL DOCUMENT FILING FEE
CASH RECEIPT
 DFW 753.5a (REV. 01/01/22) Previously DFG 753.5a

Print **StartOver** **Save**

RECEIPT NUMBER:
 42 — 03/16/2022 — 041
 STATE CLEARINGHOUSE NUMBER (If applicable)

SEE INSTRUCTIONS ON REVERSE. TYPE OR PRINT CLEARLY.

LEAD AGENCY City of Goleta	LEAD AGENCY EMAIL jvaldez@cityofgoleta.org	DATE 03/16/2022
COUNTY/STATE AGENCY OF FILING Santa Barbara	DOCUMENT NUMBER	

PROJECT TITLE

NOE - South La Patera Lane Improvement

PROJECT APPLICANT NAME City of Goleta	PROJECT APPLICANT EMAIL jvaldez@cityofgoleta.org	PHONE NUMBER (805) 961-7568
PROJECT APPLICANT ADDRESS 130 Cremona Drive, Suite B	CITY Goleta	STATE CA
		ZIP CODE 93117

PROJECT APPLICANT (Check appropriate box)

- Local Public Agency School District Other Special District State Agency Private Entity

CHECK APPLICABLE FEES:

- | | | | |
|---|------------|----|-------|
| <input type="checkbox"/> Environmental Impact Report (EIR) | \$3,539.25 | \$ | 0.00 |
| <input type="checkbox"/> Mitigated/Negative Declaration (MND)(ND) | \$2,548.00 | \$ | 0.00 |
| <input type="checkbox"/> Certified Regulatory Program (CRP) document - payment due directly to CDFW | \$1,203.25 | \$ | 0.00 |
|
 | | | |
| <input checked="" type="checkbox"/> Exempt from fee | | | |
| <input type="checkbox"/> Notice of Exemption (attach) | | | |
| <input type="checkbox"/> CDFW No Effect Determination (attach) | | | |
| <input type="checkbox"/> Fee previously paid (attach previously issued cash receipt copy) | | | |
| <hr/> | | | |
| <input type="checkbox"/> Water Right Application or Petition Fee (State Water Resources Control Board only) | \$850.00 | \$ | 0.00 |
| <input checked="" type="checkbox"/> County documentary handling fee | | \$ | 50.00 |
| <input type="checkbox"/> Other | | \$ | |

PAYMENT METHOD:

- Cash Credit Check Other

TOTAL RECEIVED \$ 50.00

SIGNATURE

X

AGENCY OF FILING PRINTED NAME AND TITLE

Angelica Ramirez, Deputy Clerk



State of California - Department of Fish and Wildlife
2022 ENVIRONMENTAL DOCUMENT FILING FEE
CASH RECEIPT
 DFW 753.5a (REV. 01/01/22) Previously DFG 753.5a

NOTICE

Each project applicant shall remit to the county clerk the environmental filing fee before or at the time of filing a Notice of Determination (Pub. Resources Code, § 21152; Fish & G. Code, § 711.4, subdivision (d); Cal. Code Regs., tit. 14, § 753.5). Without the appropriate fee, statutory or categorical exemption, or a valid No Effect Determination issued by the California Department of Fish and Wildlife (CDFW), the Notice of Determination is not operative, vested, or final, and shall not be accepted by the county clerk.

COUNTY DOCUMENTARY HANDLING FEE

The county clerk may charge a documentary handling fee of fifty dollars (\$50) per filing in addition to the environmental filing fee (Fish & G. Code, § 711.4, subd. (e); Cal. Code Regs., tit. 14, § 753.5, subd. (g)(1)). A county board of supervisors shall have the authority to increase or decrease the fee or charge, that is otherwise authorized to be levied by another provision of law, in the amount reasonably necessary to recover the cost of providing any product or service or the cost of enforcing any regulation for which the fee or charge is levied (Gov. Code, § 54985, subd. (a)).

COLLECTION PROCEDURES FOR COUNTY GOVERNMENTS

Filing Notice of Determination (NOD):

- Collect environmental filing fee or copy of previously issued cash receipt. *(Do not collect fee if project applicant presents a No Effect Determination signed by CDFW. An additional fee is required for each separate environmental document. An addendum is not considered a separate environmental document. Checks should be made payable to the county.)*
- Issue cash receipt to project applicant.
- Attach copy of cash receipt and, if applicable, previously issued cash receipt, to NOD.
- Mail filing fees for CRP document to CDFW prior to filing the NOD or equivalent final approval (Cal. Code Regs. Tit. 14, § 753.5 (b)(5)). The CRP should request receipt from CDFW to show proof of payment for filing the NOD or equivalent approval. Please mail payment to address below made attention to the Cash Receipts Unit of the Accounting Services Branch.

If the project applicant presents a **No Effect Determination** signed by CDFW, also:

- Attach No Effect Determination to NOD *(no environmental filing fee is due)*.

Filing Notice of Exemption (NOE) *(Statutorily or categorically exempt project (Cal. Code Regs., tit. 14, §§ 15260-15285, 15300-15333))*

- Issue cash receipt to project applicant.
- Attach copy of cash receipt to NOE *(no environmental filing fee is due)*.

Within 30 days after the end of each month in which the environmental filing fees are collected, each county shall summarize and record the amount collected on the monthly State of California Form No. CA25 (TC31) and remit the amount collected to the State Treasurer. Identify the remittance on Form No. CA25 as "Environmental Document Filing Fees" per Fish and Game Code section 711.4.

The county clerk shall mail the following documents to CDFW on a monthly basis:

- ✓ A photocopy of the monthly State of California Form No. CA25 (TC31)
- ✓ CDFW/ASB copies of all cash receipts (including all voided receipts)
- ✓ A copy of all CDFW No Effect Determinations filed in lieu of fee payment
- ✓ A copy of all NODs filed with the county during the preceding month
- ✓ A list of the name, address and telephone number of all project applicants for which an NOD has been filed. If this information is contained on the cash receipt filed with CDFW under California Code of Regulations, title 14, section 753.5, subdivision (e)(6), no additional information is required.

DOCUMENT RETENTION

The county shall retain two copies of the cash receipt (for lead agency and county clerk) and a copy of all documents described above for at least 12 months.

RECEIPT NUMBER

- # The first two digits automatically populate by making the appropriate selection in the County/State Agency of Filing drop down menu.
- # The next eight digits automatically populate when a date is entered.
- # The last three digits correspond with the sequential order of issuance for each calendar year. For example, the first receipt number issued on January 1 should end in 001. If a county issued 252 receipts for the year ending on December 31, the last receipt number should end in 252. CDFW recommends that counties and state agencies 1) save a local copy of this form, and 2) track receipt numbers on a spreadsheet tabbed by month to ensure accuracy.

DO NOT COMBINE THE ENVIRONMENTAL FEES WITH THE STATE SHARE OF FISH AND WILDLIFE FEES.

Mail to:

California Department of Fish and Wildlife
 Accounting Services Branch
 P.O. Box 944209
 Sacramento, California 94244-2090



2022 CEQA Transmittal Memorandum

County of Santa Barbara - Clerk of the Board of Supervisors

105 E. Anapamu St. Room 407 • Santa Barbara • CA • 93101

(805) 568-2240

Complete this form when filing a Negative Declaration, Mitigated Negative Declaration, Environmental Impact Report or Notice of Exemption.

You will need to submit one original for posting plus one copy for the Department of Fish & Wildlife. A scanned copy including the date/time of posting will be emailed to the Lead Agency and Project Applicant. If you would like a return copy, please submit an extra copy along with a pre-addressed, stamped envelope.

Contact Person Jaime Valdez		Phone 805-961-7568	
Lead Agency City of Goleta		Lead Agency Email jvaldez@cityofgoleta.org	
Project Title South La Patera Lane Improvement Project			
Project Applicant City of Goleta	Email jvaldez@cityofgoleta.org	Phone 805-961-7568	
Project Applicant Address 130 Cremona Drive, Suite B	City Goleta	State CA	Zip 93117

DOCUMENT BEING FILED:

<input type="checkbox"/> Environmental Impact Report (EIR)	\$3,539.25
<input type="checkbox"/> 2022 Filing Fee	\$0.00
<input type="checkbox"/> Previously Paid (must attach receipt)	\$0.00
<input type="checkbox"/> No Effect Determination (must be attached).....	\$0.00
<input type="checkbox"/> Negative Declaration or Mitigated Negative Declaration	\$2,548.00
<input type="checkbox"/> 2022 Filing Fee	\$0.00
<input type="checkbox"/> Previously Paid (must attach receipt)	\$0.00
<input type="checkbox"/> No Effect Determination (must be attached).....	\$0.00
<input checked="" type="checkbox"/> Notice of Exemption	\$0.00
<input checked="" type="checkbox"/> County Administrative Handling Fee (required for all filings, effective 7/19/18)	\$50.00

TOTAL: **\$ 50.00**

PAYMENT METHOD: ALL APPLICABLE FEES MUST BE PAID AT THE TIME OF FILING

Cash Credit Card Check # _____ Journal Entry # _____
(in person only)

EXHIBIT "L" (SLP Lane Categorical Exemption Report)

Notice of Exemption

Appendix E

To: Office of Planning and Research
P.O. Box 3044, Room 113
Sacramento, CA 95812-3044
County Clerk
County of: Santa Barbara
1100 Anacapa Street
Santa Barbara, CA 93101

From: (Public Agency): City of Goleta
130 Cremona Drive, Suite B
Goleta, CA 93117
(Address)

Project Title: South La Patera Lane Improvement Project

Project Applicant: City of Goleta

Project Location - Specific:

Entirety of South La Patera Lane between UPRR Right of Way and Hollister Avenue

Project Location - City: Goleta Project Location - County: Santa Barbara

Description of Nature, Purpose and Beneficiaries of Project:

The project will construct bike lanes, in-fill sidewalk and reconstruct non-standard sidewalk and curb ramps and will result in an ADA compliant sidewalk path of travel on the west side of South La Patera Lane; improvements to sidewalk on the east side of South La Patera Lane is also included. All of the changes would occur within the existing Right-Of-Way of La Patera Lane. The purpose of the project is to improve and enhance bicycle and pedestrian safety while improving the aesthetics of the La Patera Lane. The beneficiaries of the project are the residents of Goleta, the businesses along La Patera Lane, and the users of the Goleta Train Station.

Name of Public Agency Approving Project: City of Goleta

Name of Person or Agency Carrying Out Project: City of Goleta

Exempt Status: (check one):

- Ministerial (Sec. 21080(b)(1); 15268);
Declared Emergency (Sec. 21080(b)(3); 15269(a));
Emergency Project (Sec. 21080(b)(4); 15269(b)(c));
[X] Categorical Exemption. State type and section number: Class 1
Statutory Exemptions. State code number:

Reasons why project is exempt:

The minor alterations to the existing street, sidewalks, and gutters would not expand the existing use or dimensions of the Right-Of-Way, which would remain a two lane road for vehicles. Refer to the analysis contained with the Categorical Exemption Report dated March 2022 for additional justification.

Lead Agency Contact Person: Lisa Prasse Area Code/Telephone/Extension: 805 961 7542

If filed by applicant:

- 1. Attach certified document of exemption finding.
2. Has a Notice of Exemption been filed by the public agency approving the project? Yes No

Signature: Lisa Prasse Date: 03-15-22 Title: Planning Manager

Signed by Lead Agency Signed by Applicant

Authority cited: Sections 21083 and 21110, Public Resources Code.
Reference: Sections 21108, 21152, and 21152.1, Public Resources Code.

Date Received for filing at OPR:



COUNTY OF SANTA BARBARA

X 2155252

CCR

Department

Date 03/16/22

Received from Jaime Valdez

In Payment of NICE; Santa Barbara in Pateros Lane Improvement Project Access Fee

and 100 Dollars \$ 100.00

Received original of the above numbered receipt

CREDIT CARD	<input checked="" type="checkbox"/>
CASH	<input type="checkbox"/>
CHECK	<input type="checkbox"/>

Jaime Valdez
SIGNATURE OF PAYOR

[Signature]
AUTHORIZED SIGNATURE

AC-147

CLERK OF THE BOARD
 105 E. ANAPAMU ST RM 40
 SANTA BARBARA, CA 93101
 03/16/2022 14:19:00
 MID: XXXXXXXXXXXX891 TID: XXXX236

CREDIT CARD
VISA SALE

Card # Token XXXXXXXXXXXXX7183
 Chip Card: CHASE VISA
 AID: A0000000031010
 ATC: 0419
 ARQC: 9A571147D950B096
 SEQ #: 1
 Batch #: 108
 INVOICE
 Approval Code: 07022D
 Entry Method: Chip Read
 Mode: Issuer

SALE AMOUNT \$50.00

I agree to pay above total amount
 according to card issuer agreement.
 (Merchant agreement: If Credit Voucher)

Jaime Valdez
 JAIME VALDEZ

MERCHANT COPY

EXHIBIT M

**CONCRETE PAVEMENT PRESERVATION RECOMMENDATIONS FOR GOLETA
TRANSIT CENTER**

PREPARED BY CALIFORNIA – NEVADA CEMENT ASSOCIATION.

DATED NOVEMBER 5, 2021

November 5th, 2021

Randy Hildebrant, PE, GE

Associate - Engeo

RE: Concrete Pavement Preservation Recommendations for Goleta Transit Center

Mr. Hildebrant,

Based on our email conversations and site visit to 27 S La Patera Lane in Goleta, the future site of the proposed Goleta Transit Center I have prepared the following recommendations for reusing the existing concrete parking lot to the west of the existing building for additional parking area.

The following recommendations are based on the Concrete Pavement Preservation Guide, Second Edition published by the National Concrete Pavement Technology Center of the Iowa State University, available for download at:

https://intrans.iastate.edu/app/uploads/2018/08/preservation_guide_2nd_ed_508_final.pdf

The recommendations given correspond to the numbered images found on the following pages:

1. The general site view looking north shows typical slab cracking found in throughout much of the site paving. Many of the slabs appeared to be roughly 50' in length/width and exhibit mid-slab cracking, likely as a result of drying shrinkage and excessive slab dimensions; slab dimensions should generally be 24x to 30x the pavement thickness, or 16' to 20' on this 8" pavement. These cracks appeared to be held together tightly and were not exhibiting spalling or other degradation. As such, I would recommend leaving them as-is for this project.
2. An underground fuel tank and associated filling ports were observed adjacent to a backup generator. It is recommended that the fuel tank either be removed or drained, cleaned, filled, and abandoned in place, and the concrete slab above the tank replaced following the recommendations found in Chapter 6, Full-Depth Repairs of the above-referenced document, excepting that dowel bars are not needed as this is understood to be an undowelled, unreinforced pavement.
3. In many locations, corner breaks were observed on slabs that were in otherwise good condition. In order to restore those slabs and avoid future spalling and loose concrete, the processes and procedures found in Chapter 5, Partial-Depth Repairs of the above-referenced document should be used. Although not pictured, some of the construction joints exhibited spalling, likely due to an accumulation of incompressible material. The procedures found in Chapter 5, Partial-Depth Repairs can also be used to address this deterioration.
4. The area drain at the northwest corner of the parking lot exhibited signs of plugging – dirt and debris accumulation on the pavement surface and on the adjacent retaining wall. This drainage concern, although not part of the actual pavement preservation recommendations, should be addressed as part of the revitalization strategy. Allowing water to pond for extended periods will lead to weakened subgrade, possible subgrade pumping, and ultimately, premature pavement failure if allowed to continue while the pavement is in use.
5. Throughout the pavement, the control joints (those sawcut at the time of paving in order to control the location of shrinkage cracks) appear to be in generally good condition. In order to keep these joints in good condition, they should be occasionally cleaned with compressed air, high-pressure water, or with a vacuum sweeper to reduce the accumulation of incompressible materials that can lead to joint spalling.
6. In several locations, the construction joints (those made at the time of construction, often at the end of a day's production, or between placements) have an accumulation of incompressible materials and, in some locations, are growing weeds. In order to preserve these joints and prevent future spalling, they should be cleaned out and resealed following the recommendations found in Chapter 10 Joint Resealing and Crack Sealing of the above-referenced document.

Once the repairs described above are complete, it is recommended that a topping material to provide an attractive, uniform appearance that will complement the appearance of the new transit facility. I have reached out to my industry contacts to get recommendations on products that would work well for this application. Here are those recommendations:

- a) From the Sika Corporation: Sikatop 122 Plus is recommended for overlays, with Sikadur 32 as the bonding agent (it is recommended to apply the Sikatop 122 Plus mortar onto the Sikadur 32 epoxy “wet on wet”.) For more information on these products, contact Kash Amin, Project sales rep at 949-610-2695 or via email at amin.kash@us.sika.com Please find the materials information sheets attached to this report.
- b) From Euclid Chemical: Repair the cracks with gravity feed material, the joints with Eucolastic SL, prime the surface with Euroweld 2.0 and resurface with Thin Top Supreme which will hold up to heavy vehicular traffic. For more information on these products, contact Carl Schmidt at (951) 520-5890 or via email at cschmidt@euclidchemical.com Please find the materials information sheets attached to this report.
- c) From Masterbuilders: Mr. Dustin Martin prepared an extensive set of recommended procedures and products for this work. These recommendations along with the related materials information sheets are attached to this report. For more information, contact Dustin Martin at 714-390-2535 or via email at dustin.martin@mbcc-group.com

Photos related to the corresponding recommendation area above:

1.



Image 1 – General Site View Showing Typical Mid-Slab Cracking



Image 2 – Underground Fuel Tank and Fill Location

EXHIBIT "M" (Pavement Preservation Recommendations)



Image 3 – Typical Corner Break on Slab



Image 4 – Area Drain at Northwest Corner



Image 5 – Typical Control Joints



Image 6 – Typical Construction Joint

Disclaimer

These recommendations have been made based on the information provided to me and should be evaluated for the significance and limitations that may apply to the physical site location. The Engineer of Record is responsible for the review and acceptance of these recommendations. These recommendations reflect my experience, judgment, and I believe the recommendations to be appropriate, based on the information provided to me. However, neither I nor the California Nevada Cement Association make any representations or warranties concerning the applicability or installation and disclaim any and all responsibility and liability for the accuracy of the application of this information provided to the full extent of the law.

Sincerely,
California Nevada Cement Association
Nathan Forrest, P.E.
Technical Director



PRODUCT DATA SHEET

SikaTop[®]-122 Plus

TWO-COMPONENT, POLYMER-MODIFIED, CEMENTITIOUS, TROWEL-GRADE MORTAR PLUS SIKAFERROGARD[®] 901 PENETRATING CORROSION INHIBITOR

PRODUCT DESCRIPTION

SikaTop[®]-122 Plus is a two-component, polymer-modified, portland cement based, fast-setting, trowel-grade mortar. It is a high performance repair mortar for horizontal and vertical surfaces and offers the additional benefit of Sika FerroGard[®] 901, a penetrating corrosion inhibitor.

USES

- On grade, above and below grade on concrete and mortar.
- On horizontal surfaces.
- As a structural repair material for parking structures, industrial plants, walkways, bridges, tunnels, dams, ramps, floods, etc.
- To level concrete surfaces.
- As an overlay system for topping/resurfacing concrete.

CHARACTERISTICS / ADVANTAGES

- Extremely low shrinkage **proven by four industry standard test methods**
- High compressive and flexural strengths
- High abrasion resistance
- Increased freeze/thaw durability and resistance to deicing salts
- Compatible with coefficient of thermal expansion of concrete - Passes ASTM C-884
- Increased density - improved carbon dioxide resistance (carbonation) without adversely affecting water vapor transmission (not a vapor barrier)
- Sika FerroGard[®] 901, a penetrating corrosion inhibitor - reduces corrosion even in the adjacent concrete

APPROVALS / STANDARDS

- USDA certifiable for the food industry
- ANSI/NSF Standard 61 potable water compliant
- Tested per ICRI guideline for inorganic repair material data sheet protocol guideline n°320.3R

PRODUCT INFORMATION

Packaging	Component A	Component B
	1 gal (3.78 L) jug 4/carton	61.5 lb (28.9 kg) bag
Appearance / Color	Concrete gray when mixed	
Shelf Life	12 months from date of production if stored properly in original, unopened and undamaged sealed packaging	
Storage Conditions	Store dry at 40–95 °F (4–35 °C) Protect Component A from freezing. If frozen, discard. Protect Component B from moisture. If damp, discard.	

Density	136 lbs/ft ³ (2.18 kg/L)	(ASTM C-138)
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TECHNICAL INFORMATION

Compressive Strength	1 day	2,500 psi (17.2 MPa)	(ASTM C-109)
	7 days	5,300 psi (36.5 MPa)	73 °F (23 °C)
	28 days	7,000 psi (48.3 MPa)	50 % R.H.
Modulus of Elasticity in Compression	28 days	3.0x10 ⁶ psi	(ASTM C-469) 73 °F (23 °C) 50 % R.H.
Flexural Strength	28 days	1,500 psi (10.3 MPa)	(ASTM C-293) 73 °F (23 °C) 50 % R.H.
Splitting Tensile Strength	28 days	500 psi (3.4 MPa)	(ASTM C-496) 73 °F (23 °C) 50 % R.H.
Tensile Strength	28 days	2,000 psi (13.8 MPa)	(ASTM C-882 modified)*
<small>* Mortar scrubbed into substrate at 73 °F (23 °C) and 50 % R.H.</small>			
Pull-Out Resistance	7 days	>300 psi (2.1 MPa)	(ASTM C-1583)
	28 days	400 psi (2.8 MPa)	73 °F (23 °C) 50 % R.H.
Shrinkage	28 days	1"x1"x11-1/4" specimen	<0.05 % (ASTM C-157 modified)
		3"x3"x11-1/4" specimen	<0.021 % (mod. ICRI 320.3R) 73 °F (23 °C) 50 % R.H.
Ring Test	Duration	>70 days	(ASTM C-1581)
	Average Max Strain	-9 µstrain	73 °F (23 °C)
	Average Stress Strain	0.49 psi/day	50 % R.H.
	Potential for Cracking	Low	
Baenziger Block	90 days	No cracking	
Freeze-Thaw Stability	300 cycles	98 %	(ASTM C-666)
Rapid Chloride Permeability	28 days	< 500 C	(ASTM C-1202 AASHOT T-277)

APPLICATION INFORMATION

Mixing Ratio	Plant-proportioned kit, mix entire unit.		
Fresh Mortar Density	136 lbs/ft ³ (2.18 kg/l)		(ASTM C-138)
Coverage	Neat	0.51 ft ³ (0.02 m ³) per unit	
	Extended with 42 lb (19 kg) of 3/8" (9.5 mm) gravel	0.75 ft ³ (0.03 m ³) per unit	
<small>(Coverage figures do not include allowance for surface profile and porosity or material waste)</small>			
Layer Thickness		Min.	Max. in one lift
	Neat	1/8" (3.2 mm)	1" (25 mm)
	Extended	1" (25.4 mm)	4" (101.6 mm)

Product Data Sheet
SikaTop®-122 Plus
September 2018, Version 01.02
020302040070000021

Product Temperature	65–75 °F (18–24 °C)
Ambient Air Temperature	> 45 °F (7 °C)
Substrate Temperature	> 45 °F (7 °C)
Application Time	~ 30 minutes As the temperature will affect the pot life, application temperature: <ul style="list-style-type: none"> ▪ Above 73 °F (23 °C) will reduce the pot life and workability ▪ Below 73 °F (23 °C) will extend the pot life and workability
Finishing Time	50–120 minutes Note: All times start after adding Component 'B' to Component 'A' and are highly affected by temperature, relative humidity, substrate temperature, wind, sun and other job site conditions.

APPLICATION INSTRUCTIONS

SURFACE PREPARATION

- Concrete, mortar, and masonry products must be clean and sound.
- Remove all deteriorated concrete, dirt, oil, grease, and other bond-inhibiting materials from the area to be repaired.
- Be sure repair area is not less than 1/8" (3.2mm) in depth.
- Preparation work should be done by high pressure water blast, scabbler or other appropriate mechanical means to obtain an exposed aggregate surface profile of ±1/16"-1/8" (1.6-3.2 mm) (CSP-5-6).
- To ensure optimum repair results, the effectiveness of decontamination and preparation should be assessed by a pull-off test.
- Saw cutting of edges is preferred and a dovetail is recommended.
- Substrate should be Saturated Surface Dry (SSD) with clean water prior to application. No standing water should remain during application.

PRIMING

- **Reinforcing steel:** Steel reinforcement should be thoroughly prepared by mechanical cleaning to remove all traces of rust. Where corrosion has occurred due to the presence of chlorides, the steel should be high pressure washed with clean water after mechanical cleaning. For priming of reinforcing steel use Sika® Armatec® 110 EpoCem (consult PDS).
- **Concrete Substrate:** Prime the prepared substrate with a brush or sprayed applied coat of Sika® Armatec® 110 EpoCem (consult PDS). Alternately, a scrub coat of SikaTop®-122 Plus can be applied prior to placement of the mortar. The repair mortar has to be applied into the wet scrub coat before it dries.

MIXING

- Pour approximately 7/8 of Component 'A' into the mixing container.
- Add Component 'B' (powder) while mixing continuously.
- Mix mechanically with a low-speed drill (400–600 rpm) and mixing paddle or mortar mixer.
- Add remaining Component 'A' (liquid) to mix if a more loose consistency is desired.
- Mix to a uniform consistency, maximum 3 minutes.
- Thorough mixing and proper proportioning of the two components is necessary.
- Refer to ACI 306 Guidelines when there is a need to place this product in cold & hot temperatures. Thinner application will be more sensitive to the temperature

EXTENSION WITH AGGREGATES

- For applications greater than 1" (25.4 mm) in depth, add 3/8" (9.5 mm) coarse aggregate.
- Pour all of Component 'A' into mixing container.
- Add all of Component 'B' while mixing, then introduce 3/8" (9.5 mm) coarse aggregate at desired quantity.
- Mix to uniform consistency, maximum 3 minutes.
- The aggregate must be non-reactive (reference ASTM C-1260, C-227 and C-289), clean, well graded, Saturated Surface Dry (SSD), have low absorption and high density, and comply with ASTM C-33 size number 8 per Table 2.
- Do not use limestone aggregate.
- Variations in the quality of the aggregate will affect the physical properties of SikaTop®-122 Plus and may result in different strengths.
- The addition rate is 42 lb (19 kg) of aggregate per bag. It is approximately 3.0-4.5 gallons (11.3-17.0 L) by loose volume of aggregate.

APPLICATION

- SikaTop®-122 Plus must be scrubbed into the substrate, filling all pores and voids.
- Force material against edge of repair, working toward center.
- After filling repair, consolidate, then screed.
- Allow mortar or concrete to set to desired stiffness, then finish with wood or sponge float for a smooth surface, or broom or burlap-drag for a rough finish.

CURING TREATMENT

- As per ACI recommendations for Portland cement concrete, curing is required.
- Moist cure with wet burlap and polyethylene, a fine mist of water or a water based* compatible curing compound meeting ASTM C-309.
- Curing compounds adversely affect the adhesion of following lifts of mortar, leveling mortar or protective coatings.
- Moist curing should commence immediately after finishing.
- Protect freshly applied mortar from direct sunlight, wind, rain and frost.
- To prevent from freezing, cover with insulating material.

* Pretesting of curing compound is recommended.

LIMITATIONS

- Do not use solvent-based curing compound.
- Size, shape and depth of repair must be carefully considered and consistent with practices recommended by ACI or ICRI. For additional information, contact Technical Service.
- For additional information on substrate preparation, refer to ICRI Guideline No.310.2R Coatings, Polymer Overlays, and Concrete Repair.
- If aggressive means of substrate preparation is employed, substrate strength should be tested in accordance with ACI 503 Appendix A prior to the repair application.
- As with all cement based materials, avoid contact with aluminum to prevent adverse chemical reaction and possible product failure. Insulate potential areas of contact by coating aluminum bars, rails, posts etc. with an appropriate epoxy such as Sikadur 32 Hi-Mod.

BASIS OF PRODUCT DATA

Results may differ based upon statistical variations depending upon mixing methods and equipment, temperature, application methods, test methods, actual site conditions and curing conditions.

LOCAL RESTRICTIONS

See Legal Disclaimer.

ENVIRONMENTAL, HEALTH AND SAFETY

For further information and advice regarding transportation, handling, storage and disposal of chemical products, user should refer to the actual Safety Data Sheets containing physical, environmental, toxicological and other safety related data. User must read the current actual Safety Data Sheets before using any products. In case of an emergency, call CHEMTREC at 1-800-424-9300, International 703-527-3887.

LEGAL DISCLAIMER

KEEP CONTAINER TIGHTLY CLOSED •KEEP OUT OF REACH OF CHILDREN •NOT FOR INTERNAL CONSUMPTION •FOR INDUSTRIAL USE ONLY •FOR PROFESSIONAL USE ONLY

Prior to each use of any product of Sika Corporation, its subsidiaries or affiliates ("SIKA"), the user must always read and follow the warnings and instructions on the product's most current product label, Product Data Sheet and Safety Data Sheet which are available at usa.sika.com or by calling SIKA's Technical Service Department at 800-933-7452. Nothing contained in any SIKA literature or materials relieves the user of the obligation to read and follow the warnings and instructions for each SIKA product as set forth in the current product label, Product Data Sheet and Safety Data Sheet prior to use of the SIKA product.

SIKA warrants this product for one year from date of installation to be free from manufacturing defects and to meet the technical properties on the current Product Data Sheet if used as directed within the product's shelf life. User determines suitability of product for intended use and assumes all risks. User's and/or buyer's sole remedy shall be limited to the purchase price or replacement of this product exclusive of any labor costs. **NO OTHER WARRANTIES EXPRESS OR IMPLIED SHALL APPLY INCLUDING ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. SIKA SHALL NOT BE LIABLE UNDER ANY LEGAL THEORY FOR SPECIAL OR CONSEQUENTIAL DAMAGES. SIKA SHALL NOT BE RESPONSIBLE FOR THE USE OF THIS PRODUCT IN A MANNER TO INFRINGE ON ANY PATENT OR ANY OTHER INTELLECTUAL PROPERTY RIGHTS HELD BY OTHERS.** Sale of SIKA products are subject to the Terms and Conditions of Sale which are available at <https://usa.sika.com/en/group/SikaCorp/termsandconditions.html> or by calling 201-933-8300.

Sika Corporation
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Carretera Libre Celaya Km. 8.5
Fracc. Industrial Balvanera
Corregidora, Queretaro
C.P. 76920
Phone: 52 442 2385800
Fax: 52 442 2250537



Product Data Sheet
SikaTop®-122 Plus
September 2018, Version 01.02
020302040070000021

SikaTop-122Plus-en-US-(09-2018)-1-2.pdf

EXHIBIT "M" (Pavement Preservation Recommendations) **BUILDING TRUST** 

PRODUCT DATA SHEET

Sikadur[®]-32 Hi-Mod

HIGH-MODULUS, HIGH-STRENGTH, EPOXY BONDING/GROUTING ADHESIVE

PRODUCT DESCRIPTION

Sikadur[®]-32 Hi-Mod is a multi-purpose, 2-component, 100 % solids, moisture-tolerant structural epoxy adhesive. It conforms to the current ASTM C-881 Types I, II, and V, Grade 2, Class C and AASHTO M-235 specifications.

USES

Sikadur[®]-32 Hi-Mod may only be used by experienced professionals.

- Bond fresh, plastic concrete to hardened concrete and steel.
- Grout horizontal cracks in structural concrete and wood by gravity feed.
- Machinery and 'robotic' base-plate grout.
- Structural adhesive for concrete, masonry, metal, wood, etc.

CHARACTERISTICS / ADVANTAGES

- High-strength bonding/grouting adhesive.
- Tolerant to moisture before, during and after cure.
- Excellent adhesion to most structural materials.
- Convenient easy-to-mix ratio A:B = 1:1 by volume.
- Easy-to-use for bonding/grouting applications.
- Fast initial set; rapid gain to ultimate strengths.
- USDA-certified for use in food plants.

PRODUCT INFORMATION

Chemical Base	100 % epoxy	
Packaging	1, 2 and 4 gal. units	
Color	Concrete gray	
Shelf Life	2 years in original, unopened containers	
Storage Conditions	Store dry at 40–95 °F (4–35 °C). Condition material to 65–75 °F (18–24 °C) before using.	
Viscosity	Approximately 4–5,000 cps.	
Water Absorption	0.21 % (7 days, 24 h immersion)	(ASTM D-570) 73 °F (23 °C) 50 % R.H.

TECHNICAL INFORMATION

Compressive Strength	40 °F*	73 °F*	90 °F*	(ASTM D-695)
	(4 °C)	(23 °C)	(32 °C)	
8 hour	-	140 (1.0)	1,700 (11.7)	
16 hour	-	4,800 (33.1)	7,300 (50.3)	
1 day	30.0 (0.2)	5,700 (39.3)	7,300 (50.3)	
3 day	5,300 (36.6)	11,300 (77.9)	10,400(71.7)	
7 day	9,600 (66.2)	11,800 (81.4)	10,400(71.7)	
14 day	11,900 (82.1)	12,200 (84.1)	10,400(71.7)	
28 day	12,600 (86.9)	12,200 (84.1)	10,500(72.4)	

*Material cured and tested at the temperatures indicated.

Modulus of Elasticity in Compression	2.1 x 10 ⁶ psi (1,449 MPa) (7 days)	(ASTM D-695) 73 °F (23 °C) 50 % R.H.																			
Flexural Strength	7,000 psi (48.3 MPa) (14 day)	(ASTM D-790) 73 °F (23 °C) 50 % R.H.																			
Modulus of Elasticity in Flexure	6.0 x 10 ⁵ psi (4,800 MPa) (14 day)	(ASTM D-790) 73 °F (23 °C) 50 % R.H.																			
Tensile Strength	6,900 psi (48 MPa) (7 days)	(ASTM D-638) 73 °F (23 °C) 50 % R.H.																			
Tensile Modulus of Elasticity	5.4 x 10 ⁵ psi (3,726 MPa) (14 days)	(ASTM D-638) 73 °F (23 °C) 50 % R.H.																			
Elongation at Break	1.9 % (7 days)	(ASTM D-638) 73 °F (23 °C) 50 % R.H.																			
Tensile Adhesion Strength	<table border="1"> <tbody> <tr> <td>2 day (moist cure)</td> <td>Plastic Concrete to Hardened Concrete</td> <td>1,700 psi (11.7 MPa)</td> <td rowspan="6">(ASTM C-882) 73 °F (23 °C) 50 % R.H.</td> </tr> <tr> <td></td> <td>Hardened Concrete to Hardened Concrete</td> <td>2,000 psi (13.8 MPa)</td> </tr> <tr> <td></td> <td>Hardened Concrete to Steel</td> <td>1,900 psi (13.1 MPa)</td> </tr> <tr> <td>14 day (moist cure)</td> <td>Plastic Concrete to Hardened Concrete</td> <td>2,200 psi (15.1 MPa)</td> </tr> <tr> <td></td> <td>Hardened Concrete to Hardened Concrete</td> <td>2,000 psi (13.8 MPa)</td> </tr> <tr> <td></td> <td>Hardened Concrete to Steel</td> <td>2,000 psi (13.8 MPa)</td> </tr> </tbody> </table>	2 day (moist cure)	Plastic Concrete to Hardened Concrete	1,700 psi (11.7 MPa)	(ASTM C-882) 73 °F (23 °C) 50 % R.H.		Hardened Concrete to Hardened Concrete	2,000 psi (13.8 MPa)		Hardened Concrete to Steel	1,900 psi (13.1 MPa)	14 day (moist cure)	Plastic Concrete to Hardened Concrete	2,200 psi (15.1 MPa)		Hardened Concrete to Hardened Concrete	2,000 psi (13.8 MPa)		Hardened Concrete to Steel	2,000 psi (13.8 MPa)	
2 day (moist cure)	Plastic Concrete to Hardened Concrete	1,700 psi (11.7 MPa)	(ASTM C-882) 73 °F (23 °C) 50 % R.H.																		
	Hardened Concrete to Hardened Concrete	2,000 psi (13.8 MPa)																			
	Hardened Concrete to Steel	1,900 psi (13.1 MPa)																			
14 day (moist cure)	Plastic Concrete to Hardened Concrete	2,200 psi (15.1 MPa)																			
	Hardened Concrete to Hardened Concrete	2,000 psi (13.8 MPa)																			
	Hardened Concrete to Steel	2,000 psi (13.8 MPa)																			
Shear Strength	6,200 psi (43 MPa) (14 days)	(ASTM D-732) 73 °F (23 °C) 50 % R.H.																			



APPLICATION INFORMATION

Mixing Ratio	Component 'A': Component 'B' = 1:1 by volume
Coverage	Bonding Adhesive: 1 gal. covers approximately 80 ft ² on smooth surface. Base Plate Grout: 1 gal. mixed with 1.5 parts oven-dried aggregate by loose volume yields approximately 420 in ³ of grout. Anchoring Grout: 1 gal. yields 231 in ³ of grout.
Product Temperature	Condition material to 65°-75°F (18°-24°C) before using.
Ambient Air Temperature	Minimum ambient temperature 40°F (4°C).
Substrate Temperature	Minimum substrate temperature 40°F (4°C).
Pot Life	Approximately 30 minutes. (60 gram mass) Approximately 22 minutes. (350 gram mass)
Contact Time	40 °F (4 °C)*: 15–16 h 73 °F (23 °C)*: 2–2.5 h 90 °F (32 °C)*: 1.5–2 h <small>*Material cured and tested at the temperatures indicated.</small>

APPLICATION INSTRUCTIONS

SUBSTRATE QUALITY

Surface must be clean and sound. It may be dry or damp, but free of standing water. Remove dust, laitance, grease, curing compounds, impregnations, waxes and any other contaminants.

SUBSTRATE PREPARATION

Concrete - Should be cleaned and prepared to achieve a laitance and contaminant free, open textured surface by blast cleaning or other equivalent mechanical means.

Steel - Should be cleaned and prepared thoroughly by blast cleaning or other equivalent mechanical means.

MIXING

Pre-mix each component. Proportion equal parts by volume of Component 'A' and Component 'B' into clean pail. Mix thoroughly for 3 minutes with Sika paddle on low-speed (400-600 rpm) drill until blend is a uniform color. Mix only that quantity that can be applied within its pot life.

APPLICATION METHOD / TOOLS

To bond fresh concrete to hardened concrete - Apply by brush, roller, broom or spray. Place fresh concrete while Sikadur® 32, Hi-Mod, is still tacky. If coating becomes glossy and loses tackiness, remove any surface contaminants then recoat with additional Sikadur® 32 Hi-Mod, and proceed.

To grout baseplates - Add up to 1 1/2 parts of oven-dried aggregate to 1 part of mixed Sikadur® 32, Hi-Mod, by volume. Place grout under baseplate. Avoid contact with the underside of the plate. A 1/4 to 3/8 in. (6 to 10

mm) space should remain between the top of the grout and the bottom of the plate.

Maximum thickness of grout per lift is 1.5 in. (38 mm) If multiple lifts are needed, allow preceding layer to cool to touch before applying additional layer. The remaining 1/4 to 3/8 in. (6 to 10 mm) space should be filled with neat Sikadur® 32 Hi-Mod. Pour a sufficient quantity of neat epoxy to allow the level to rise slightly higher than the underside of the bearing plate.

To gravity feed cracks - Pour neat material into vee-notched crack. Continue placement until completely filled.

Seal underside of slab prior to filling if cracks reflect through.

LIMITATIONS

- For spray applications, consult Technical Service at 800-933-7452.
- Use only oven-dry aggregate.
- Material is a vapor barrier after cure.
- For applications on exterior, on-grade substrates, consult Technical Services at 800-933-7452.
- Do not apply over wet, glistening surface.
- Not an aesthetic product. Color may alter due to variations in lighting and/or UV exposure.

BASIS OF PRODUCT DATA

Results may differ based upon statistical variations depending upon mixing methods and equipment, temperature, application methods, test methods, actual site conditions and curing conditions.

OTHER RESTRICTIONS

See Legal Disclaimer.

ENVIRONMENTAL, HEALTH AND SAFETY

For further information and advice regarding transportation, handling, storage and disposal of chemical products, user should refer to the actual Safety Data Sheets containing physical, environmental, toxicological and other safety related data. User must read the current actual Safety Data Sheets before using any products. In case of an emergency, call CHEMTREC at 1-800-424-9300, International 703-527-3887.

LEGAL DISCLAIMER

- KEEP CONTAINER TIGHTLY CLOSED
- KEEP OUT OF REACH OF CHILDREN
- NOT FOR INTERNAL CONSUMPTION
- FOR INDUSTRIAL USE ONLY
- FOR PROFESSIONAL USE ONLY

Prior to each use of any product of Sika Corporation, its subsidiaries or affiliates ("SIKA"), the user must always read and follow the warnings and instructions on the product's most current product label, Product Data Sheet and Safety Data Sheet which are available at usa.sika.com or by calling SIKA's Technical Service Department at 1-800-933-7452. Nothing contained in any SIKA literature or materials relieves the user of the obligation to read and follow the warnings and instructions for each SIKA product as set forth in the current product label, Product Data Sheet and Safety Data Sheet prior to use of the SIKA product.

SIKA warrants this product for one year from date of installation to be free from manufacturing defects and to meet the technical properties on the current Product Data Sheet if used as directed within the product's shelf life. User determines suitability of product for intended use and assumes all risks. User's and/or buyer's sole remedy shall be limited to the purchase price or replacement of this product exclusive of any labor costs. **NO OTHER WARRANTIES EXPRESS OR IMPLIED SHALL APPLY INCLUDING ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. SIKA SHALL NOT BE LIABLE UNDER ANY LEGAL THEORY FOR SPECIAL OR CONSEQUENTIAL DAMAGES. SIKA SHALL NOT BE RESPONSIBLE FOR THE USE OF THIS PRODUCT IN A MANNER TO INFRINGE ON ANY PATENT OR ANY OTHER INTELLECTUAL PROPERTY RIGHTS HELD BY OTHERS.**

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Product Data Sheet
Sikadur®-32 Hi-Mod
March 2020, Version 01.02
020204030010000129

Sikadur-32Hi-Mod-en-US-(03-2020)-1-2.pdf



SELLING BRIEF



Euroweld 2.0

Latex Bonding Agent for Concrete Repairs and Toppings

For Internal Use Only

General Description

EUCOWELD 2.0 is a non-rewettable, neat-applied liquid latex bonding agent for cement-based repair mortars and concrete.

Product Positioning

EUCOWELD 2.0 will help round out our bonding agent product line; here is a brief review of the positioning for our current products:

- **AKKRO-7T, FLEX-CON, and SBR LATEX:** non-rewettable latex products that are best used as admixtures in cementitious products. When used as topically applied bonding agents, they must be combined with sand and cement and essentially used as a scrub coat – where your repair mortar or topping is placed on the bonding slurry before it dries out. These products have zero bonding ability if they are applied to the surface neat and allowed to dry.
- **TAMMSWELD:** re-wettable, ethylene vinyl acetate (EVA) product that is best used as a primer coat under EucoFloor SL160, Flo-Top, and Super Flo-Top. We have accepted and used Tammsweld as a neat bonding agent for concrete repairs in the past, but it does have its limitations - as the “re-wetting” and bonding performance is dependent upon moisture content of the repair mortar or concrete being placed on it. EVA-based products are also easily outperformed by the latest technology in EUCOWELD 2.0. Moving forward, Tammsweld will remain in the position of a primer coat under our underlayments/overlayments that will not receive a grind and polish (EucoFloor Epoxy Primer is still the “go to” for polished toppings).
- **EUCOWELD 2.0:** a new, non-rewettable latex bonding agent that is best used as a neat-applied bonding agent for repairs with any of our cementitious repair mortars, or with ready-mix concrete. “Non-rewettable” and “neat-applied” together may sound strange at first – but it is not a typo! As you read on, you will find that the benefits of this product are numerous in comparison with our existing latex line-up. From bond strengths, ease of use, robustness, price, you name it – this product outperforms the rest.

Packaging & Availability

EUCOWELD 2.0 is immediately available for sale in 5 gallon (18.9 L) pails and in cases of 1 gallon (3.8 L) jugs (6 jugs per case). Initially, distribution will be from the Cleveland, OH facility. As demand increases, other warehousing locations will be added. **EUCOWELD 2.0** meets all local and national governmental guidelines for VOC emissions and can be sold anywhere in North America.

Product Overview/Value Statement

There are two main points to take away from this selling brief:

1. EUCOWELD 2.0 is nearly “dummy proof”.
2. EUCOWELD 2.0 exhibits bond strengths that almost rival Duralprep A.C.

To elaborate – the lab here in Cleveland put this product through the ringer during testing. It was tested “wet on wet” and after being allowed to dry for 3 hours, 24 hours, 3 days, and 7 days... it was tested after it was applied and got “rained on” (lab simulation)... it was applied, topped, and then put through freeze-thaw cycles before bond testing... it was applied, topped, and wet cured before bond testing... we thought of almost everything, and this product performed through it all. This only bodes well for us, and provides confidence for recommending this product as a neat bonding agent under our cementitious repair mortars, both interior and exterior.

On top of that, the direct tension bond pulls (C1583) and slant shear bond strengths (C882) were excellent all around, and nearly rival those of water-based epoxy bonding agents like Duralprep A.C. This is another confidence booster for both us and our customers, especially in comparison to the EVA-based products on the market (and our own Tammsweld). This also provides us and our customers a “solution” to our recent changes regarding not using Duralprep A.C. under thin toppings (less than 3.5” thick). This is a product that we can now confidently recommend under toppings of any thickness, and it’s even easier to use than Duralprep A.C. – no mixing.

Take this product to your customers and compare our testing with that of Larsen’s Weld-Crete (which seems to be the market leader in neat-applied latex bonding agents) – EUCOWELD 2.0 has testing that more directly relates to concrete and toppings, and the numbers will speak for themselves. Pricing is also very competitive on this product, even in comparison to our own Tammsweld.

EUCOWELD 2.0 represents a new generation of unique, non-EVA based latex that utilizes reactive chemistry for bonding, rather than depending on the moisture content of the repair material. For full details and instructions, please refer to the included TDS.

Competitive Products

- All EVA-based, neat-applied latex bonding agents (Larsen Weld-Crete, in particular)
- ChemMasters Cretelox (similar chemistry to Euoweld 2.0)
- Sika Latex R (similar chemistry to Euoweld 2.0)

Typical Customer Profile & Applications

Any repair and restoration contractor in search of a reliable, economical, easy-to-use/neat-applied latex bonding agent that outperforms the widely available EVA-based products

Pricing Guidelines

SAP# L6202 95	Case of (6) 1 gal. jugs	\$98.40
SAP# L6202 05	5 gal. pail	\$74.00

Sales and Marketing Tools

Tool Description	Target Audience	Availability
Selling Brief	Euclid sales/internal	This document
Technical Data Sheets	Engineering, distributors, contractors, Euclid sales/internal	Available now
Safety Data Sheets	Engineering, distributors, contractors, Euclid sales/internal	Available now
Sell Sheet/Product Introduction	Engineering, distributors, contractors	Coming soon
Inventory	Euclid sales, distributors, contractors	Available now

Product Business Contact

Matt Kwiecien Office: (216) 692-8346 Cell: (216) 905-0378
e-mail: MKwiecien@euclidchemical.com



THIN-TOP SUPREME

Single Component Cementitious Topping & Repair Mortar for Thin Applications

Description

THIN-TOP SUPREME is a latex and microsilica modified cementitious mortar designed for use as a floor or deck topping at thicknesses of 1/16" to 3/8" (1.6 mm to 9.5 mm). This product is a single-component formula which incorporates a powder latex technology. It provides excellent durability under freeze-thaw cycling as well as reducing the ingress of water and de-icing salts. THIN-TOP SUPREME offers normal set times in a trowelable consistency for easy workability.

Primary Applications

- Parking decks
- Pavements
- Joints
- Marine structures
- Curbs and gutters
- Ramps
- Floors
- Walkways

Features/Benefits

- Provides a strong, wear resistant thin overlay
- Excellent durability in freeze-thaw cycles
- Contains an integral corrosion inhibitor
- Excellent bond to prepared concrete
- Reduces the penetration of water and de-icing salts for substrate protection
- Suitable for both interior and exterior use

Technical Information

The following are typical values obtained under laboratory conditions. Expect reasonable variation under field conditions.

Compressive Strength ASTM C109
2" (50 mm) cubes @ 2.9 qts (2.7 L)/50 lb (22.7 kg) bag.

Age	Strength
1 day.....	2,000 psi (13.8 MPa)
7 days.....	4,000 psi (27.6 MPa)
28 days.....	6,000 psi (41.3 MPa)

Linear Shrinkage ASTM C157
28 days.....-0.15%

Unit Weight.....approx. 130 lb/ft³ (2082 kg/m³)

Flexural Strength ASTM C348
7 days1,000 psi (6.9 MPa)
28 days.....1,200 psi (8.3 MPa)

Split Tensile Strength ASTM C496
7 days.....300 psi (2.1 MPa)
28 days.....400 psi (2.8 MPa)

Freeze/Thaw Resistance ASTM C666 Procedure A
300 cycles 89% relative dynamic modulus

Working Time 30 to 40 minutes

Initial Set 1 to 1.5 hours

Final Set approx. 3 hours

Appearance: THIN-TOP SUPREME is a free-flowing powder as packaged. After mixing and placing, the color may initially appear darker than the surrounding concrete. The color will lighten up substantially as it cures and dries out, though it may always appear somewhat darker than the surrounding concrete.

Packaging/yield

THIN-TOP SUPREME is packaged in 50 lb (22.7 kg) moisture resistant bags. Yield: 0.43 ft³/bag (0.012 m³) when mixed with 3 qt (2.8 L) of water. Typical water requirement is 2.75 to 3.25 qt (2.6 to 3.08 L)/bag.

Shelf Life

2 years in original, unopened package

Specifications/Compliances

Canadian Food Inspection Agency, MTQ and MTO

Directions for Use

Surface Preparation: Concrete surfaces must be structurally sound, free of loose or deteriorated concrete and free of dust, dirt, paint, efflorescence, oil and all other contaminants. Mechanically abrade the surface to achieve a surface profile equal to CSP 4-6 in accordance with ICRI Guideline 310.2. Properly clean profiled area.

Priming & Bonding (Horizontal Toppings): For the best adhesion to concrete, use EUCOFLOOR EPOXY PRIMER seeded with sand as the bonding coat. Refer to the EUCOFLOOR EPOXY PRIMER technical data sheet for full instructions. Alternatively, application of EUCOWELD 2.0 to a dry substrate or a scrub coat of THIN-TOP SUPREME to the saturated surface dry (SSD) concrete surface may be used for bonding. The topping material must be placed on the scrub coat before the scrub coat dries out.

Mixing: Single bags may be mixed with a drill and “jiffy” mixer. Use a paddle type mortar mixer for large jobs. All material should be in the proper temperature range of 60°F (15°C) to 90°F (32°C). Add the appropriate amount of water 2.75 to 3.25 qt (2.6 to 3.08 L) per bag for the batch size and then add the dry product. Mix for 3 to 5 minutes.

Placement: Discharge material from mixer immediately and place on to the repair area. For repairs, spread with a trowel, come-a-long, or square tipped shovel to a thickness that matches the surrounding concrete. Work material into place by floating or troweling. On large areas, use screed strips with a vibratory screeding to level.

Finishing: This product is designed for finishing with a float or broom appearance. Do not add additional water to the surface during the finishing operation; use EUCOBAR evaporation retarder. For a hard, flat troweled surface, delay finishing until the product is near final set (approx. 3 hours) to reduce the risk of blistering during troweling.

Curing and Sealing: Proper curing procedures are important to ensure the durability and quality of the repair. To prevent surface cracking, cure the material with a high solids curing compound, such as SUPER AQUA-CURE VOX or SUPER DIAMOND CLEAR VOX. Note: **Do not use a solvent based curing compound on this product.** If a curing compound is not desired, cover with polyethylene for a minimum of 3 days. **Do not wet cure.** Always re-establish floor and slab joints when using this product as an overlay.

Clean-Up

Clean tools and equipment with water before the material hardens. Hardened THIN-TOP SUPREME will require removal by mechanical means.

Precautions/Limitations

- Do not wet cure. Do not use a solvent based curing compound on this product.
- Do not allow repairs to freeze until the material has reached a minimum of 1,000 psi (7 MPa) compressive strength.
- Use only potable water for mixing.
- Do not add admixtures or sand.
- Do not use DURALPREP A.C. as a bonding agent for toppings and overlays done with THIN-TOP SUPREME.
- Do not use material at temperatures below 45°F (7°C) or above 100°F (38°C).
- When necessary, follow the recommendations in ACI 305R “Guide to Hot Weather Concreting” or ACI 306R “Guide to Cold Weather Concreting”.
- No heavy traffic until the product has cured.
- Mixing partial bags may yield variable results; always mix full units.
- Store product in a dry place.
- For repairs and toppings thicker than 3/8” (9.5 mm), use CONCRETE-TOP SUPREME.
- In all cases, consult the Safety Data Sheet before use.

Rev. 08.20

WARRANTY: The Euclid Chemical Company (“Euclid”) solely and expressly warrants that its products shall be free from defects in materials and workmanship for one (1) year from the date of purchase. Unless authorized in writing by an officer of Euclid, no other representations or statements made by Euclid or its representatives, in writing or orally, shall alter this warranty. EUCLID MAKES NO WARRANTIES, IMPLIED OR OTHERWISE, AS TO THE MERCHANTABILITY OR FITNESS FOR ORDINARY OR PARTICULAR PURPOSES OF ITS PRODUCTS AND EXCLUDES THE SAME. If any Euclid product fails to conform with this warranty, Euclid will replace the product at no cost to Buyer. Replacement of any product shall be the sole and exclusive remedy available and buyer shall have no claim for incidental or consequential damages. Any warranty claim must be made within one (1) year from the date of the claimed breach. Euclid does not authorize anyone on its behalf to make any written or oral statements which in any way alter Euclid’s installation information or instructions in its product literature or on its packaging labels. Any installation of Euclid products which fails to conform with such installation information or instructions shall void this warranty. Product demonstrations, if any, are done for illustrative purposes only and do not constitute a warranty or warranty alteration of any kind. Buyer shall be solely responsible for determining the suitability of Euclid’s products for the Buyer’s intended purposes.

EXHIBIT "M" (Pavement Preservation Recommendations)



October 27, 2021

Nathan Forrest
California Nevada Cement Association

RE:
City of Goleta – New Transit Center
Goleta, CA

Nathan,
Based on the information you provided about the City of Goleta transit center parking lot please consider using the MasterSeal Traffic 2500 system over the top of MasterSeal 350 moisture mitigation epoxy primer. Below is an overview of a typical Installation and rate of production.

Overview of install:

- Remove all concrete substrate areas which are not sound. Repair all voids, delaminated and spalled concrete areas with Master Builders Solutions cementitious (MasterEmaco 1061DR) and/or epoxy patching materials (MasterSeal 350). All concrete repairs should be performed prior to surface preparation.
- All concrete surfaces must be shot blasted to profile the surface of the concrete to ICRI CSP surface profile of 4 (similar to 100 grit sandpaper). For areas with limited space or access for shot-blasting, alternative mechanical methods can be used to achieve the recommended surface profile. All dust and debris or other contaminants should be removed prior to coating installation.
- Mix and apply MasterSeal NP2, a 50% movement joint sealant, to all joints, flashings and cant beads at horizontal to vertical transitions. Cracks exceeding 1/16" in width or moving cracks should be routed out to a minimum ¼" X ¼" and sealed with a MasterSeal® NP2, polyurethane sealant. Once the sealant is placed and struck flush, apply sand the top of the sealant (cracks only) to allow for better adhesion to the MasterSeal 350. For dynamic cracks and joints a bond breaker should be used to prevent adhesion to the bottom of the joint.

MasterSeal Traffic 2500 - Heavy Duty System w/ MasterSeal 350

1. MasterSeal 350– 100% moisture mitigation epoxy
 - o Apply at a rate of 25 wet mils or 60 s.f. per gal.
 - o Immediately backroll to evenly level
 - o While coating is still wet broadcast aggregate to refusal at the rate of 20-35 lbs / 100s.f.
 - o Allow base coat to cure 3-4 hours before applying midcoat.

Note: Do not coat expansion joints over 1" inch wide.

2. MasterSeal TC 275 midcoat – 2 component aromatic midcoat –

- Apply at a rate of 18 -20 wet mils or 90 s.f. per gal.
 - Immediately backroll to evenly level
 - Broadcast aggregate to refusal at the rate of 20-35 lbs / 100s.f.
 - Allow to cure for 3-4 hours before applying next midcoat.
3. MasterSeal TC 295 topcoat – 2 component aliphatic topcoat –
- Apply at 20 wet mils or 80 s.f. per gal.
 - Immediately backroll to evenly level
 - Broadcast 3-5 lbs/100s.f. and lightly backroll into top coat if additional slip resistance is needed.
 - Allow to cure for for minimum 48-72 hours before opening to vehicular traffic.

Master Builders Solutions will offer a standard 5 year warranty for this system.

Notes:

- 1) The aggregate outlined in this written specification and recommended for use on this structure is MasterSeal 941 or kiln dried sand 16/30 blend.
- 2) All coverage rates are approximate and may vary due to the application technique used. Actual coverage rate will depend on finish and porosity of the substrate.
- 3) Extend curing time at temperatures less than 75 degrees F and relative humidity less than 50 percent.

All repairs should be completed prior to coating placement and proper repair procedures should be followed. Please refer to the product technical data guides for surface preparation, mixing and application instructions which supercedes this letter.

We appreciate your support of Master Builders Solutions. If there is anything further I can help with please don't hesitate to contact me.

Sincerely,



Dustin Martin
Phone: (714) 390-2535
Email: dustin.martin@mbcc-group.com
-group.com

MasterEmaco[®] T 1061

Rapid-setting cement-based concrete repair mortar with extended working time

FORMERLY 10-61 RAPID MORTAR

PACKAGING

MasterEmaco T 1061
50 lb (22.6 kg) polyethylene-lined bags
2,500 lb (1,134 kg) bulk bags

MasterEmaco T 1061DR
50 lb (22.6 kg) polyethylene-lined bags

YIELD

0.43 ft³ (0.012 m³) per 50 lb (22.6 kg)
- WHEN EXTENDED 50%:
0.57 ft³ (0.016 m³)
- WHEN EXTENDED 100%:
0.77 ft³ (0.022 m³)

STORAGE

Store in unopened containers in cool, clean, dry conditions

SHELF LIFE

- 50 LB BAGS:
1 year when properly stored
- 2,500 LB BULK BAGS:
6 months when properly stored

VOC CONTENT

0 g/L less water and exempt solvents

DESCRIPTION

MasterEmaco T 1061 is a one-component, shrinkage-compensated, cement-based mortar with an extended working time. It is designed for repairing horizontal concrete surfaces. MasterEmaco T 1061DR is a reduced dust version available separately.

PRODUCT HIGHLIGHTS

- Extended working time
- Extra low permeability helps minimize chloride intrusion
- Rapid-setting for quick turn-around repairs
- Low residual moisture, can be coated in as little as 6 hours
- Excellent resistance to freeze/thaw cycling
- Shrinkage compensated, minimizing cracking from drying shrinkage, reducing stress at the bond line
- Can be placed neat up to 2" (50 mm) thickness
- Can be extended up to 100% by weight, providing higher yields
- Proprietary cement blend bonds to carbonated and noncarbonated concrete substrates

APPLICATIONS

- Interior and exterior
- Horizontal surfaces
- Applications requiring high early-strength gain
- Structural concrete repairs
- Partial and full-depth repairs

SUBSTRATES

- Concrete

HOW TO APPLY

SURFACE PREPARATION CONCRETE

1. Substrate must be structurally sound and fully cured (28 days).
2. Saw cut the perimeter of the area being repaired into a square with a minimum depth of ½" (13 mm).
3. Refer to current ICRI Guideline no. 310.2R for surface prep requirements to permit proper bond.

REINFORCING STEEL

1. Remove all oxidation and scale from the exposed reinforcing steel in accordance with ICRI Technical Guideline No. 310.1R.
2. For additional protection from future corrosion, coat the prepared reinforcing steel with MasterProtect P 8100 AP.

Technical Data

Composition

MasterEmaco T 1061 is a proprietary blend of cement, graded aggregate, shrinkage-compensating agents, and set-control additives.

MasterEmaco T 1061DR is a proprietary blend of cement, graded aggregate, shrinkage-compensating agents, set-control and dust reducing additives.

Compliances

- ASTM C 928

Test Data

The following results were obtained with a water / powder ratio of 5.5 pints (2.6 L) of water to 50 lbs (22.7 kg) of MasterEmaco T 1061 and MasterEmaco T 1061DR at 73 °F (23 °C).

PROPERTY	RESULTS	TEST METHOD
Fresh wet density, lb/ft³ (kg/m³)	130 (2,082)	ASTM C 138
Set time, min, at 72 °F (22 °C)		ASTM C 191
Initial	50	
Final	80	
Working time, min	25	
Length change, % (µstrain)		ASTM C 928
Drying shrinkage	-0.05 (-500)	
Wetting expansion	+0.03 (+300)	
Coefficient of thermal expansion, in/in/°F (cm/cm/°C)	6.8 x 10 ⁻⁶ (12.6 x 10 ⁻⁶)	CRD C 39
Modulus of elasticity, psi (GPa)	4.6 x 10 ⁶ (32)	ASTM C 469
Rapid chloride permeability, coulombs	< 300	ASTM C 1202
Freeze/thaw resistance, % RDM, at 300 cycles	100	ASTM C 666, (Procedure A)
Scaling resistance, at 25 cycles	0 rating; no scaling	ASTM C 672
Slant shear bond strength, psi (MPa)		ASTM C 882, modified ¹
1 day	2,300 (16)	
28 days	2,600 (18)	
Splitting tensile strength, psi (MPa)		ASTM C 496
1 day	400 (3)	
28 days	450 (3)	
Flexural strength, psi (MPa)		ASTM C 348
1 day	700 (5)	
28 days	850 (6)	
Compressive strength, psi (MPa), 2" cubes		ASTM C 109
3 hr	3,000 (21)	
1 day	4,000 (28)	
28 days	8,000 (55)	
Compressive strength, psi (MPa), 3 by 6" cylinders, at 28 days	7,400 (51)	ASTM C 39
Dust Reduction, %		
MasterEmaco T 1061DR vs. control	75%	DIN 55992-2

¹No bonding agent used; mortar scrubbed into substrate.

All application and performance values are typical for the material, but may vary with test methods, conditions, and configurations

MIXING

1. Precondition material to 70 °F ±5° (21 °C ±3°) before mixing.
2. Add 5½ pints (2.6 L) of potable water to the mixing container for each bag of MasterEmaco T 1061. If required, add the correct amount of aggregate to the mixer. Add the powder to the water while continuously mixing with a slow-speed drill and paddle, mortar mixer, or other forced action mixer.
3. Mix for a minimum of 3 minutes until fully homogeneous.

AGGREGATE EXTENSION

1. For repair areas 2–4" (51–102 mm) in depth, the minimum recommended addition is 15–25 lbs (6.8–11.4 kg) of ¾" (10 mm) washed, graded, rounded, SSD, low-absorption, high-density aggregate per 50 lb (22.6 kg) bag.
2. For areas greater than 4" (102 mm) in depth, the minimum recommended addition is 25–50 lbs (11.4–22.6 kg) of ¾" (10 mm) washed, graded, rounded, SSD, low-absorption, high-density aggregate per 50 lb bag.
3. The maximum aggregate extension is 50 lbs (22.6 kg) of pea gravel per bag.
4. Aggregate must comply with the requirements of ASTM C 33.

APPLICATION

1. After removing all standing water, thoroughly scrub a thin layer of bond coat into the saturated surface with a stiff-bristled broom or brush. Do not dilute the bond coat with water. Do not apply more of this bond coat than can be covered with mortar before the bond coat dries. Do not retemper the bond coat.
2. Immediately place the repair mortar from one side of the prepared area to the other. Work the material firmly into the bottom and sides of the patch to ensure good bond. Level the MasterEmaco T 1061 and screed it to the elevation of the existing concrete. Apply the appropriate finish.
3. Finish the completed repair, as required, taking care not to overwork the surface.
4. The recommended application range of MasterEmaco T 1061 is from 50 to 85 °F (10 to 29 °C). Follow ACI 305 and 306 for hot or cold weather.
5. A maximum of 25 minutes should be allowed to mix, place, and finish MasterEmaco T 1061 at 70 °F (21 °C).

CURING

Cure with an approved curing compound compliant with ASTM C 309 or preferably ASTM C 1315. Alternative curing options include application of a fine mist of water, wet burlap, or polyethylene sheeting for a minimum of 2 days.

CLEAN UP

Clean tools and equipment with clean water immediately after use. Cured material must be removed mechanically.

FOR BEST PERFORMANCE

- Minimum ambient, surface, and material temperature is 50 °F (10 °C) and rising.
- Do not mix longer than 5 minutes.
- Minimum application thickness is ½" (13 mm).
- Neat MasterEmaco T 1061 can be applied to a minimum of ¼" (6 mm) if intended for use under deck membranes on balconies subject to pedestrian traffic.
- Consult coating supplier for overcoating requirements.
- Do not mix partial bags.
- Do not add plasticizers, accelerators, retarders, or other additives.
- For professional use only; not for sale to or use by the general public.
- Make certain the most current versions of product data sheet and SDS are being used; visit www.master-builders-solutions.com/en-us to verify the most current versions.
- Proper application is the responsibility of the user. Field visits by Master Builders Solutions personnel are for the purpose of making technical recommendations only and not for supervising or providing quality control on the jobsite.

HEALTH, SAFETY AND ENVIRONMENTAL

Read, understand and follow all Safety Data Sheets and product label information for this product prior to use. The SDS can be obtained by visiting www.master-builders-solutions.com/en-us, e-mailing your request to mbsbcst@mbcc-group.com or calling 1(800)433-9517. Use only as directed.

IN CASE OF EMERGENCY: Call CHEMTEL +1 (800) 255-3924 or if outside the US or Canada, +1 (813) 248-0585.

LIMITED WARRANTY NOTICE

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MasterSeal[®] Vehicular Traffic 2500

High-solids polyurethane waterproofing, traffic-bearing membrane systems for vehicular areas

FORMERLY CONIPUR[®] II

PACKAGING

- MasterSeal P 255
 - 3.4-gallon (12.9 L) pail
 - 55-gallon (208.2 L) drums
- MasterSeal M 265
 - 4.66-gallon (17.64 L) pail
- MasterSeal TC 275
 - 4.78-gallon (18.1 L) unitized kit
- MasterSeal TC 295
 - Part A: 1.75 gallons (6.62 L) in 6-gallon (22.71 L) pail
 - Part B: 3.5-gallon (13.25 L) pail
- MasterSeal 941 Aggregate
 - 50-lb (22.68 KG) bag
- MasterSeal 941DR Aggregate
 - 50-lb (22.72 KG) bag
- MasterSeal 945 Aggregate
 - 40-lb (18.14 KG) bag

SHELF LIFE

- MasterSeal P 255: 1.25 years
- MasterSeal M 265: 1 year
- MasterSeal TC 275: 1.25 years
- MasterSeal TC 295: 1 year
- MasterSeal 941: 5 years
- MasterSeal 941DR: 5 years
- MasterSeal 945: 5 years

STORAGE

Store in unopened containers in a cool, clean, dry area

YIELD

See preferred MasterSeal Deck Coating Solution for total system yield.

COLORS

- TC 275: Grey, Charcoal & Black
- TC 295: Grey, Charcoal & Tint Base

DESCRIPTION

MasterSeal Vehicular Traffic 2500 is a fluid-applied polyurethane waterproofing system using a fast-setting, two-component reactive curing mechanism. It has very low odor and is VOC compliant.

MasterSeal Vehicular Traffic 2500 is composed of:

- MasterSeal P 255, a two-component, polyurethane-based adhesive primer
- MasterSeal M 265, a two-component, fast-curing polyurethane base coat
- MasterSeal TC 275 – a two-component fast curing aromatic polyurethane top coat
- MasterSeal TC 295 – a high performance, two-component, aliphatic, polyaspartic-modified, high solids, polyurethane waterproofing coating

For projects requiring aggregate, three options are available:

- MasterSeal 941, a hard-wearing, angular aggregate
- MasterSeal 941DR, an aggregate free of respirable crystalline silica
- MasterSeal 945, an aggregate free of respirable crystalline silica for integrated top coats

PRODUCT HIGHLIGHTS

- Two-component system provides faster setting times, even in cooler climates, to help reduce facility downtime
- MasterSeal 945 aggregate is pre-mixed with MasterSeal top coats to reduce labor and material costs
- MasterSeal 941DR aggregate is free of respirable crystalline silica
- Low odor/high solids allow MasterSeal Vehicular Traffic 2500 to be used over or near inhabited structures; Non-flammable and solvent-free
- Seamless waterproof membrane helps protect concrete from freeze/thaw damage; protects occupied spaces below from water damage and has no seams that may result in leaks
- Excellent chloride resistance to protect against chloride intrusion, extending the life of reinforcing steel
- Excellent chemical and chloride resistance helps protect against common parking deck chemicals including gasoline, diesel fuel, oil, alcohol, ethylene glycol, de-icing salt, bleach and cleaning agents as well as chloride intrusion
- Provides skid resistance to increase safety and offers excellent durability and superior abrasion resistance

INDUSTRIES/SECTORS

- Stadiums
- Parking Garages
- Commercial Construction
- Building and Restoration
- Plywood Decks

VOC CONTENT

When components are mixed, MasterSeal components have the following g/L VOC contents less water and exempt solvents:

- MasterSeal P 255 Part A: 10 g/L
- MasterSeal P 255 Part B: 13 g/L
- MasterSeal M 265 Part A: 4 g/L
- MasterSeal M 265 Part B: 5 g/L
- MasterSeal TC 275 Part A: 71 g/L
- MasterSeal TC 275 Part B: 13 g/L
- MasterSeal TC 295 Part A: 20 g/L
- MasterSeal TC 295 Part B: 174 g/L

Technical Data

Composition

MasterSeal Vehicular Traffic 2500 is a two-component polyurethane membrane.

Compliances

- CSA S413
- ASTM C 957



Issued to: BASF Corporation
Product: MasterSeal Traffic 2500

ASTM D 412: Tensile Strength of Top Coat
MasterSeal TC 275 Top Coat: Tensile Strength: 2,600 psi;
Elongation: 26%
MasterSeal TC 295 Top Coat: Tensile Strength: 3,200 psi;
Elongation: 410% Pass ✓

ASTM D 4541: Adhesion of Base Coat
MasterSeal M 265 w/ Primer P 255
Pull-off Adhesion: 400 psi + Pass ✓

ASTM D 4060: Abrasion Resistance of Top Coat
MasterSeal TC 275 Top Coat: Abrasion Resistance:
135 mgms loss – mgms loss/1,000 cycles
MasterSeal TC 295 Top Coat: Abrasion Resistance:
57 mgms loss – mgms loss/1,000 cycles Pass ✓

Validation Date: 3/1/18-2/28/23

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DECK COATING VALIDATION
www.swrionline.org

Test Data

PROPERTY	RESULTS				TEST METHOD
	P 255	M 265	TC 275	TC 295	
Solids					ASTM D 1259
By weight, %	99	99	99	90	
Viscosity, cps	630	3,400	1,600	2,500–4,000	ASTM D 2393

*Uncured material

Test Data

PROPERTY	RESULTS	SPECIFICATIONS	TEST METHOD
Crack bridging, MasterSeal M 265	Passes	No cracking	ASTM C 957
Adhesion peel, pli, Primer and Base Coat			ASTM C 957
Plywood	25	3	
Concrete	14	5	
Adhesion (Pull-off), psi	400	—	ASTM D 4541
MasterSeal P 255 / MasterSeal M 265			
Tensile strength, psi (MPa),			ASTM D 412
Base Coat	3,400 (23.4)	Control	
MasterSeal TC 275	3,000 (20.7)	Control	
MasterSeal TC 295	3,400 (23.4) /	Control	
Pre-pigmented / Tint Base	3,000 (20.7)		
Elongation, %,			ASTM D 412
Base Coat	900	Control	
MasterSeal TC 275	30	Control	
MasterSeal TC 295	340 / 390	Control	
Pre-pigmented / Tint Base			
Hardness, Shore A			ASTM D 2240
MasterSeal TC 275	94	—	
MasterSeal TC 295	94 / 90	—	
Pre-pigmented / Tint Base			
Taber abrasion resistance, mgms;	100	—	ASTM D 4060
CS-17 Wheel, 1,000 g load, 1,000 cycles, MasterSeal P 255 / M 265 / TC 275			
Taber abrasion resistance, mgms;	47	—	ASTM D 4060
CS-17 Wheel, 1,000 g load, 1,000 cycles, MasterSeal P 255 / M 265 / TC 275			

Test results are averages obtained under laboratory conditions. Reasonable variations can be expected.

MasterSeal Aggregates

PROPERTY	941 RESULTS	941 DR RESULTS	945 RESULTS
Color	Gray	Green to Gray	Green to Gray
Compressive Strength	28,000 psi		
Hardness	6–6.5 Mohns	7 Mohns	7 Mohns
Specific Gravity	2.90 g/cc	3.3 g/cc	3.3 g/cc
Bulk Density	102 pcf	85 to 105 pcf	85 to 105 pcf
US SIEVE SIZE	% RETAINED ON SIEVE		
#6			
#12	71	2–10	
#16	23	10–30	
20	2	20–35	
30	1	20–40	0–3
40	0	7–22	10–25

HOW TO APPLY

SURFACE PREPARATION CONCRETE

1. Concrete must be fully cured (28 days), structurally sound, clean and dry (ASTM D 4263). All concrete surfaces (new and old) must be shot blasted to remove previous coatings, laitance and all miscellaneous surface contamination and to provide profile for proper adhesion. Abrasive shot blasting must occur after concrete repair has taken place. Acid-etching is not permitted. Proper profile should be a minimum of ICRI CSP-3 (as described in ICRI document 03732.) For balconies and other pedestrian areas with limited space or access for shot-blasting, alternative mechanical methods can be used to achieve the recommended surface profile.
2. Repair voids and delaminated areas with Master Builders Solutions branded cementitious and epoxy patching materials. For application when fastturn repairs are required, MasterSeal 350 can be used to repair patches up to 1.5" in depth when used in aggregate slurry mix. Please refer to the MasterSeal 350 Technical Data Guide for proper application techniques.
3. All units must be applied within the specified pot life.

SURFACE PRE-STRIPPING AND DETAILING

1. Pre-stripe with MasterSeal P 255 1" (25 mm) beyond all surfaces that require detail work, using a short-nap roller. Just before application of MasterSeal P 255, remove all dust, dirt and contaminants. Allow MasterSeal P 255 to dry tack-free. On the same day, coat primed surfaces with 25–30 wet mils (0.64–0.77 mm) of MasterSeal M 265. Feather the edges.
2. For non-moving joints and cracks less than 1/16" (1.6 mm) wide, apply 25–30" wet mils (0.64–0.77 mm) pre-stripping of MasterSeal M 265 over cured MasterSeal P 255. Apply the Base Coat to fill and overlap the joint or crack 3" (76 mm) on each side. Feather the edges.
3. Dynamic cracks and joints over 1/16" (1.6 mm) wide must be routed to a minimum of 1/4 by 1/4" (6 by 6 mm) and cleaned. Install bond breaker tape to prevent adhesion to bottom of joint.

Prime joint faces only with MasterSeal P 173 and fill with MasterSeal SL 1™, SL 2™, NP1™ or NP2™. For joints deeper than 1/4" (6 mm), use appropriate backer rod. For cracks, sealant should be flush with the adjacent surface. For expansion joints, sealant should be slightly concave. After the sealant has cured, prime the deck on either side of the sealant with MasterSeal P 255. After the P 255 primer is tack free, apply 25–30 wet mils (0.64–0.77 mm) of MasterSeal M 265 pre-stripping over the cured sealant and MasterSeal P 255, overlap the joint 3" (76 mm) on each side.

4. Sealed joints 1" (25 mm) wide or less can be coated over with the MasterSeal Traffic system. Expansion joints exceeding 1" (25 mm) wide, including the primary wide expansion-joint system, are not to be coated so they can perform independently of the deck coating system.
5. Form a sealant cant into the corner at the junction of all horizontal and vertical surfaces (wall sections, curbs, columns) by priming with MasterSeal P 173 and applying a 1" (25 mm) wide bead of MasterSeal NP 1 or MasterSeal NP 2. Tool to form a 45° cant. Apply masking tape to the vertical surfaces 4–5" (102–127 mm) above the sealant cant to provide a clean termination of the vertical detail coat. After the sealant has cured, prime the deck on either side of the sealant with MasterSeal P 255. Apply 25 wet mils (0.64 mm) of MasterSeal M 265 over the cured cant up to the masking tape and 4" (102 mm) onto deck surface.
6. Where the coating system will be terminated and no wall, joint, or other appropriate break exists, cut a 1/4 by 1/4" (6 by 6 mm) keyway into the concrete. Fill and coat keyway during application of MasterSeal M 265.

UNCOATED METAL SURFACES

Remove dust, debris, and any other contaminants from vent, drain pipe, and post penetrations, reglets and other metal surfaces. Clean surfaces to near white per SSPC-NACE2 and prime immediately with MasterSeal P 173. Provide appropriate cant with MasterSeal NP 1 or MasterSeal NP 2 sealants to eliminate 90° angles.

PLYWOOD

1. All plywood must be smooth-faced, APA-stamped, and exterior grade tongue and groove plywood. Construction must conform to code, but plywood must not be less than 23/32" (18 mm) thick. Plywood spacing and deck construction must follow APA guidelines.
2. Surfaces must be free of contaminants. Priming is not necessary on clean, dry plywood.
3. All seams must be caulked with MasterSeal NP 1 or MasterSeal NP 2 sealants (see Form Nos. 1017906 and 1017911). Prestripe 4–6" (102–152 mm) wide with 25 wet mils (0.6 mm) of Base Coat. Reinforce all seams between plywood sheets and between flashing and the plywood deck by embedding MasterSeal 995 into the pre-stripping.

HOW TO APPLY

COLOR – MasterSeal TC 295 Tint Base

1. All of the 40 standard colors from the MasterSeal Color Portfolio require the use of 2 MasterSeal 900 color packs per 5.25-gallon pail of MasterSeal TC 295 Tint Base.
2. A second aesthetic Top Coat of 10–15 wet mils (0.2–0.4 mm) is required with all Tint Base colors to achieve a uniform appearance.

MIXING – MasterSeal P 255

1. Precondition both A and B components to a temperature of approximately 70 °F (21 °C).
2. Add entire contents of Part A into Part B. Mix components with a slow-speed drill (400–600 rpm, for a minimum of 3 minutes. Scrape down sides and bottom of mixing vessel, then mix again for 2 minutes. Keep the mixing paddle submerged during mixing to avoid adding air into the mixture.

MIXING – MasterSeal M 265

1. Precondition both A and B components to a temperature of approximately 70 °F (21 °C).
2. Add entire contents of Part A into Part B. Mix components with a slow-speed drill (400–600 rpm, for a minimum of 3 minutes. Scrape down sides and bottom of mixing vessel, then mix again for 2 minutes. Keep the mixing paddle submerged during mixing to avoid adding air into the mixture.

MIXING – MasterSeal TC 275 / 295 (Pre-Pigmented)

1. Precondition both A and B components to a temperature of approximately 70 °F (21 °C).
2. Add entire contents of Part A into Part B. Mix components with a slow-speed drill (400–600) rpm, for a minimum of 3 minutes. Scrape down sides and bottom of mixing vessel, then mix again for 2 minutes. Keep the mixing paddle submerged during mixing to avoid adding air into the mixture.

MIXING – TC 295 Tint Base

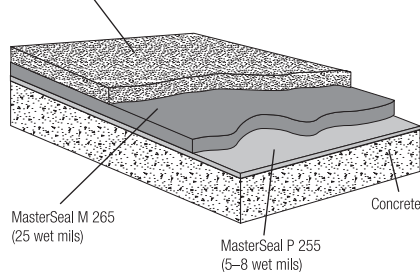
1. Precondition both A and B components to a temperature of approximately 70 °F (21 °C).
2. Add entire contents of Part B into Part A. Mix components with a slow-speed drill (400–600) rpm, for a minimum of 3 minutes.
3. Transfer entire contents of two (2) pigment cans into MasterSeal TC 295 Tint Base mixed kit. Use a spatula or knife to remove all the pigment from the container. The TC 295 Tint Base Top Coat requires two (2) MasterSeal 900 color paks per 5.25-gallon pail.
4. Scrape down sides and bottom of mixing vessel, then mix again for 2–3 minutes. Keep the mixing paddle submerged during mixing to avoid adding air into the mixture.
5. To ensure consistent color throughout the pail, pour contents into separate container and continue mixing until all Tint Base has dispersed.
6. When using multiple units, all units must be boxed to ensure color consistency.

APPLICATION

MasterSeal Vehicular Traffic 2500 can be installed in several configurations, depending upon the degree of traffic to which the system is exposed. In areas of extreme traffic (turning lanes, pay booths, entrances and exits), apply the Extra Heavy-Duty Traffic System. The following summary briefly describes each configuration. All coverage rates are approximate.

LIGHT TO MEDIUM DUTY TRAFFIC AND PARKING STALLS

MasterSeal TC 275 or TC 295 (15–20 wet mils) with MasterSeal 941/941D or equivalent broadcast and backrolled into the wet top coat



LIGHT-MEDIUM TRAFFIC AND PARKING STALLS

1. Apply MasterSeal P 255 with paint roller or squeegee at a rate of 200–300 ft²/gal.
2. Apply 25 wet mils (0.64 mm) of MasterSeal M 265 with proper notched squeegee at the rate of approximately 55–60 ft²/gal (1.35–1.47 m²/L). Allow base coat to cure 3–4 hours.
3. Apply 15–20 wet mils (0.38–0.51 mm) of MasterSeal TC 275/TC 295 at the rate of 80–100 ft²/gal (1.96–2.45 m²/L).

4A. BROADCAST AND BACKROLL METHOD

Immediately broadcast MasterSeal 941/941DR aggregate or 16–30 mesh, rounded silica sand at the rate of 15–20 lbs/100 ft² (0.75–1.0 kg/m²) into TC275/TC295 and backroll to encapsulate.

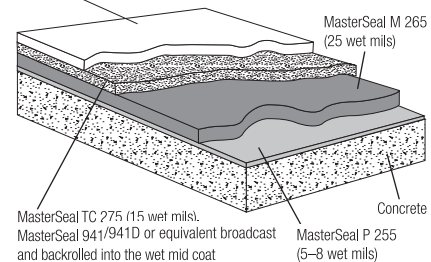
4B. INTEGRATED AGGREGATE

After mixing the top coat per instructions, pour half of the mixed material into a second pail. Add 20 lbs of MasterSeal 945 aggregate to one half of the mixed material (2.4 gallons of TC 275 and 2.63 gallons of TC 295). Mix for an additional 3 minutes for uniform consistency. Apply the topcoat at 20 wet mils or 80 sf/gallon with 1/8" notch squeegee. Fully saturate the roller. Backroll with 3/8" nap roller, roll in a crosshatch pattern for equal distribution of aggregate. Repeat for second half of top coat. For vehicular use, a second coat is required. Pail will need to be remixed for 2 minutes after 10 minutes of idle sitting to redistribute the aggregate.

5. Allow minimum curing time of 24–48 hours before allowing vehicular traffic onto the coating. Existing environmental conditions effect the allowable time period.

HEAVY DUTY TRAFFIC SYSTEM

MasterSeal TC 275 or TC 295 at 15–20 wet mils



HEAVY DUTY TRAFFIC SYSTEM

1. Apply MasterSeal P 255 with paint roller or squeegee at a rate of 200–300 ft²/gal.
2. Apply 25 wet mils (0.64 mm) of MasterSeal M 265 with proper notched squeegee at the rate of approximately 55–60 ft²/gal (1.35–1.47 m²/L). Allow base coat to cure 3–4 hours.
3. Apply 12–20 wet mils (0.30–0.51 mm) of MasterSeal TC 275/TC 295 intermediate topcoat using a properly notched squeegee at the rate of approximately 80–130 ft²/gal (1.96–3.19 m²/L). Immediately back roll to evenly level Top Coat. The next step, #4, can utilize either method described in 4A or 4B.

4A. AGGREGATE TO REFUSAL METHOD

Immediately broadcast MasterSeal 941/941DR or equivalent 16–30 mesh, rounded silica sand into the wet coating at the rate of 20–30 lbs per 100 ft² (1.0–1.5 kg/m²). Immediately after the aggregate is broadcast and while the coating is still wet, blow any excess aggregate via a portable blower forward into the wet coating. Do not overapply aggregate; it is acceptable to have localized wet spots in the aggregate surface after completion of this method. This process requires coordination between all members in the work crew. The blower operator, wearing clean spiked shoes, should blow the excess aggregate forward towards the freshly applied and backrolled topcoat. In this method, the coating should not accept additional sand, minimal excess aggregate is on the surface, less aggregate is used and the textured appearance should be fairly uniform.

4B. BROADCAST AND BACKROLL METHOD

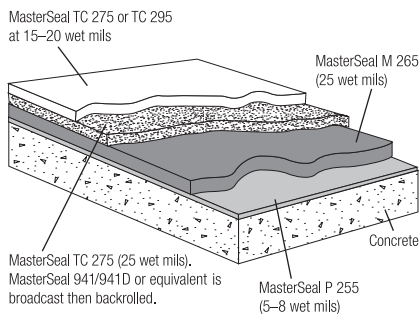
Immediately broadcast MasterSeal 941/941DR or equivalent 16–30 mesh, rounded silica sand into the wet coating and backroll to encapsulate the aggregate. Evenly broadcast aggregate at the rate of 15–20 lbs/100ft² (0.75–1.00 kg/m²).

4C. INTEGRATED AGGREGATE

The integrated MasterSeal 945 aggregate is NOT intended for use in heavy-duty traffic systems.

5. Remove all excess or loose aggregate by sweeping or vacuuming
6. Ensure there is no moisture on the surface of the aggregate/membrane before application of topcoat. Apply 15–25 wet mils (0.38–0.64 mm) of MasterSeal TC275/295 at the rate of 60–100 ft²/gal (1.47–2.21 m²/L) using a flat squeegee. Immediately back roll to evenly level topcoat.
7. Immediately broadcast MasterSeal 941/941DR or equivalent at the rate of 3–5 lbs/100 ft² (0.15–0.25 kg/m²). Lightly backroll into top coat.
8. Allow minimum curing time of 24–48 hours before allowing vehicular traffic onto the coating. Existing environmental conditions effect the allowable time period.

EXTRA HEAVY-DUTY TRAFFIC SYSTEM



EXTRA HEAVY TRAFFIC SYSTEM

1. Apply MasterSeal P 255 with paint roller or squeegee at a rate of 200–300 ft²/gal.
 2. Apply 25 wet mils (0.64 mm) of MasterSeal M 265 with a proper notched squeegee at the rate of approximately 55–60 ft²/gal (1.35–1.47 m²/L). Immediately backroll to level base coat. Allow base coat to cure 3–4 hours.
 3. Apply 25 wet mils (6.4 mm) of MasterSeal TC 275/TC 295 intermediate topcoat using a properly notched squeegee at the rate of approximately 55–60 ft²/gal (1.35–1.47 m²/L). Immediately backroll to evenly level topcoat. The next step, #4, can utilize either method described in 4A or 4B.
- 4A. AGGREGATE TO REFUSAL METHOD
Immediately broadcast MasterSeal 941/941DR or equivalent 16–30 mesh, rounded silica

sand into the wet coating at the rate of 20–35 lbs/100 ft² –1.0–1.75 kg/m²). Immediately after the aggregate broadcast and while the coating is still wet, blow any excess aggregate via a portable blower forward into the wet coating. Do not over apply aggregate; it is acceptable to have localized wet spots in the aggregate surface after completion of this method.

This process requires coordination between all members in the work crew. The blower operator, wearing clean spiked shoes, should blow the excess aggregate forward towards the freshly applied and backrolled topcoat. In this method, the coating should not accept additional sand, minimal excess aggregate is on the surface, less aggregate is used and the textured appearance should be fairly uniform.

4B. BROADCAST AND BACKROLL METHOD
Immediately broadcast MasterSeal 941/941DR or equivalent 16–30 mesh rounded silica sand into the wet coating and backroll to encapsulate the aggregate. Evenly broadcast aggregate at the rate of 15–25 lbs/100 ft²/gal (0.75–1.25 kg/m²).

4C. INTEGRATED AGGREGATE

The integrated MasterSeal 945 aggregate is NOT intended for use in extra heavy-duty traffic systems.

5. Remove all excess or loose aggregate by sweeping or vacuuming.
6. Ensure there is no moisture on the surface of the aggregate/membrane before application of topcoat. Apply 15–25 wet mils (0.38–0.64 mm) of MasterSeal TC275/295 at the rate of 60–100 ft²/gal (1.46–2.21 m²/L) using a flat squeegee. Immediately backroll to evenly level topcoat.
7. Immediately broadcast MasterSeal 941/941DR or equivalent at the rate of 3–5 lbs/100 ft² (0.15–0.25 kg/m²). Lightly backroll into top coat.
8. Allow minimum curing time of 24–48 hours before allowing vehicular traffic onto the coating. Existing environmental conditions effect the allowable time period.
9. CAD & PDF deck coatings details are available for download from our website, Master Builders Solutions Customer Support can direct you to the site.

IMPORTANT NOTE: All coverage rates are approximate and may vary due to the application technique used. Coverage rates are affected by substrate texture, choice and distribution of aggregate, intermediate

aggregate load and environmental conditions and application methods and are not under the control of Master Builders Solutions. Ensure that an adequate amount of aggregate is utilized to achieve required slip resistance. Exterior applications must utilize MasterSeal TC 295 at the specified coverage rate of 15–20 wet mils.

MOCKUP

1. Provide mockup of at least 100 ft² (9.3 m²) to include surface profile, sealant joint, crack, flashing and juncture details and allow for evaluation of slip resistance and appearance.
2. Install mockup with specified coating types and with other components noted.
3. Locate where directed by architect.
4. Mockup may remain as part of work if acceptable to architect.

CLEAN UP

Clean all tools and equipment immediately after use with MasterSeal 990 or xylene. Cured material must be removed mechanically.

CURING TIME

Allow curing time of 72 hours before vehicular use and 48 hours before pedestrian use. Extend the curing time in cool-weather conditions. To reduce the time period in which MasterSeal Traffic 2000 might be vulnerable to inclement weather or to reduce the time between coats, use MasterSeal 914.

MAINTENANCE

See MasterSeal Traffic maintenance technical bulletin.

FOR BEST PERFORMANCE

- MasterSeal NP 100 and MasterSeal NP150 should not be used in conjunction with this urethane deck coating system due to potential for curing issues.
- If vapor drive is present or suspected, please consult with your local Master Builders Solutions representative prior to system application.
- MasterSeal P 255, M 265 and TC 275 or TC 295 have very short working times (20 min ± 5) (at 70° F 50% RH). Once the material has been mixed, the coating must be poured onto the surface and applied immediately.

- MasterSeal TC 275 will discolor if exposed to UV light. Where UV resistance is required, the application of TC 295 is recommended.
- Minimum application temperature is 40 °F (4 °C).
- If areas of inadequate slip resistance exist, an additional top coat back rolled with aggregate is required.
- Do not apply to concrete that is outgassing.
- Warm temperatures will shorten working time; plan work accordingly.
- Concrete should have a minimum compressive strength of 3,000 psi (21 MPa) and be cured for a minimum of 28 days.
- Do not apply MasterSeal Vehicular Traffic 2500 to concrete slabs on grade, unvented metal pan decks or split slab applications with a waterproofing membrane between slabs. Contact Master Builders Solutions Technical Services.
- Be sure to allow for movement in the deck by the proper design and use of expansion and control joints.
- Select the proper type and amount of aggregate to achieve desired slip resistance.
- Contact Technical Service when substrates are over 90 °F (32 °C) or under 40 °F (4 °C) or when applying to decks containing between slab membranes.
- The best method to ensure the proper wet film thickness is the use of a grid system. Divide the surface to be coated into grids and calculate the square footage of each. Refer to the coverage chart to determine the quantity of coating needed for each grid to arrive at the required mil thicknesses. For example, one pail of MasterSeal M265 should cover approximately 255–280 ft² or a minimum grid of 16 x 16 ft at 25 wet mils. Verify via site mockup.
- Avoid application when inclement weather is present or imminent.
- Do not apply to damp, wet, or contaminated surfaces.
- Not suitable for use where chained or metalstudded tires will be used.
- Proper application is the responsibility of the user. Field visits by Master Builders Solutions personnel are for the purpose of making technical recommendations only and not for supervising or providing quality control on the jobsite.

- CAD & PDF deck coatings details are available for download from our website, Master Builders Solutions Customer Support can direct you to the site.
- On steep ramps in excess of 15%, contact your local Master Builders Solutions representative. Do not use self-leveling grade product on slopes greater than 15%. Do not coat expansion joints over 1" (25 mm) wide.
- Do not apply use pre-mixed, integrated MasterSeal 945 aggregate in heavy- or extra heavy-duty vehicular applications.

FOR BEST PERFORMANCE: TC 295 TINT BASE ONLY

- Avoid whipping air into Tint Base.
- Mix pigment cans thoroughly into Tint Base.
- Always do a test area to assure acceptable color appearance and slip resistance.
- Do not apply MasterSeal TC 295 Tint Base heavier than the recommended 15–20 mil (0.38–0.51 mm) application.
- Colors exposed to direct sunlight may fade over a period of time. Darker colors potentially fade at an increased rate.
- Aggregate and substrate conditions may affect color and appearance.

HEALTH, SAFETY AND ENVIRONMENTAL

Read, understand and follow all Safety Data Sheets and product label information for this product prior to use. The SDS can be obtained by visiting www.master-builders-solutions.com/en-us, e-mailing your request to mbsbcst@mbcc-group.com or calling 1(800)433-9517. Use only as directed.

IN CASE OF EMERGENCY: Call CHEMTEL +1 (800) 255-3924 or if outside the US or Canada, +1 (813) 248-0585.

LIMITED WARRANTY NOTICE

Master Builders Solutions Construction Systems US, LLC ("Master Builders") warrants this product to be free from manufacturing defects and to meet the technical properties on the current Technical Data Guide, if used as directed within shelf life. Satisfactory results depend not only on quality products but also upon many factors beyond our control.

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MasterSeal[®] 350

Rapid-setting, epoxy-based concrete overlay system

FORMERLY TRAFICGUARD[®] EP35

PACKAGING

- 10 gallon (38 L) kits
- 110 gallon (412 L) kits
- 530 gallon (2006 L) kits

YIELD

Parking Decks: 40 - 60 ft²/gallon
(1.0 - 1.5 m²/L), depending on porosity
and profile of substrate

Bridge Decks: 20 - 40 ft²/gallon
(0.5 - 1.0 m²/L), depending on porosity
and profile of substrate

80 ft²/gallon (1.96 m²/L) as a primer
for epoxy binder

Binder yield varies depending on mix
ratio (aggregate to epoxy) and
aggregate size and gradation.

Mortar Mix Yield: A ratio of
3 GAL Sand + 1 GAL mixed
MasterSeal 350 = 2.8 GAL
mortar mix (650 in³)

STORAGE

Store in unopened containers at 60–
80 °F (16–27 °C) in clean, dry conditions.

SHELF LIFE

2 years when properly stored

VOC CONTENT

0 g/L less water and exempt solvents
when components are mixed and
applied per Master Builders Solutions
instructions

DESCRIPTION

MasterSeal 350 is a rapid-curing, skid-resistant, epoxy-based concrete overlay system. When mixed with aggregate it can be used as a repair mortar.

PRODUCT HIGHLIGHTS

- MasterSeal 940 DR aggregate is free of respirable crystalline silica
- Rapid strength development helps minimize traffic disruption
- Waterproof to prevent chloride ion contamination, freeze-thaw damage and salt scaling
- 90% lighter than typical concrete overlays to limit dead load in suspended structures
- Excellent adhesion to the substrate to prevent delamination and extend surface life
- Skid resistant increasing safety for vehicles and pedestrians
- One to one mix ratio by volume simplifies application
- Durable surface extends service life
- No primer required for faster installation
- 100% solids

APPLICATIONS

- Horizontal surfaces
- Interior and exterior
- Bridge decks
- Steel decks
- Warehouse floors
- Elevated airport runways
- Balconies
- Concrete
- Steel

INDUSTRIES/SECTORS

- Parking structures

HOW TO APPLY

SURFACE PREPARATION

UNCOATED METAL SURFACES
Remove dust, debris and any other
contaminants from vent, drain pipe and post
penetrations, reglets and other metal surfaces.
Clean surfaces to near white per SSPC-NACE2.

CONCRETE

1. Concrete must be fully cured (28 days), structurally sound, clean and dry (ASTM D 4263). All concrete surfaces (new and old) must be shot blasted to remove previous coatings, laitance and all miscellaneous surface contamination and to provide profile for proper adhesion. Abrasive shot blasting must occur after concrete repair has taken place. Acid-etching is not permitted. Proper profile should be a minimum of ICRI CSP-5 (as described in ICRI document 03732.)
2. Repair voids and delaminated areas with Master Builders Solutions branded cementitious and epoxy patching materials. For application when fast-turn repairs are required, MasterSeal 350 can be used to repair patches up to 1.5" in depth when used in aggregate slurry mix. Please refer to the MasterSeal 350 Technical Data Guide for proper application techniques.
3. All units must be applied within the specified pot life.

Technical Data

Composition

MasterSeal 350 is a two component epoxy-based binder.

Compliances

- ASTM C 881

Test Data

PROPERTY	RESULTS	TEST METHOD
Mix ratio , by volume	1 to 1	
Viscosity, poise , at 75 °F (24 °C); #3 spindle at 20 rpm	20–25	ASTM D 2393
Gel time , min, at 72 °F (22 °C); (Modified to test 70 g sample)	15–20	ASTM C 881
Compressive strength , psi (MPa)		ASTM D 695
24 hrs	4,000–4,500	
7 days	6,500–7,000	
Compressive strength , psi (MPa) Mixed with aggregate		ASTM C 579
3 hrs	3,000–3,500	
24 hrs	5,000–5,500	
Modulus of Elasticity in Compression , psi (MPa)	1.21 x 10 ⁶ (834)	ASTM C 695
Tensile strength , psi (MPa), at 7 days	6,525	ASTM D 638
Tensile elongation , %, at 7 days	>30	ASTM D 638
Adhesion Pull Test 24 hrs	>536 psi (break in concrete)	ASTM D 7234 (ACI 503 Appendix A)
Hardness Shore D @ 7 days	62	ASTM D 2240
Abrasion - Taber 1000 cycles - CS 17 wheel	70 mg (neat) 77 mg (with aggregate)	ASTM D 4060
Thermal compatibility , 5 cycles Modified: 8 hours @ 60 °C plus 16 Hours @ -21 °C	Pass	ASTM C 884
Water absorption , % 24 hrs	0.02	ASTM D 570
Rapid Chloride Permeability Chloride ion penetration @ 28 days	0 negligible	ASTM C1202 (AASHTO T277)

All application and performance values are typical for the material, but may vary with test methods, conditions, and configurations.

MIXING

1. Thoroughly mix each separate component for 2–3 minutes.
2. Mix Part A (resin) and Part B (hardener) in the proper ratio (1:1 by volume), using a slow-speed drill (500 rpm) and paddle for 2–3 minutes.
3. Because of the quick cure rate of this product, do not mix more material than can be applied within the pot life of 15–25 minutes at 75°F (24°C). Elevated temperatures decrease pot life, and reduced temperatures increase pot life.
4. The maximum recoat window for additional coats of MasterSeal 350 is 24 hours.

BROADCAST-AGGREGATE METHOD PARKING DECKS

1. Spread the mixed MasterSeal 350 onto the substrate with a notched squeegee at a rate of 60 ft²/gallon (1.0 m²/L). Place the epoxy to permit a continuous operation by applying the second mix immediately behind the first mix.
2. Begin the aggregate broadcast immediately, but stop to maintain a wet edge. Broadcast MasterSeal 940 Aggregate #9 or 940 DR Aggregate to complete saturation (approximately 1.1 lb/ft² (5.4 kg/m²). If wet spots develop, immediately broadcast additional aggregate until a dry surface is reestablished.
3. Apply the second coat in the same manner described above at a rate of 40–60 ft²/gal. The maximum recoat window is 24 hours.

BRIDGE DECKS

1. Spread the mixed MasterSeal 350 onto the substrate with a notched squeegee at a rate of 40 ft²/gal (1.0 m²/L) or 2.5 gallons per 100 ft². Place the epoxy to permit a continuous operation by applying the second mix immediately behind the first mix.
2. Begin the aggregate broadcast immediately, but stop to maintain a wet edge. Broadcast MasterSeal 940 Aggregate #9 or 940 DR Aggregate to complete saturation (approximately 1.1 lb/ft² (5.4 kg/m²). If wet spots develop, immediately broadcast additional aggregate until a dry surface is reestablished.
3. Apply the second coat in the same matter but at a rate of 20 ft²/gal (.05 m²/L) or 80 mils. The maximum recoat window is 24 hours.

EPOXY MORTAR

1. Mix the two components of MasterSeal 350 using the recommended procedures under the Mixing section.
2. Slowly add up to five parts by volume of oven-dried sand to one part of mixed epoxy.
3. For larger applications, a paddle-type (mortar) mixer may be used. However, the A and B components must first be mixed together using a slow-speed drill as outlined previously.
4. Prime the area to receive the epoxy mortar using neat resin (parts A and B mixed but with no aggregate). Some applications, e.g., paving dams, will require forming to prevent the material from slumping into the joint.
5. Place the epoxy mortar into the repair area and level with a trowel or float. Excess working of the surface will bring resin to the top, which will create a slick finish when cured. To prevent this, broadcast aggregate to refusal onto leveled surface.
6. Allow time for sufficient curing before removing forms, if applicable.
7. When using the MasterSeal 350 as a binder in this method, the mortar should be placed at no more than 1½" maximum depth.
8. Allow a minimum cure time of 6 hrs at 70°F (21°C). for MasterSeal 350 before allowing vehicular traffic.

AGGREGATE

MasterSeal 940/940 DR Aggregate is recommended with MasterSeal 350 polymer concrete overlay. MasterSeal 940/940 DR Aggregate is a hard-wearing, angular, dark-gray aggregate.

MasterSeal 940 Aggregate #9 is a coarse aggregate.

Alternatively, an angular shaped silica or basalt aggregate may be used. The aggregate shall be an angular-shaped silica with Mohs scale hardness of 7 or greater or basalt with a hardness of 6 or greater. The alternate aggregate must be clean, dry (less than 0.2% moisture), and conform to the following gradation.

PERCENT, BY WEIGHT, PASSING IN INDICATED
U.S. STANDARD-SIEVE SERIES

COARSE AGGREGATE				
Sieve #	4	8	16	30
% Passing	100	30–75	0–5	0–1

CLEANUP

Cleanup tools with xylene immediately after use.

FOR BEST PERFORMANCE

- Minimum application temperature is 50 °F (10 °C) and rising. Contact Technical Service when temperatures are above 90 °F (32 °C)
- Precondition all components to 70 °F (21 °C) for 24 hours before using.
- Do not apply when rain is expected within 12 hours.
- Finished product is a vapor barrier and should not be applied to on-grade slabs subject to exterior service conditions or other structures where moisture-vapor transmission is a concern.
- Do not use neat (without aggregate).
- Proper application is the responsibility of the user. Field visits by Master Builders Solutions personnel are for the purpose of making technical recommendations only and not for supervising or providing quality control on the jobsite.
- The MasterSeal 350 topcoat is a rigid epoxy material and may crack due to substrate flex and movement under the membrane system. Do not install it over moving joints.

HEALTH, SAFETY AND ENVIRONMENTAL

Read, understand and follow all Safety Data Sheets and product label information for this product prior to use. The SDS can be obtained by visiting www.master-builders-solutions.com/en-us, e-mailing your request to mbsbscst@mbcc-group.com or calling 1(800)433-9517. Use only as directed.

IN CASE OF EMERGENCY: Call CHEMTEL +1 (800) 255-3924 or if outside the US or Canada, +1 (813) 248-0585.

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MasterSeal® NP 2™

Multi-component high performance polyurethane sealant

FORMERLY SONOLASTIC® NP 2™

PACKAGING

- 11/2 gallon units in 2 gallon (5.67 L) pails
- 3 gallon unit in 31/2 gallon (11.3 L) pails

Available in pre-tinted colors:
Precast Gray and Limestone

COLORS

40 standard, stocked colors are available. Refer to Master Builders Solutions Color Portfolio for additional colors.

YIELD

See page 3 for charts

STORAGE

Store in unopened containers in a cool, clean, dry area. Do not open containers until ready for use.

SHELF LIFE

PARTS A AND B

1 year when properly stored

MASTERSEAL 900 COLOR PACKS

5.5 years

MIXED VOC CONTENT

When mixed, product contains less than 19 g/L less water and exempt solvents

DESCRIPTION

MasterSeal NP 2 is a multi-component, highly flexible, non-priming, high performance polyurethane sealant. It has been successfully tested for joint movement of 50%. It can be tinted to multiple colors.

PRODUCT HIGHLIGHTS

- Movement capability of 50% adds protection against unanticipated movement
- Weather resistant for long-lasting weathertight seals
- Easy to gun and tool to speed up application and make neater joints
- MasterSeal 905 accelerator available for use in cold climate applications to help speed initial cure
- No primer required for most construction materials, lowering installation costs
- Wide temperature application range makes MasterSeal NP 2 suitable for all climates
- UL listed; Passes 4-hour, 4-inch, fire and hose stream test when used with Ultra Block or mineral wool
- Suitable for water immersion with documented performance in wet areas
- Chemical cure allows for faster turnaround time
- Bulk packaging results in less waste
- Long pot life provides extended working time
- Formulated to withstand pedestrian and vehicular traffic

APPLICATIONS

- Interior and exterior
- Above and below grade
- Immersed in water
- Expansion joints
- Panel walls
- Precast units
- Aluminum and wood window frames
- Roofing
- Fascia
- Parapets
- Vinyl siding
- Store front assemblies
- Parking structures

HOW TO APPLY

JOINT PREPARATION

1. The product may be used in sealant joints designed in accordance with SWR Institute's Sealants - The Professional's Guide.
2. In optimal conditions, the depth of the sealant should be ½ the width of the joint. The sealant joint depth (measured at the center) should always fall between the maximum depth of ½" and the minimum depth of ¼". Maximum recommended joint width is 3". Refer to Table 1.

Technical Data

Composition

MasterSeal NP2 is a multi-component polyurethane product.

Compliances

- ASTM C 920, Type M, Grade NS, Class 25, use NT, T, A, M, O* and I
- Federal Specification TT-S-00227E, Type II, Class A
- Corps of Engineers CRD-C-506
- Canadian Standards Board CAN/CGSB-19.24-M90, Classification MCG-2-40-A-N, No. 81029
- CFI accepted
- Underwriters Laboratories Inc.® classified (fire resistance only).

* Refer to substrates in Where to Use.

Typical Properties

PROPERTY	VALUE
Temperature range, °F (°C)	-40 to 180 (-40 to 82)
Shrinkage	None

Test Data

PROPERTY	RESULTS	TEST METHOD
Movement capability, %	50%	ASTM C 719
Tensile strength, psi (MPa)	160 (1.1)	ASTM D 412
Ultimate elongation at break, %	280	ASTM D 412
Stain and color change	Passes (no visible stain)	ASTM C 510
Extrusion rate, sec, 3 hrs after mixing	6 Passes	ASTM C 603
Rheological (flow), at 120 °F (49 °C)	Nonsag	ASTM C 639
Hardness, Shore A		ASTM C 661
At standard conditions	25	
After heat aging (max Shore A:50)	22	
Tack-free time, hrs, (maximum 72 hrs)	< 48 hours	ASTM C 679
Bond durability*, %, on aluminum and concrete	Passes	ASTM C 719
Weight loss, after heat aging, %	4.7	ASTM C 792
Cracking and chalking, after heat aging	None	ASTM C 792
Artificial weathering, Xenon arc, 250 hours	Passes	ASTM C 793
Artificial weathering, Xenon arc, 2,000 hours	No surface cracking	ASTM G 26
Adhesion in peel, on aluminum and concrete*, pli	> 10	ASTM C 794
Water immersion, 122 °F (50 °C)	Passes 10 weeks with movement cycle	ASTM C 1247

*Primed for water immersion dictated by ASTM C 920. Concrete and aluminum primed with MasterSeal P 173; glass primed with MasterSeal P 176

Test results are typical values obtained under laboratory conditions. Reasonable variations can be expected.

TABLE 1
Joint Width and Sealant Depth

JOINT WIDTH, IN (MM)	SEALANT DEPTH AT MIDPOINT, IN (MM)
1/4–1/2 (6–13)	1/4 (6)
1/2–3/4 (13–19)	1/4–3/8 (6–10)
3/4–1 (19–25)	3/8–1/2 (10–13)
1–3 (25–75)	1/2 (13)

TABLE 2
Working Time, hours

	STANDARD CONDITIONS 73 °F (23 °C) 50% RH	HIGHER TEMPERATURE 95 °F (35 °C), 5 – 90% RH	COLDER TEMPERATURE 40 °F (4 °C)
No accelerator	2 – 3	1 – 2	4 – 6
1 accelerator	1 – 2	< 1	2 – 3
2 accelerators	< 1	—	1.5 – 2.5

Yield

LINEAR FEET PER GALLON*

JOINT DEPTH, (INCHES)									JOINT WIDTH (INCHES)	
	1/4	3/8	1/2	5/8	3/4	7/8	1	1 1/2	2	3
1/4	308	205	154	122	–	–	–	–	–	–
3/8	–	–	–	82	68	58	51	–	–	–
1/2	–	–	–	–	51	44	38	26	19	12

METERS PER LITER

JOINT DEPTH, (MM)									JOINT WIDTH (MM)	
	6	10	13	16	19	22	25	38	50	75
6	24.8	16.5	12.4	9.8	–	–	–	–	–	–
10	–	–	–	6.6	5.5	4.7	4.1	–	–	–
13	–	–	–	–	4.1	3.5	3.0	2.2	1.5	0.7

- In deep joints, the sealant depth must be controlled by closed cell backer rod or soft backer rod. Where the joint depth does not permit the use of backer rod, a bond breaker (polyethylene strip) must be used to prevent three-point bonding.
- To maintain the recommended sealant depth, install backer rod by compressing and rolling it into the joint channel without stretching it lengthwise. Closed cell backer rod should be about 1/8" (3 mm) larger in diameter than the width of the joint to allow for compression. Soft backer rod should be approximately 25% larger in diameter than the joint width. The sealant does not adhere to it, and no separate bond breaker is required. Do not prime or puncture the backer rod.

SURFACE PREPARATION

Substrates must be structurally sound, fully cured, dry and clean. Substrates should always be free of the following: dirt, loose particles, oil, grease, asphalt, tar, paint, wax, rust, waterproofing or curing and parting compounds, membrane materials and sealant residue.

CONCRETE, STONE, AND OTHER MASONRY

Clean by grinding, sandblasting or wire brushing to expose a sound surface free of contamination and laitance.

WOOD

New and weathered wood must be clean, dry and sound. Scrape away loose paint to bare wood.

Any coatings on wood must be tested to verify adhesion of sealant or to determine an appropriate primer.

METAL

Remove scale, rust and loose coatings from metal to expose a bright white surface. Any coatings on metal must be tested to verify adhesion of sealant or to determine an appropriate primer.

PRIMING

- MasterSeal NP2 is considered a non-priming sealant, but special circumstances or substrates may require a primer. It is the user's responsibility to check the adhesion of the cured sealant on typical test joints at the project site before and during application. Refer to product data sheet on MasterSeal P173 and MasterSeal P176, and consult Technical Service for additional information.
- For immersion applications, MasterSeal P173 must be used.
- Apply primer full strength with a brush or clean cloth. A light, uniform coating is sufficient for most surfaces. Porous surfaces require more primer; however, do not over-apply.
- Allow primer to dry before applying MasterSeal

NP2. Depending on temperature and humidity, primer will be tack-free in 15–20 minutes. Priming and sealing must be done on the same day.

MIXING

- MasterSeal NP2 is a multi-component system with a configuration of Part A, Part B and a color pack.
- Transfer entire contents of Part B to Part A container using a spatula or margin trowel.
- Part B must be mixed thoroughly with Part A. Before adding pigment, scrape sides of container to ensure complete mixing of Parts A and B. With a slow-speed drill and a sealant mixing paddle, mix 4–6 minutes. Keep the paddle blade below the surface of the sealant to avoid whipping air into the sealant.
- Transfer the entire contents of one MasterSeal 900 pigment can into the mixed Part A and B. Use a spatula or knife to remove all the pigment from the container. Continue mixing with a slow-speed drill and slotted paddle until color is uniform. During the process, scrape the sides and bottom of the mixing container several times to obtain a complete mix.
- The pot life of mixed MasterSeal 905 accelerator is influenced by temperature. See Table 2 for specific data. MasterSeal 905 accelerator may be added to adjust the initial cure rate.

APPLICATION

1. Except when unusual job conditions dictate the use of knife or spatula, apply MasterSeal NP 2 by professional bulk gun loaded at the jobsite. Fill joints from the bottom up to the exterior face by holding a properly sized nozzle against the joint bottom.
2. Dry tooling is recommended. Proper tooling results in the correct bead shape, neat joints, and optimal adhesion.
3. Best practices dictate that all caulking and sealing be done when temperatures are above 40 °F (4 °C) to avoid application to moisture-laden surfaces. Moisture on substrates will adversely affect adhesion.
4. Application may proceed as low as 40 °F (4 °C) if there is certainty that substrates are completely dry, free of moisture and clean as described under Surface Preparation.

CURING

The cure of MasterSeal NP 2 varies with temperature and humidity. The following times assume 75 °F (24 °C), 50% relative humidity, and a joint 1/2" (13 mm) in width by 1/4" (6 mm) in depth.

- Skins: within 3–4 hours
- Full cure: approximately 1 week

See Table 2 for use of MasterSeal 905 accelerator.

CLEAN UP

Immediately after use and before sealant has cured, clean equipment with MasterSeal 990 or xylene. Cured sealant may be removed by cutting with a sharp-edged tool. Remove thin films by abrading.

FOR BEST PERFORMANCE

- Pursuant to accepted industry standards and practices, using rigid paints and/or coatings over flexible sealants can result in a loss of adhesion of the applied paint and/or coating, due to the potential movement of the sealant. However, should painting and/or coating be desired, it is required that the applicator of the paint and/or coating conduct on-site testing to determine compatibility and adhesion.

- Do not allow uncured MasterSeal NP 2 to come into contact with alcohol-based materials or solvents.
- Do not use as a cap, heel or toe bead for exterior glazing.
- Do not apply polyurethane sealants in the vicinity of uncured silicone sealants or uncured MasterSeal NP 150™.
- MasterSeal NP 2 should not come in contact with oil-based caulking, silicone sealants, polysulfides or fillers impregnated with oil, asphalt or tar.
- Do not apply epoxy-based coatings in the vicinity of uncured MasterSeal NP 2.
- Do not apply to freshly treated wood; treated wood must have weathered for at least 6 months.
- Do not open containers until ready for use.
- Units are premeasured; do not use partial units.
- MasterSeal NP 2 may yellow in the presence of unvented artificial heat; this is a surface phenomenon that does not affect sealant performance.
- When MasterSeal NP 2 is used in areas subject to continuous water immersion, cure for 14 days at 70 °F (23 °C). Allow longer cure times at lower temperatures. Always use Master Seal P 173.
- Do not use in swimming pools, or on other submerged conditions where the sealant will be exposed to strong oxidizers. Avoid submerged conditions where water temperatures will exceed 120 °F (50 °C).
- Horizontal joints subject to traffic or intermittent ponding of water require the use of primer. Call Technical Service for details.
- Substrates such as copper, stainless and galvanized steel typically require the use of a primer; MasterSeal P 173 or MasterSeal P 176 are acceptable. For Kynar coatings, use MasterSeal P 173 only. An adhesion test is recommended for any other questionable substrate.
- Use only MasterSeal 900 color packs designed for use with MasterSeal NP 2.
- Proper application is the responsibility of the user. Field visits by Master Builders Solutions personnel are for the purpose of making technical recommendations only and not for

supervising or providing quality control on the jobsite.

HEALTH, SAFETY AND ENVIRONMENTAL

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EXHIBIT N

SUBSTITUTION REQUEST FORM

**(PRIOR TO BID OPENING – MINIMUM OF (5) WORKING DAYS PRIOR TO RECEIPTS
OF BIDS)**

SECTION 00 63 25

SUBSTITUTION REQUEST FORM

(Prior to Bid Opening – minimum of (5) working days prior to receipts of Bids)

To:	City Project Manager, City of Goleta	
Project:		
Contractor		
Subcontractor/ Supplier		
Drawing Sheet Reference/ Detail No:		
The undersigned Contractor hereby submits for consideration the following equipment instead of the specified item for the above Project:		
Section	Paragraph	Specified Item
Proposed Substitution:		
The Contractor must include all information required under Section 01 60 00 (Products, Materials, Equipment & Substitutions).		
The undersigned has (a) attached manufacturer’s literature, including complete technical data and laboratory test results, if applicable, (b) attached an explanation of why proposed substitution is a true equivalent to specified item, (c) included complete information on changes to Contract Documents that the proposed substitution will require for its proper installation, and (d) filled in the blanks below:		
A. Does the substitution affect dimensions shown on Drawings?		
B. Are the manufacturer’s guarantees and warranties on the proposed substitution items identical to those on the specified items? If there are differences, please specify each and every difference in detail.		
C. What effect does the substitution have on other contractors, trades, or suppliers?		

D. What are the differences between the proposed substitution and the specified item? If proposed substitution has a color or pattern, provide a color board showing proposed substitution in relation to the other adjacent colors and patterns.	
E. Will granting the requested substitution cause any schedule delay? (If yes, please explain)	
Submitted By:	
The undersigned Contractor certifies that the function, appearance, and quality of the proposed substitution are equivalent or superior to those of the specified item.	
Contractor:	
Signature:	
Name:	
Address:	
Telephone:	
Email:	
Date:	
City of Goleta Review/Response	
Accepted:	
Accepted as Noted:	
Not Accepted:	
Received to Late:	
By, City Representative:	
Remarks:	

END OF SECTION – 00 63 25



SECTION 01 10 00

GENERAL REQUIREMENTS

PART 1 – GENERAL

1.01 COORDINATION AND COOPERATION WITH OTHERS

- A. During the course of the work to be performed under this contract, it is expected that public agencies, utility companies, and other contractors will be performing work in the immediate vicinity. The Contractor shall notify the other public agencies, utilities, and contractors affected at least five (5) working days prior to beginning construction. The Contractor under this contract shall schedule his work and coordinate his operation with others so as to minimize conflicts and interference between his operations and those of other contractors.
- B. Agencies that may be performing work in the immediate vicinity may include, but are not limited to:
1. City of Goleta
 2. Goleta Water District
 3. Goleta Sanitary District
 4. Goleta West Sanitary District
 5. Southern California Edison
 6. Southern California Gas
 7. Frontier (Telephone)
 8. AT&T (Telephone)
 9. Mobil Oil Company
 10. Santa Barbara Flood Control District
 11. Cox Communications

1.02 QUALITY CONTROL

- A. The Contractor shall be responsible for verifying all dimensions in the field and shall check all field conditions continuously during construction.
- B. The Contractor shall inspect related and appurtenant work and shall report in writing to the OAR any conditions that may prevent proper completion of the work.
- C. The Work shall be conducted under the general observation of the OAR and shall be subject to intermittent or continuous inspection to assure strict compliance with the requirements of the Contract Documents.



- D. The work hereunder shall be under the general direction of the OAR, acting directly and through his or her authorized representatives. The presence of an inspector, however, shall not relieve the Contractor of the responsibility for the proper execution of the Work in accordance with all requirements of the Contract Documents. Compliance with Contract Documents is distinctly a duty of the Contractor and said duty shall not be avoided by any act or omission on the part of an inspector.
- E. All materials and articles furnished by the Contractor shall be subject to rigid inspection, and no material or articles shall be used in the Work until it has been inspected and accepted by the OAR.
- F. Unless otherwise specified, all sampling and testing shall be in accordance with the methods prescribed in the current standards of the ASTM or other specified published standards, as applicable to the class and nature of the article or materials considered.
- G. Samples and test specimens required under the Contract Documents shall be furnished by the Contractor and prepared for testing in ample time for the completion of the necessary tests and analyses before the subject materials or articles are to be used. The Contractor shall furnish all required test specimens at its own expense. The cost of any test which shows unsatisfactory results shall be borne by the Contractor.
- H. Whenever the Contractor is ready to backfill, bury, cast in concrete, hide, or otherwise cover or make inaccessible any work under the Contract, the Contractor shall notify the OAR not less than 24 hours in advance of beginning any such work so that the required inspections can be scheduled and performed. Failure of the Contractor to notify the OAR at least 24 hours in advance of any such work shall be reasonable cause for the OAR to require sufficient delay in the Contractor's schedule to allow time for such inspections and any remedial or corrective work required. All costs of such delays, including its impact or effect upon other portions of the Work shall be borne by the Contractor.

1.03 TEMPORARY UTILITIES

- A. The Contractor shall provide, at its own expense, all necessary power required for its operations under the Contract, and shall provide and maintain all temporary power lines required to perform the work in a safe and satisfactory manner. All temporary connections for electricity shall be subject to the approval of the OAR and the power company representative, and shall be removed in the like manner at the Contractor's expense prior to final acceptance of the work.
- B. The Contractor shall provide, at its own expense, all necessary water required for construction of the project, including disinfecting of the pipelines, valving, and appurtenances. The Contractor shall not make connection to, or draw water from any fire hydrant or pipeline without first making application for and obtaining a temporary water meter for construction from the Goleta Water District. For each such connection made,



the Contractor shall first attach to the fire hydrant or pipeline a valve, meter, and backflow prevention device of a size and type acceptable to the District. The backflow prevention device shall be tested and certified prior to use of the temporary meter with a copy of the certification provided to the District.

- C. Before final acceptance of the work on the project, all temporary connections and piping installed by the Contractor shall be entirely removed, and all affected improvements shall be restored to their original condition, or better, to the satisfaction of the District and to the agency owning the affected utility

1.04 PROTECTION OF EXISTING FACILITIES

- A. All oil, gasoline, power, telephone, communication, gas, water, irrigation, sewer, and storm drain facilities, both underground and overhead, encountered along the line of the Work shall remain continuously in service during all the operations under the Contract, unless other arrangements satisfactory to the OAR are made with the owner of said facilities.
- B. Prior to any construction in the vicinity of existing underground facilities, the Contractor shall notify the Underground Service Alert agency and the authorized representatives of such utility owners or agencies not less than 3 days nor more than 7 days prior to construction so that a representative of said owners or agencies can be present during such work if they so desire.
- C. The right is reserved to the owners of public utilities and franchises to enter at any time upon any public street, alley, right-of-way, or easement for the purpose of making changes in their property made necessary by the Work of this Contract.
- D. The Contractor shall protect all existing utilities and improvements not designated for removal and shall restore damaged or temporarily relocated utilities and improvements to a condition equal to or better than they were prior to such damage or temporary relocation, all in accordance with requirements of the Contract Documents
- E. The Contractor shall not perform any work that would affect oil, gas, sewer, or water pipelines, telephone, communications, or electric lines, fences or other structures, nor shall the Contractor enter upon the right-of-way involved until notified by the OAR that the necessary authorization has been secured from the proper party. After authorization has been obtained, the Contractor shall give said party due notice of its intention to begin work, and shall give said party convenient access and every facility for removing, shoring, supporting, or otherwise protecting such pipeline, line, or structure, and for replacing same.
- F. Existing utility lines that are discovered during excavation operations shall be protected from damage during excavation and backfilling and, if damaged, shall be immediately repaired by the Contractor. The Contractor shall take all possible precautions for the



- protection of unforeseen utility lines to provide for uninterrupted service and to provide such special protection as may be necessary. When utility lines that are to be removed are encountered, the Contractor shall notify the OAR a sufficient time in advance for the necessary measures to be taken to prevent interruption of service.
- G. In the event that the Contractor damages any existing utility lines that are not shown or the locations of which are not made known to the Contractor prior to excavation, a written report thereof shall be made immediately to the OAR. If directed by the OAR, repairs shall be made by the Contractor under the provisions for changes and extra work contained in the General Provisions. All costs of locating, repairing damage not due to failure of the Contractor to exercise reasonable care, and removing or relocating such utility facilities not shown in the Contract Documents with reasonable accuracy, and for equipment on the project which was actually working on that portion of the work which was interrupted or idled by removal or relocation of such utility facilities, and which was necessarily idled during such work will be paid for as extra work in accordance with the provisions of the General Provisions.
- H. The Contractor shall be responsible for and shall repair all damage caused by its operations even in the event such damage occurs after backfilling or is not discovered until after completion of the backfilling. All repairs to a damaged improvement are subject to inspection and approval by an authorized representative of the improvement owner before being concealed by backfill or other work.
- I. Where the proper completion of the Work requires the temporary or permanent removal and/or relocation of an existing utility or other improvement which is shown, the Contractor, without unnecessary delay, shall temporarily replace or relocate such utility or the facility. Restoration to former location shall be accomplished by the Contractor in a manner that will restore or replace the utility or improvement as nearly as possible to its former locations and to as good or better condition than found prior to removal.
- J. The Contractor shall not destroy, remove, or otherwise disturb any existing survey markers or other existing street or roadway markers without proper authorization. No pavement breaking or excavation shall be started until all survey or other permanent marker points that will be disturbed by the construction operations have been properly referenced for easy and accurate restoration. All survey markers or points disturbed by the Contractor shall be accurately restored by the Contractor at the Contractor's expense after all street or roadway resurfacing has been completed.
- K. All paved areas, including curbs and berms, cut or damaged during construction shall be replaced with similar materials and of equal thickness to match the existing adjacent undisturbed areas, except where specific resurfacing requirements have been called for in the Contract Documents or in the permit of the governing agency. All pavement restoration and other facilities restoration shall be constructed to finish grades compatible with adjacent undisturbed pavement.



- L. Wherever sidewalks, driveways, or private roads have been removed for purposes of construction, the Contractor shall place suitable temporary sidewalks or roadways promptly after backfilling and shall maintain them in satisfactory condition for the period of time fixed by the governing agency before proceeding with the final restoration or, if no such period of times is so fixed, the Contractor shall maintain temporary sidewalks or roadways until the final restoration has been made.

1.05 POTHOLING AND LOCATING EXISTING UNDERGROUND FACILITIES

- A. The Contractor shall notify Underground Service Alert (USA) at least 48 hours in advance of any construction or potholing and make arrangements for the existing utilities to be marked by the affected utility companies.
- B. The Contractor shall verify the exact location, depth, alignment, and grade of all utilities shown on the construction drawings and marked as part of the USA procedure. The Contractor shall make exploratory excavations (potholing) of all utilities that may interfere with the Work. All such exploratory excavations shall be performed as soon as practicable after award of contract and, in any event, a sufficient time in advance of construction to avoid possible delays to the Contractor's work. When such exploratory excavations show the utility location as shown to be in error, the Contractor shall immediately notify the OAR.
- C. **The Contractor shall pothole and locate the existing underground utilities at locations where connections will be made to existing utilities or where proposed facilities cross existing utilities and as shown on the drawings prior to submitting shop drawings.** The Contractor shall submit the pothole data to the OAR for review. The OAR will not review any submittals by the Contractor until the potholing is completed and the pothole data has been submitted to the OAR for review. No extension of time or additional compensation will be made for delays caused by the failure of the Contractor to complete the potholing in a timely manner.
- D. All costs incurred in exposing and locating the existing utilities including all labor, tools, equipment for excavation, backfill and restoring existing surface improvements, shall be borne by the Contractor. The Contractor shall bear the cost of repairing or replacing any existing utility damaged by his potholing work.

1.06 TEMPORARY ENVIRONMENTAL CONTROLS

- A. The use of explosives on the Work will NOT be permitted.



- B. The Contractor shall furnish all labor, equipment, and means required and shall carry out effective measures wherever and as often as necessary to prevent its operation from producing dust in amounts damaging to property, cultivated vegetation, or domestic animals, or causing a nuisance to persons living in or occupying buildings in the vicinity. The Contractor shall be responsible for any damage resulting from any dust originating from its operations. The Contractor's dust abatement measures shall be in accordance with the Santa Barbara County Air Pollution Control District standard dust mitigation measures and any other appropriate agency's dust abatement measures.
- C. During the progress of the Work, the Contractor shall keep the site of the Work and other areas used by it in a neat and clean condition, and free from any accumulation of rubbish. The Contractor shall dispose of all rubbish and waste materials of any nature occurring at the Work site, and shall establish regular intervals of collection and disposal of such materials and waste. The Contractor shall also keep its haul roads free from dirt, rubbish, and unnecessary obstructions resulting from its operations. Disposal of all rubbish and surplus materials shall be off the site of construction in accordance with all applicable laws and regulations.
- D. Fixed or portable chemical toilets shall be provided by the Contractor wherever needed for the use of employees. The Contractor shall establish a regular daily collection of all sanitary and organic wastes. All wastes and refuse from sanitary facilities provided by the Contractor or organic material wastes from any other source related to the Contractor's operations shall be disposed of away from the site in a manner satisfactory to the OAR and in accordance with all applicable laws and regulations.
- E. The Contractor's attention is directed to the Federal Clean Water Act (1977) which requires a Corps of Engineers permit under Section 404 of the Act, for the discharge of one cubic yard or more of any dredged or fill material into "navigable waters" as defined in "Permits for Activities in Navigable Waters or Ocean Waters, Paragraph (d)(2), Federal Register of 25 July 1975, page 3134.
- F. All chemicals used during project construction or furnished for project operation, whether defoliant, soil sterilant, herbicide, pesticide, disinfectant, polymer, reactant or of other classification, shall show approval of either the U.S. Environmental Protection Agency or the U.S. Department of Agriculture. Use of all such chemicals and disposal of residues shall be in strict accordance with the printed instructions of the manufacturer.

1.07 PERMANENT UTILITY SERVICES

- A. Electrical power shall conform to the requirements of the serving utility companies and shall meet with the approval of local, state and national inspecting authorities. The



Contractor shall verify the location of services and the serving utility company requirements.

- B. The Contractor shall apply for permanent electrical service in the name of the City of Goleta, and forward the service application to the General Manager for execution on behalf of the City. The City will pay all connection and cable charges or other charges levied by the utility. The Contractor shall have the sole responsibility for coordinating the service installation to ensure that service is available as required by the Contractor's schedule.
- C. The Contractor shall be responsible for all service charges until the facility is placed into service and final acceptance of the work is made by the City. All service charges, paid by the City prior to acceptance of the facility, will be deducted from the Contractor's progress or final payment.

1.08 ELECTRICAL CONTINUITY TEST OF METAL PIPELINES

- A. All metallic pipelines requiring joint bonding, including mortar lined and coated steel pipe (CML&C), shall be tested for electrical continuity upon completion of construction and prior to acceptance by the Goleta Water District. The Contractor shall pay for retesting of work not conforming to the Specifications and the Contract Drawings.

1.09 COST OF OVERTIME INSPECTION AND OTHER SERVICES

- A. Inspection of the work as well as other required services will be provided between the hours of 7:30 a.m. and 4:00 p.m. on Monday through Friday only except holidays. Any inspections or other services requested by or made necessary as a result of the actions of the Contractor beyond the hours stated above shall be paid for by the Contractor at the prevailing rate of 1-1/2 times the regular hourly rate plus equipment charges.
- B. Inspections or other services requested by or made necessary as a result of the actions of the Contractor on Saturdays, Sundays, or holidays, must be scheduled and approved and paid for by the Contractor in advance, at the prevailing rate for overtime and/or holiday work. The following holidays are observed: New Year's Day, Presidents Day, Memorial Day, Independence Day, Labor Day, Thanksgiving and Christmas. Contact the city or agency for specific dates and days holidays will be observed prior to scheduling any construction operations.
- C. The need for overtime inspection or other services shall be determined by the OAR, and his decision shall be final.



PART 2 – PRODUCTS [NOT USED]

PART 3 – EXECUTION [NOT USED]

PART 4 – MEASUREMENT AND PAYMENT

4.01 MEASUREMENT

- A. All work performed under General Construction Requirements will not be measured for payment unless otherwise stated in the individual sections of these Technical Specifications.

4.02 PAYMENT

- A. Full compensation for work performed under General Requirements shall be considered as included in the contract price paid for the various other items of work and no additional compensation will be allowed therefore unless otherwise stated in the individual sections of these Technical Specifications.

END OF SECTION



SECTION 01 11 00

SUMMARY OF WORK

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. The furnishing of all labor, materials, equipment, services, and incidentals necessary for Work of the Goleta Train Depot, located at 27 South La Patera Lane Goleta, California 93117, as set forth in the Construction Documents which include, but are not limited to, the Drawings, Addenda and Specifications.

1.02 RELATED REQUIREMENTS:

1. Section 01 12 16: Phasing of the Work.
2. Section 01 23 00: Alternates (Bid Items).
3. Section 01 31 13: Project Coordination.
4. Section 01 32 29: Project Forms.
5. Section 01 32 13: Construction Schedule.
6. Section 01 45 25: Testing, Adjusting, and Balancing for HVAC.
7. Section 01 50 00: Construction Facilities and Temporary Controls.
8. Section 01 71 23: Field Engineering.

PART 2 - PRODUCTS (Not used)

PART 3 - EXECUTION

3.01 USE OF PREMISES

- A. CONTRACTOR shall coordinate Work of all trades, Subcontractors, utility service providers, with CITY and/or Separate Work Contract. CONTRACTOR shall sequence, coordinate, and perform the Work to impose minimum hardship on the operation and use of the existing facilities and/or Project site. CONTRACTOR shall install all necessary protection for existing improvements, Project site, property, and new Work against dust, dirt, weather, damage, vandalism, and maintain and relocate all protection to accommodate progression of the Work.



- B. CONTRACTOR shall confine entrance and exiting to the Project site and/or facilities to routes designated by the OAR.
 - C. CONTRACTOR is advised adjacent Amtrak Station may be in use during performance of the Work. CONTRACTOR shall utilize all available means to prevent generation of unnecessary noise and maintain noise levels to a minimum. When required by the OAR, CONTRACTOR shall immediately discontinue noise-generating activities and/or provide alternative methods to minimize noise generation. CONTRACTOR shall install and maintain air compressors, tractors, cranes, hoists, vehicles, and other internal combustion engine equipment with mufflers, including unloading cycle of compressors. CONTRACTOR shall discontinue operation of equipment producing objectionable noise as required by the OAR.
 - D. CONTRACTOR shall furnish, install, and maintain adequate supports, shoring, and bracing to preserve structural integrity and prevent collapse of existing improvements and/or Work modified and/or altered as part of the Work.
 - E. CONTRACTOR shall secure building entrances, exits, and Work areas with locking devices as required by the OAR.
 - F. CONTRACTOR assumes custody and control of CITY property, both fixed and portable, remaining in existing facilities vacated during the Work.
 - G. CONTRACTOR shall not use or allow anyone other than CITY employees to use facility telephones and/or other equipment, except in an emergency. CONTRACTOR shall reimburse CITY for telephone toll charges originating from the facility except those arising from emergencies or use by CITY employees.
 - H. CONTRACTOR shall protect all surfaces, coverings, materials, and finished Work from damage. Mobile equipment shall be provided with pneumatic tires.
 - I. CONTRACTOR is advised CITY may award Separate Work Contracts at this Project site.
 - J. CONTRACTOR shall not permit the use of portable and/or fixed radio's or other types of sound producing devices including Bluetooth speakers and similar devices.
- 3.02 FURNITURE, FIXTURES AND EQUIPMENT (MATERIALS) OWNER FURNISHED CONTRACTOR INSTALLED (OFCI)
- A. Certain materials identified in the Contract Documents as OWNER Furnished CONTRACTOR Installed, OFCI, will be delivered to the Project site by the CITY.
 - B. If designated in the Contract Documents to be OWNER furnished CONTRACTOR installed, (OFCI), CONTRACTOR shall unload, store, uncrate, assemble, install, and connect OWNER supplied materials.



- C. One-hundred fifty days before the date the CONTRACTOR needs to have the OFCI materials on site, CONTRACTOR shall notify CITY of the scheduled date for needed OFCI materials. Upon delivery to Project site, CONTRACTOR shall store OFCI materials inside rooms and/or protected spaces and will be responsible for security of OFCI materials until Substantial Completion. OAR will sign receipt or bill of lading as applicable.
 - D. CONTRACTOR shall, within ten days after delivery, uncrate and/or unpack OFCI materials in presence of CITY who shall inspect delivered items. CITY shall prepare an inspection report listing damaged or missing parts and accessories. CITY shall transmit one copy of the report to CONTRACTOR. CITY will procure and/or replace missing and or damaged OFCI materials, as indicated in inspection report.
 - E. CONTRACTOR shall install OFCI materials in the locations and orientation as indicated in the Contract Documents. CONTRACTOR shall verify exact locations with OAR before final installation of OFCI materials.
 - F. If required, OAR will furnish setting and or placement drawings for OFCI materials.
 - G. CONTRACTOR shall install OFCI materials by proper means and methods to ensure an installation as recommended by the manufacturer. CONTRACTOR shall furnish and install all necessary fasteners and required blocking to properly install OFCI materials.
 - H. CONTRACTOR shall install OFCI materials with manufacturer recommended fasteners for the type of construction to which the OFCI materials are being fastened and/or anchored.
 - I. CONTRACTOR shall provide final connections of any electrical, signal, gas, water, waste, venting and/or similar items to OFCI materials. CONTRACTOR shall, prior to final connection, verify the operating characteristics of OFCI materials are consistent with the designated supply.
- 3.03 FURNITURE, FIXTURES AND EQUIPMENT (Materials) - OWNER furnished, OWNER installed (OFOI)
- A. Certain materials are identified in the Contract Documents as OWNER Furnished, OWNER Installed (OFOI)
 - B. On dates and during times designated by CITY, CONTRACTOR shall provide clear off-loading, receiving, protected storage, and CITY'S dumpster space areas for the use of CITY or CITY'S third party OFOI installation contractors. At such times, CONTRACTOR shall also make clear routes and access available to all rooms and spaces to receive OFOI materials.



- C. On dates and during times designated by CITY, CONTRACTOR shall provide access to the elevators for use of CITY or CITY’S third party OFOI installation contractors.
- D. CONTRACTOR shall cooperate fully with CITY or CITY’S third part OFOI installation contractors.
- E. CONTRACTOR may be requested by CITY to provide supplemental labor and equipment to support OFOI activities. Such requests must be submitted in accordance with the change order clauses of Contract.
- F. Immediately prior to mobilization of CITY or CITY’S third party OFOI installation contractors, CITY shall document the condition of the Work in areas to be utilized for OFOI activities.
- G. CONTRACTOR shall not be responsible for damage caused by CITY or CITY’S forces. CITY shall document the condition of the Work and report to CONTRACTOR any damage in areas utilized for OFOI activities.

END OF SECTION – 01 11 00



SECTION 01 12 16 PHASING OF THE WORK

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Requirements for phasing of Work include logistics, phasing, and completion of designated phases prior to commencement of subsequent phases.

1.02 RELATED REQUIREMENTS

- A. Section 01 11 00: Summary of Work.
- B. Section 01 33 00: Submittal Procedures.
- C. Section 01 31 13: Project Coordination.
- D. Section 01 32 13: Construction Schedule.
- E. Section 01 50 00: Construction Facilities and Temporary Controls.
- F. Section 01 77 00: Contract Closeout.

PART 2 - PRODUCTS (Not used)

PART 3 - EXECUTION

3.01 SUBMITTALS

- A. CONTRACTOR shall submit a Project site logistics plans in accordance with and as required by this Section.

3.02 LOGISTICS

- A. Prior to commencement of Work, CONTRACTOR shall prepare and submit to OAR, a detailed Project site logistic plan, in same size and scale of Drawings, setting forth CONTRACTOR plan of Work relative to following, but not limited to, items:
 - 1 Hauling route shall be in accordance with local ordinances a truck access route to and from Project site.
 - 2. The identification of any overhead wire restrictions for power, street lighting, signal or cable.



3. Local sidewalk access and street closure requirements.
 4. Protection of sidewalk pedestrians and vehicular traffic.
 5. Project site fencing and access gate locations.
 6. Construction parking.
 7. Material staging or delivery areas.
 8. Material storage areas.
 9. Temporary trailer locations.
 10. Temporary service location and proposed routing of all temporary utilities.
 11. Location of temporary or accessible fire protection.
 12. Trash removal and location of dumpsters.
 13. Concrete pumping locations.
 14. Crane locations.
 15. Location of portable sanitary facilities.
 16. Mixer truck wash out locations.
 17. Traffic control signage.
 18. Perimeter and site lighting.
 19. Storm Water Pollution Prevention Plan – SWPPP.
 20. Stockpile or lay down areas.
 21. Security lighting
- B. Revised Project site logistic plan may be required by OAR for separately identified phases of Work as set forth in this Section.
- C. CONTRACTOR is responsible for securing and/or obtaining all approvals and permits from authorities having jurisdiction relative to any activities set forth in Article 3.02.A.

3.03 PHASING OF THE WORK

- A. Project will be constructed in separate Milestone increments, as identified or as described in this Section or Contract Documents. Phasing will also delineate Work to be completed in



each designated phase. Unless otherwise approved or directed by OWNER, each phase shall be completed according to approved Baseline Schedule prior to commencement of next subsequent phase. CONTRACTOR shall incorporate and coordinate Work of Separate Work Contracts relative to this Project into the Phasing and Construction Schedule.

- B. CONTRACTOR shall install all necessary Work for, but not limited to, power, lighting, signal, HVAC, drainage, and plumbing systems in phased Work before completion of designated phase. All valves, pull boxes, stub outs, temporary capping, and other Work necessary for phased completion and operation of all necessary systems shall be provided whether or not such Work is specifically identified in Contract Documents.

3.04 PHASING OF THE WORK – GENERAL

- A. CONTRACTOR shall prepare Construction Schedule in order to complete Work and related activities in accordance with phasing plans on drawings and Amtrak Encroachment Diagram in Appendix “A”. CONTRACTOR shall include all costs to complete all Work within Milestones or Contract Time.
- B. OWNER will be seriously damaged by not having all Work completed within Milestones or Contract Time. It is mandatory Work be complete within Milestones or Contract Time.

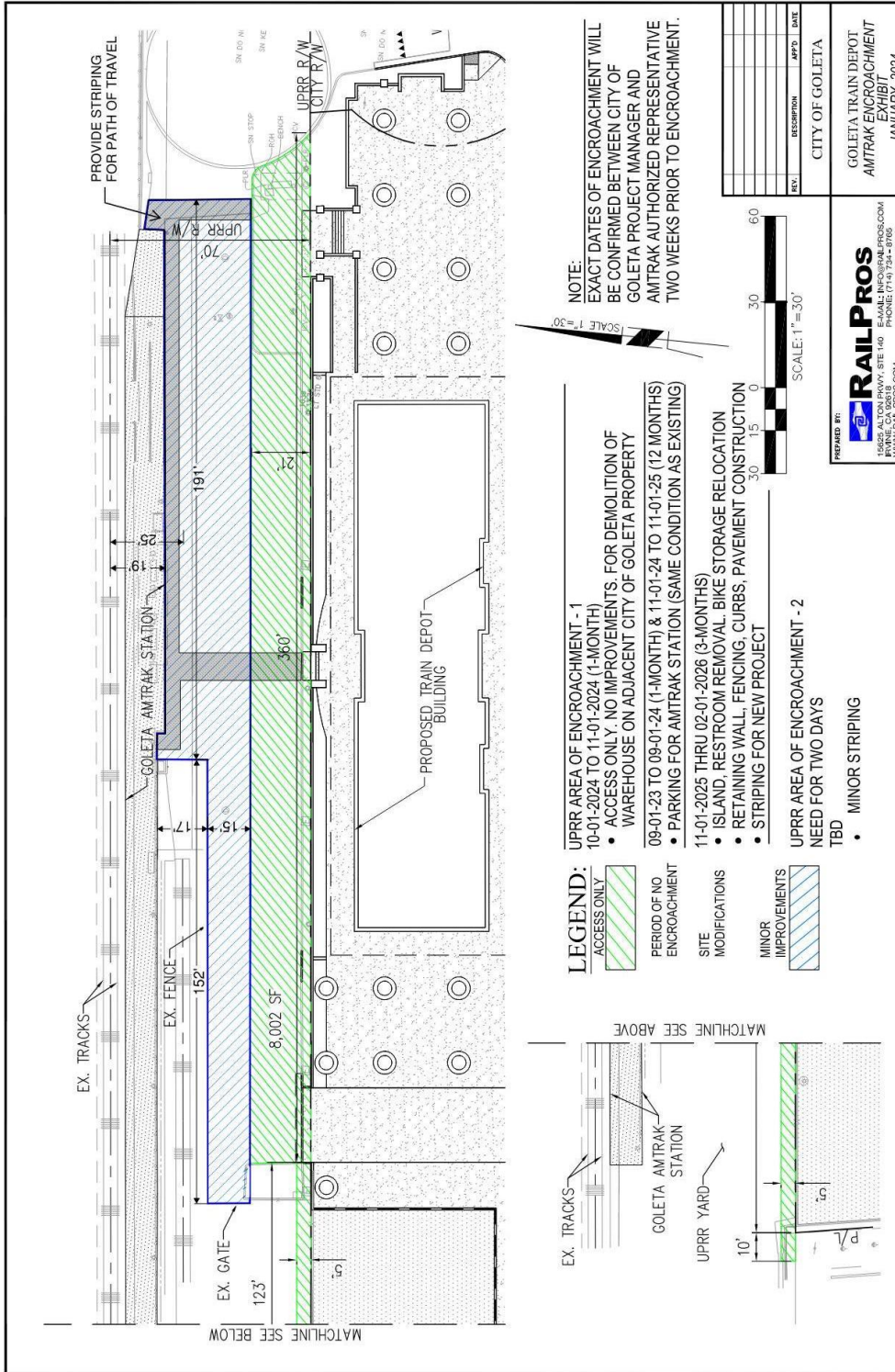
3.05 PHASING OF THE WORK – SPECIFIC

- A. CONTRACTOR shall prepare Construction Schedule, and shall complete following, but not limited to Milestones, as shown in construction phasing drawings (Sheets PH-001 and PH-002) and within designated phases in accordance with following:
1. Phase 0 Procurement – (# of days) calendar days: Offsite preconstruction activities
 - Onsite activities cannot commence until September 1, 2024.
 2. Phase 1 Mobilization – (# of days) calendar days: Milestones 1 & 3.
 - Includes Hazardous Material Mitigation.
 3. Phase 2 Demo and Construction through Substantial Completion – (#days) calendar days: Milestone 2, 4-28.
 - See drawings for Train Depot Sub-Phasing. Twenty-Seven (25 std & 2 ADA) parking stalls shall be maintained for use by Amtrak passengers as either existing or temporary stalls with an accessible path of travel to the existing Amtrak platform ramp for the duration of the project. To be coordinated based upon Amtrak Encroachment Exhibits attached herein as 01 12 16 - Appendix A.
 - South La Patera Lane Improvements
 4. Phase 3 Administrative Closeout – (# of days) calendar days: Milestone 29.
- B. The Contract Time shall be a total of (600 days) calendar days from date of commencement of Contract Time.



END OF SECTION - 01 12 16

APPENDIX A - AMTRAK ENROACHMENT DIAGRAM





SECTION 01 91 13 GENERAL COMMISSIONING REQUIREMENTS

PART 1 - GENERAL

1.01 SUMMARY

- A. General requirements that apply to implementation of commissioning without regard to systems, subsystems, and equipment being commissioned.
- B. Related Sections
 - 1. 23 08 00 HVAC Systems Commissioning
 - 2. 26 08 00 Electrical Systems Commissioning
 - 3. 26 31 00 Photovoltaic System
 - 4. 32 80 00 Planting Irrigation

1.02 DEFINITIONS

- A. BoD: Basis of Design
- B. CxA: Commissioning Authority.
- C. OPR: Owner's Project Requirements
- D. Cx Plan: Commissioning Plan
- E. Systems Subsystems, and Equipment: Where these terms are used together or separately, they shall mean "as-built" systems, subsystems, and equipment.
- F. TAB: Testing, Adjusting, and Balancing.

1.03 LEED ENHANCED AND MONITORING-BASED COMMISSIONING

- A. The project will comply with LEED v4/v4.1 Option 1, Path 2 Enhanced and Monitoring-Based Commissioning, which includes monitoring-based procedures and points to be measured and evaluated to assess performance of energy- and water-consuming systems.



1.04 PROCEDURES FOR COMMISSIONING

- A. Contractor shall provide labor, equipment, and services to place systems and equipment into service. Regular and overtime payrolls and all other contingencies in connection with the checkout and initial operation of equipment shall be included as part of Contractor's lump sum Contract price. Procedures for equipment startup shall conform to manufacturer's procedures submitted.
- B. Owner's representative may observe Contractor's personnel during startup, checkout, and initial operation. Contractor shall provide workers required to make adjustments and correct deficiencies during equipment commissioning and initial operation. It is anticipated that commissioning may be in progress continuously over extended periods of time.
- C. Contractor shall furnish and apply oils, greases, refrigerants, fuels and other lubricants and materials required to place equipment in condition ready for operation and acceptance. Contractor shall provide temporary gauging devices required during checkout and operation of equipment and systems.
- D. After systems have been Functionally Tested to the satisfaction of the CxA, Architect/Engineer, Contractor, and equipment manufacturers, the building will be considered commissioned and ready for operation.

1.05 COMMISSIONING TEAM

- A. Members Appointed by Contractor(s): Individuals, each having authority to act on behalf of the entity he or she represents, explicitly organized to implement the commissioning process through coordinated actions. The commissioning team shall consist of, but not be limited to, representatives of each Contractor, including Project superintendent and subcontractors, installers, suppliers, and specialists deemed appropriate by the CxA.
- B. Members Appointed by Owner:
 - 1. CxA: The designated person, company, or entity that plans, schedules, and coordinates the commissioning team to implement the commissioning process. Owner or Architect will engage the CxA under a separate contract.
 - 2. Representatives of the facility user and operation and maintenance personnel.
 - 3. Architect and engineering design professionals.

1.06 OWNER'S RESPONSIBILITIES

- A. Approve the OPR documentation. The OPR is developed with input from the Owner, Architect and CxA. When completed the OPR is provided to the CxA, Mechanical



- Engineer, Electrical Engineer and the Landscape Architect for use in developing the BoD and Commissioning plan.
- B. Assign operation and maintenance personnel and schedule them to participate in commissioning team activities including, but not limited to, the following:
1. Coordination meetings
 2. Training in operation and maintenance of systems, subsystems, and equipment.
 3. Testing meetings.
 4. Demonstration of operation of systems, subsystems, and equipment.
- C. Approves the BoD documents prepared by the Architect and AE team. Provide BoD to the CxA for use in developing the commissioning plan, Pre-functional checklists, Functional Tests, training documentation forms.

1.07 CONTRACTOR'S RESPONSIBILITIES

- A. Provide utility services required for the commissioning process.
- B. Each Contractor shall assign representatives with expertise and authority to act on behalf of the Contractor and schedule them to participate in and perform commissioning team activities including, but not limited to the following:
1. Participate in construction-phase coordination meetings.
 2. Participate in maintenance orientation and inspection.
 3. Participate in operation and maintenance training sessions.
 4. Participate in final review at acceptance meeting.
 5. Certify all Pre-Functional check lists and complete and provided to the CxA before Functional Testing starts.
 6. Certify that work is complete and systems are operational according to the Contract Documents, including calibration of instrumentation and controls.
 7. Evaluate performance deficiencies identified in test reports and, in collaboration with entity responsible for system and equipment installation, recommend and take corrective action.



8. Participate in Enhanced and Monitoring Based Commissioning, including participation of reviewing building operations 10 months after substantial completion.
- C. Subcontractors shall assign representatives with expertise and authority to act on behalf of subcontractors and schedule them to participate in and perform commissioning team activities including, but not limited to, the following:
1. Participate in construction phase coordination meetings.
 2. Participate in maintenance orientation and inspection.
 3. Participate in procedures meeting for testing if required by the CxA.
 4. Provide schedule for operation and maintenance data submittals, equipment startup, and testing to CxA for incorporation into the commissioning plan.
 5. Provide information to the CxA for developing construction-phase commissioning plan.
 6. Participate in training sessions for Owner’s operation and maintenance personnel.
 7. Provide updated Project Record Documents to the CxA as needed.
 8. Gather and submit operation and maintenance data for systems, subsystems, and equipment to the CxA, as specified in Division 01 Section “Operation and Maintenance Data.”
 9. Provide technicians who are familiar with the construction and operation of installed systems and who shall develop specific test procedures and participate in testing of installed systems, subsystems, and equipment.
 10. Videotape and edit training sessions.
 11. Participate in Enhanced and Monitoring Based Commissioning, including participation of reviewing building operations 10 months after substantial completion.
- D. Provide programming of the DDC control system to allow trending and monitoring of HVAC, lighting, and energy values as required for LEED Enhanced and Monitoring-Based Commissioning. Points to be trended and monitored may include, but not be limited to:
1. Temperatures
 2. Pressures



3. CO2 levels
4. Electrical current, voltage, and power to primary equipment
5. Operating status of primary equipment
6. Lighting levels
7. Air flow rates

1.08 CxA's RESPONSIBILITIES

- A. Organize and lead the commissioning team.
- B. Prepare a construction-phase commissioning plan. Collaborate with Contractor and with subcontractors to develop test and inspection procedures. Include design changes and scheduled commissioning activities coordinated with overall Project schedule. Identify commissioning team member responsibilities, by name, firm, and trade specialty, for performance of each commissioning task.
- C. Review and comment on submittals from each Contractor for compliance with the OPR, BoD, Contract Documents, and construction-phase commissioning plan.
- D. Convene commissioning team meetings for the purpose of coordination, communication, and conflict resolution. Discuss progress of the commissioning processes. Responsibilities include arranging for facilities, preparing agenda and attendance lists, and notifying participants. The CxA shall prepare and distribute minutes to commissioning team members and attendees within five workdays of the commissioning meeting.
- E. At the beginning of the construction phase, conduct an initial construction-phase coordination meeting for the purpose of reviewing the commissioning activities and establishing tentative schedules.
- F. Observe and inspect construction and report progress and deficiencies. In addition to compliance with the OPR, BoD, and Contract Documents, inspect systems and equipment installation for adequate accessibility for maintenance and component replacement or repair.
- G. Prepare Project-specific test and inspection procedures and checklists.
- H. Schedule, direct, witness, and document tests, inspections, and systems startup.
- I. Certify date of acceptance and startup for each item of equipment for start of warranty periods.
- J. Review Project Record Documents for accuracy. Request revisions from Contractor to achieve accuracy. Project Record Documents requirements are specified in Division 01 Section "Project Record Documents."



- K. Review and comment on operation and maintenance documentation and systems manual outline for compliance with the OPR, BoD, and Contract Documents. Operation and maintenance documentation requirement are specified in Division 01.
- L. Review operation and maintenance training program, prepared by the sub and approve qualified instructors to conduct operation and maintenance training. Operation and maintenance training is specified in Division 01 and the Cx Plan.
- M. Prepare commissioning reports.
- N. Oversight of Enhanced and Monitoring Based Commissioning.
- O. Assemble the final commissioning documentation as noted in the Cx Plan.

1.09 COMMISSIONING DOCUMENTATION

- A. Index of Commissioning Documents: CxA shall prepare and maintain a Commissioning Notebook as required in the Cx Plan.
- B. OPR: A written document, prepared by Owner, that details the functional requirements of Project and expectations of how it will be used and operated. This document includes Project and design goals, measurable performance criteria, schedules, success criteria, and supporting information.
- C. BoD Document: A document, prepared by Architect and Design team, that records concepts, calculations, decisions, and product selections used to meet the OPR and to satisfy applicable regulatory requirements, standards, and guidelines. The document includes both narrative descriptions and lists of individual items that support the design process.
- D. Commissioning Plan: A document, prepared by CxA, that outlines the documentation requirements of the commissioning process, and shall include, but is not limited to the following:
 - 1. Review of submittals, systems manuals, and other documents and reports. Submittal dates shall include the latest date approved submittals must be received without adversely affecting commissioning plan.
 - 2. Description of the organization and content of commissioning documentation (including systems manual) and a detailed description of documents to be provided along with identification of responsible parties.
 - 3. Identification of systems and equipment to be commissioned.
 - 4. Description of schedules for testing procedures along with identification of parties involved in performing and verifying tests.



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5. Identification of items that must be completed before the next operation can proceed.
 6. Description of responsibilities of commissioning team members
 7. Description of observations to be made.
 8. Description requirements for operation and maintenance training, including required training materials.
 9. Schedule for commissioning activities with specific dates coordinated with overall construction schedule.
 10. Identification of installed systems, subsystems, and equipment, including design changes that occurred during the construction phase.
 11. Process and schedule for documenting changes on a continuous basis to appear in Project Record Documents.
 12. Process and schedule for completing pre-start and startup checklists for systems, subsystems, and equipment to be verified and tested.
 13. Update the systems manual with any modifications or new settings, and give the reason for any modifications from the original design.
- E. Enhanced and Monitoring-Based Commissioning Plan: A document, prepared by CxA that shall include, but is not limited to the following:
1. Roles and responsibilities;
 2. Measurement requirements (meters, points, metering systems, data access);
 3. The points to be tracked, with frequency and duration for trend monitoring;
 4. The limits of acceptable values for tracked points and metered values (where appropriate, predictive algorithms may be used to compare ideal values with actual values);
 5. The elements used to evaluate performance, including conflict between systems, out-of-sequence operation of systems components, and energy and water usage profiles;
 6. An action plan for identifying and correcting operational errors and deficiencies;
 7. Training to prevent errors;



8. Planning for repairs needed to maintain performance; and
 9. The frequency of analyses in the first year of occupancy (at least quarterly).
- F. Test Checklists: The CxA, with assistance of Architect, shall develop test checklists for each system, subsystem, or equipment including interfaces and interlocks, and include a separate entry, with space for comments, for each item to be tested. Prepare separate checklists for each mode of operation and provide space to indicate whether the mode under test responded as required. Provide space for testing personnel to sign off on each checklist. Each checklist, regardless of system, subsystem, or equipment being tested, shall include, but not be limited to, the following:
1. Name and identification of tested item.
 2. Test number.
 3. Time and date of test.
 4. Dated signatures of the person performing test and of the witness, if applicable.
 5. Individuals present for test.
 6. Deficiencies, if any.
- G. Pre-Functional checklists shall be completed and signed by General Contractor, Subcontractor(s), Owners representative and provided to the CxA certifying that systems, subsystems, equipment, and associated controls are ready for Functional testing. Completed test checklists signed by the responsible parties shall be given to the CxA.
- H. Test and Inspection Reports: CxA shall record test data, observations, and measurements on test checklists. CxA shall compile test and inspection reports, Functional Tests Checklists and test and inspection certificates and include them in systems manual and commissioning report.
- I. Corrective Action Documents: CxA shall document corrective action taken for systems and equipment that fail tests. Include required modifications to systems and equipment and revisions to test procedures, if any. Retest systems and equipment requiring corrective action and document retest results.
- J. Project Log: CxA shall prepare and maintain a Project/issues log that describes design, installation, and performance issues that are at variance with the OPR, BoD, and Contract Documents. Identify and track issues as they are encountered, documenting the status of unresolved and resolved issues.



K. Commissioning Report: CxA shall document results of the commissioning process including Commissioning Report: CxA shall document results of the commissioning process including any unresolved issues and performance of systems, subsystems, and equipment. The commissioning report shall indicate systems, subsystems, and equipment have been completed and are performing according to the OPR, BoD, and Contract Documents. The commissioning report is described in the Cx Plan:

1. Project/Issues log.
2. Date of Pre-functional checklist completion and any appropriate issues
3. Date of Functional checklist completion and any appropriate issues.

1.10 SUBMITTALS

- A. Commissioning Plan Submittal: CxA shall submit an electronically formatted final commissioning plan to the Architect.
- B. Test Checklists and Report Forms: CxA shall submit sample checklists and forms to each Contractor quality-control manager and subcontractors for review.
- C. Test and Inspection Reports: CxA shall submit test and inspection reports.
- D. Corrective Action Documents: CxA shall submit corrective action documents if any.
- E. Final Commissioning Report Submittal: CxA shall submit electronically formatted final commissioning report to the owner and Architect.

1.11 COORDINATION

- A. Coordinating Meetings: CxA may conduct coordination meetings as needed, of the commissioning team to review progress on the commissioning plan, to discuss scheduling conflicts, and to discuss upcoming commissioning process activities.
- B. Pre-testing Meetings: CxA may conduct pretest meetings of the commissioning team, if necessary, to review startup reports, pretest inspection results, testing procedures, testing personnel and instrumentation requirements, and manufacturers' authorized service representative services for each system, subsystem, equipment, and component to be tested.
- C. Testing Coordination: CxA shall coordinate sequence of testing activities to accommodate required quality-assurance and -control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspecting.



PART 2 - PRODUCTS

2.01 NOT USED

PART 3 - EXECUTION

3.01 OPERATION AND MAINTENANCE TRAINING REQUIREMENTS

- A. Training Preparation Conference: The General Contractor is responsible to ensure all training of the Owners personnel is accomplished and documented. Before operation and maintenance training, CxA may convene a training preparation conference to include Owner's operation and maintenance personnel, each Contractor, and subcontractors:
1. Review installed systems, subsystems, and equipment.
 2. Review instructor qualifications.
 3. Review instructional methods and procedures.
 4. Review training module outlines and contents.
 5. Review course materials (including operation and maintenance manuals).
 6. Review and finalize training schedule and verify availability of educational materials, instructors, audiovisual equipment, and facilities needed to avoid delays.
 7. For instruction that must occur outside, review weather and forecasted weather conditions and procedures to follow if conditions are unfavorable.

3.02 TRAINING MODULES

- A. Develop an instruction program that includes individual training modules for each system, subsystem, and equipment as specified in the Cx Plan.
- B. Provide a written record of attendees at each training.
- C. Provide a video recording of all training sessions for Owner's Use.

END OF SECTION – 01 91 13



SECTION 01 23 00

ALTERNATES

(Bid Items)

PART 1 - GENERAL

1.01 SECTION INCLUDES:

- A. This Section specifies administrative and procedural requirements governing alternate bid items.

1.02 RELATED REQUIREMENTS:

- A. Section 00 21 13: Instructions to Bidders
- B. Section 00 41 00: Bid and Acceptance Form
- C. Section 01 11 00: Summary of Work.

PART 2 - PRODUCTS (Not applicable)

PART 3 - EXECUTION

3.01 SPECIFIC:

- A. Bid item is an amount proposed by bidder and stated on the Bid and Acceptance Form for certain Work defined in the Bidding Documents that may be added to or deducted from the base bid amount if OWNER decides to accept a corresponding change in either the amount of Work to be completed, the Contract Documents, or in the products, materials, equipment, systems, or installation methods described in the Contract Documents.
 - 1. The amount added or deducted from the base bid is the net addition to or deducted from the base bid to incorporate bid item Work into the Work. Unless noted otherwise, no other adjustments are made to the Contract Amount, Milestones or the Contract Time.

3.02 PROCEDURES:

- A. CONTRACTOR shall modify or adjust affected adjacent Work as necessary to completely and fully integrate OWNER accepted bid item Work.



1. Include as part of each bid item, miscellaneous devices, accessory objects, and similar items incidental to or required for a complete installation whether or not mentioned as part of the bid item.
- B. Accepted bid items are subject to the same terms and conditions as other Work of the Contract Documents.
- C. OWNER reserves the right to accept bid items for a period of ninety days after bid opening date.
- D. Schedule: A schedule of bid items is included at the end of this Section. The Contract Documents referenced in the schedule identify necessary requirements to complete the Work described as specified for each bid item.

3.03 SCHEDULE OF BID ITEMS: (See the Bidding Documents for Additional Information)

- A. Alternate Bid Item 1: Main Entry Paving: Installation of Unit Pavers in lieu of Asphaltic Concrete paving at La Patera Lane turnaround.
- B. Alternate Bid Item 2: Crosswalks Paving: Installation of Unit Pavers in lieu of Asphaltic Concrete paving and standard striping.
- C. Alternate Bid Item 3: Fire Lane Paving: Installation of Unit Pavers in lieu of Decorative Vehicular Concrete paving at west plaza area.
- D. Alternate Bid Item 4: La Patera Improvement Package: Entire South La Patera Lane Improvement Project package.
- E. Alternate Bid Deduct Item 5: La Patera Improvement Package / Deduct from Alternative Bid Item 4 above: Removal of installation of landscape related items identified on landscape (L) sheets and street pole lights identified on electrical (E) sheets. Wiring included but conduits and sleeved not a part of the Alternate Bid Deduct 5.

END OF SECTION – 01 23 00



SECTION 01 25 13

PRODUCT PROCEDURES FOR SUBSTITUTION AND “OR EQUAL”

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. This Section includes administrative and procedural requirements for handling requests for substitutions and “or equal” submitted pursuant to the General Provisions.

1.02 RELATED REQUIREMENTS

- A. Section 01 31 50: Project Management Control Systems
- B. Section 01 32 29: Project Forms.
- C. Section 01 33 00: Submittal Procedures.
- D. Section 01 60 00: Product Requirements.
- E. Section 01 77 00: Contract Closeout.

1.03 APPLICATION

- A. OAR will review CONTRACTOR proposed changes in products or materials required by the Contract Documents.
 - 1. Substitutions: OAR will consider requests for substitution if a product is no longer manufactured or the OAR and ARCHITECT, after a diligent search have verified that product or material is not available to CONTRACTOR. The following are not considered to be valid requests for substitutions:
 - a. Revisions to the Contract Documents requested by OAR or ARCHITECT.
 - b. Specified options of products included in the Contract Documents.
 - c. Substitutions requested on a “or equal” or “equivalent” basis. This is determined by OAR’s approval and their opinion of a substituted product being the same or better to the product originally specified.
 - 2. “Or Equal”: OAR will consider requests for “or equal” if submitted within the time indicated in Article 6.14 of the General Conditions.

1.04 SUBMITTALS

- A. Transmit submittals as described in related Sections for each request for substitution or “or equal”.



1. Identify the product to be replaced in each request. Include related Specification Section and Drawing number.
2. Provide complete documentation denoting compliance with the requirements for substitutions, and the following information, as appropriate.
 - a. A detailed comparison of significant qualities of the proposed substitution with those specified in the Contract Documents. Significant qualities may include elements, such as performance, weight, size, durability, and visual effect.
 - b. Product Data, including Drawings, descriptions of products, fabrication, and installation procedures.
 - c. Samples, where applicable or requested.
 - d. CONTRACTOR certification the proposed substitution or “or equal” conforms to requirements of the Contract Documents in every respect and is appropriate for the applications indicated.
 - e. CONTRACTOR waiver of rights to an increase in the Contract Amount, Milestones and/or Contract Time.
3. If required, OAR and ARCHITECT will request additional information or documentation for evaluation.
4. ARCHITECT will review requests for substitutions and “or equals” and provide a recommendation to OAR.
5. If ARCHITECT accepts proposed substitutions or “or equals” OAR will forward submittals to the OWNER’s Maintenance and Operations Technical Unit for review. OAR will notify CONTRACTOR of acceptance or rejection of the substitution.
6. Where a proposed substitution or “or equal” involves and/or affects more than one Subcontractor, CONTRACTOR shall ensure each Subcontractor cooperates with the other Subcontractor involved to coordinate the Work, provide uniformity and consistency, and assure compatibility of all products.
7. CONTRACTOR submittal and ARCHITECT review of Shop Drawings, Product Data, material lists or Samples do not constitute an acceptable or valid request for substitutions or “or equals”.

PART 2 - PRODUCTS (Not used)

PART 3 - EXECUTION

END OF SECTION – 01 25 13



SECTION 01 2613

REQUEST FOR CLARIFICATION

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Procedure for requesting clarification of the intent of the Contract Documents.

1.02 RELATED REQUIREMENTS

- A. Section 01 11 00: Summary of Work.
- B. Section 01 31 13: Project Coordination.
- C. Section 01 3150: Project Management Control Systems
- D. Section 01 32 13: Construction Schedule.
- E. Section 01 32 29: Project Forms.
- F. Section 01 77 00: Contract Closeout.

PART 2 - PRODUCTS (Not used)

PART 3 - EXECUTION

3.01 PROCEDURE

- A. CONTRACTOR shall prepare a Request for Clarification through the Project Management Control System.
- B. ARCHITECT response is a clarification of the intent of the Contract Documents and does not authorize changes in the Contract Amount, Milestones and/or Contract Time.
- C. A Request for Clarification may be returned with a stamp or notation "Not Reviewed," if:
 - 1. The requested clarification is ambiguous or unclear.
 - 2. The requested clarification is equally available to the requesting party by researching and/or examining the Contract Documents.
 - 3. CONTRACTOR has not reviewed the Request for Clarification prior to submittal.



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- D. Allow a minimum of nine days for review and response time, after receipt by ARCHITECT and OAR. CONTRACTOR shall verify and is responsible in verifying ARCHITECT and OAR receipt of a Request for Clarification.
- E. Changes or alterations to the approved drawings or specifications shall be made by means of addenda or change orders as per section 4-338 of the California Building Standards Commission's, California Administrative Code.

END OF SECTION – 01 2613



SECTION 01 29 00

PAYMENT PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes administrative and procedural requirements necessary to prepare and process Applications for Payment.
- B. Related Requirements:
 - 1. Document 004373 "Proposed Schedule of Values Form" for requirements for furnishing proposed schedule of values with bid.
 - 2. Section 012100 "Allowances" for procedural requirements governing the handling and processing of allowances.
 - 3. Section 012200 "Unit Prices" for administrative requirements governing the use of unit prices.
 - 4. Section 012600 "Contract Modification Procedures" for administrative procedures for handling changes to the Contract.
 - 5. Section 013200 "Construction Progress Documentation" for administrative requirements governing the preparation and submittal of the Contractor's construction schedule.
 - 6. Section 018113.13 "Sustainable Design Requirements - LEED 2009 for New Construction and Major Renovations" for administrative requirements governing submittal of cost breakdown information required for sustainable design documentation.
 - 7. Section 018113.16 "Sustainable Design Requirements - LEED 2009 for Commercial Interiors" for administrative requirements governing submittal of cost breakdown information required for sustainable design documentation.
 - 8. Section 018113.19 "Sustainable Design Requirements - LEED 2009 for Core and Shell Development" for administrative requirements governing submittal of cost breakdown information required for sustainable design documentation.
 - 9. Section 018113.23 "Sustainable Design Requirements - LEED 2009 for Schools" for administrative requirements governing submittal of cost breakdown information required for sustainable design documentation.
 - 10. Section 018113.14 "Sustainable Design Requirements - LEED v4 BD+C" for administrative requirements governing submittal of cost breakdown information required for sustainable design documentation.
 - 11. Section 018113.17 "Sustainable Design Requirements - LEED v4 ID+C" for administrative requirements governing submittal of cost breakdown information required for sustainable design documentation.



12. Section 018113.43 "Sustainable Design Requirements - ASHRAE 189.1" for administrative requirements governing submittal of cost breakdown information required for sustainable design documentation.
13. Section 018113.53 "Sustainable Design Requirements - Green Globes" for administrative requirements governing submittal of cost breakdown information required for sustainable design documentation.

1.2 DEFINITIONS

- A. Schedule of Values: A statement furnished by Contractor allocating portions of the Contract Sum to various portions of the Work and used as the basis for reviewing Contractor's Applications for Payment.

1.3 SCHEDULE OF VALUES

- A. Coordination: Coordinate preparation of the schedule of values with preparation of Contractor's construction schedule. Cost-loaded Critical Path Method Schedule may serve to satisfy requirements for the schedule of values.
 1. Coordinate line items in the schedule of values with items required to be indicated as separate activities in Contractor's construction schedule.
 2. Submit the schedule of values to Construction Manager at earliest possible date, but no later than seven days before the date scheduled for submittal of initial Applications for Payment.
- B. Format and Content: Use Project Manual table of contents as a guide to establish line items for the schedule of values. Provide at least one line item for each Specification Section.
 1. Identification: Include the following Project identification on the schedule of values:
 - a. Project name and location.
 - b. Owner's name.
 - c. Owner's Project number.
 - d. Name of Architect.
 - e. Architect's Project number.
 - f. Contractor's name and address.
 - g. Date of submittal.
 2. Arrange schedule of values consistent with format of AIA Document G703.
 3. Arrange the schedule of values in tabular form, with separate columns to indicate the following for each item listed:
 - a. Related Specification Section or division.
 - b. Description of the Work.



- c. Name of subcontractor.
 - d. Name of manufacturer or fabricator.
 - e. Name of supplier.
 - f. Change Orders (numbers) that affect value.
 - g. Dollar value of the following, as a percentage of the Contract Sum to nearest one-hundredth percent, adjusted to total 100 percent. Round dollar amounts to whole dollars, with total equal to Contract Sum.
 - 1) Labor.
 - 2) Materials.
 - 3) Equipment.
4. Provide a breakdown of the Contract Sum in enough detail to facilitate continued evaluation of Applications for Payment and progress reports. Provide multiple line items for principal subcontract amounts more than five percent of the Contract Sum.
 5. Provide a separate line item in the schedule of values for each part of the Work where Applications for Payment may include materials or equipment purchased or fabricated and stored, but not yet installed.
 - a. Differentiate between items stored on-site and items stored off-site.
 6. Allowances: Provide a separate line item in the schedule of values for each allowance. Show line-item value of unit-cost allowances, as a product of the unit cost, multiplied by measured quantity. Use information indicated in the Contract Documents to determine quantities.
 7. Purchase Contracts: Provide a separate line item in the schedule of values for each Purchase contract. Show line-item value of Purchase contract. Indicate Owner payments or deposits, if any, and balance to be paid by Contractor.
 8. Overhead Costs, Proportional Distribution: Include total cost and proportionate share of general overhead and profit for each line item.
 9. Overhead Costs, Separate Line Items: Show cost of temporary facilities and other major cost items that are not direct cost of actual work-in-place as separate line items.
 10. Temporary Facilities: Show cost of temporary facilities and other major cost items that are not direct cost of actual work-in-place as separate line items.
 11. Closeout Costs. Include separate line items under Contractor and principal subcontracts for Project closeout requirements in an amount totaling five percent of the Contract Sum and subcontract amount.
 12. Schedule of Values Revisions: Revise the schedule of values when Change Orders or Construction Change Directives result in a change in the Contract Sum. Include at least one separate line item for each Change Order and Construction Change Directive.



1.4 APPLICATIONS FOR PAYMENT

- A. Each Application for Payment following the initial Application for Payment shall be consistent with previous applications and payments, as certified by Construction Manager and paid for by Owner.
- B. Payment Application Times: The date for each progress payment is indicated in the Owner/Contractor Agreement. The period of construction work covered by each Application for Payment is the period indicated in the Agreement.
- C. Payment Application Times: Submit final Application for Payment to Construction Manager by the end of the month. The period covered by each Application for Payment is one month, ending on the last day of the month.
 - 1. Submit draft copy of Application for Payment [**five**] calendar days prior to due date for review by Construction Manager.
- D. Application for Payment Forms: Use AIA Document G702 and AIA Document G703 or as approved by Owner as form for Applications for Payment.
 - 1. Other Application for Payment forms proposed by the Contractor may be acceptable to Construction Manager and Owner. Submit forms for approval with initial submittal of schedule of values.
- E. Application Preparation: Complete every entry on form. Notarize and execute by a person authorized to sign legal documents on behalf of Contractor. Construction Manager will return incomplete applications without action.
 - 1. Entries shall match data on the schedule of values and Contractor's construction schedule. Use updated schedules if revisions were made.
 - 2. Include amounts for work completed following previous Application for Payment, whether or not payment has been received. Include only amounts for work completed at time of Application for Payment.
 - 3. Include amounts of Change Orders and Construction Change Directives issued before last day of construction period covered by application.
 - 4. Indicate separate amounts for work being carried out under Owner-requested project acceleration.
- F. Stored Materials: Include in Application for Payment amounts applied for materials or equipment purchased or fabricated and stored, but not yet installed. Differentiate between items stored on-site and items stored off-site.
 - 1. Provide certificate of insurance, evidence of transfer of title to Owner, and consent of surety to payment for stored materials.
 - 2. Provide supporting documentation that verifies amount requested, such as paid invoices. Match amount requested with amounts indicated on documentation; do



- not include overhead and profit on stored materials.
3. Provide summary documentation for stored materials indicating the following:
 - a. Value of materials previously stored and remaining stored as of date of previous Applications for Payment.
 - b. Value of previously stored materials put in place after date of previous Application for Payment and on or before date of current Application for Payment.
 - c. Value of materials stored since date of previous Application for Payment and remaining stored as of date of current Application for Payment.
- G. Transmittal: Submit, through Electronic Project Management System, signed and notarized original copies of each Application for Payment to Construction Manager. One copy shall include waivers of lien and similar attachments if required.
1. Transmit each copy with a transmittal form listing attachments and recording appropriate information about application.
- H. Waivers of Mechanic's Lien: With each Application for Payment, submit waivers of mechanic's lien from entities lawfully entitled to file a mechanic's lien arising out of the Contract and related to the Work covered by the payment for construction period covered by the previous application.
1. Submit partial waivers on each item for amount requested in previous application, after deduction for retainage, on each item.
 2. When an application shows completion of an item, submit conditional final or full waivers.
 3. Owner reserves the right to designate which entities involved in the Work must submit waivers.
 4. Submit final Application for Payment with or preceded by conditional final waivers from every entity involved with performance of the Work covered by the application who is lawfully entitled to a lien.
 5. Waiver Forms: Submit executed waivers of lien on forms acceptable to Owner.
- I. Initial Application for Payment: Administrative actions and submittals that must precede or coincide with submittal of first Application for Payment include the following:
1. List of subcontractors.
 2. Schedule of values.
 3. Contractor's construction schedule (preliminary if not final).
 4. Combined Contractor's construction schedule (preliminary if not final) incorporating Work of multiple contracts, with indication of acceptance of schedule by each Contractor.
 5. Products list (preliminary if not final).
 6. Sustainable design action plans, including preliminary project materials cost



- data.
 7. Schedule of unit prices.
 8. Submittal schedule (preliminary if not final).
 9. List of Contractor's staff assignments.
 10. List of Contractor's principal consultants.
 11. Copies of building permits.
 12. Copies of authorizations and licenses from authorities having jurisdiction for performance of the Work.
 13. Initial progress report.
 14. Report of preconstruction conference.
 15. Certificates of insurance and insurance policies.
 16. Performance and payment bonds.
 17. Data needed to acquire Owner's insurance.
- J. Application for Payment at Substantial Completion: After Architect issues the Certificate of Substantial Completion, submit an Application for Payment showing 100 percent completion for portion of the Work claimed as substantially complete.
1. Include documentation supporting claim that the Work is substantially complete and a statement showing an accounting of changes to the Contract Sum.
 - a. Complete administrative actions, submittals, and Work preceding this application, as described in Section 017700 "Closeout Procedures."
 2. This application shall reflect Certificate(s) of Substantial Completion issued previously for Owner occupancy of designated portions of the Work.
- K. Final Payment Application: After completing Project closeout requirements, submit final Application for Payment with releases and supporting documentation not previously submitted and accepted, including, but not limited, to the following:
1. Evidence of completion of Project closeout requirements.
 2. Certification of completion of final punch list items.
 3. Insurance certificates for products and completed operations where required and proof that taxes, fees, and similar obligations were paid.
 4. Updated final statement, accounting for final changes to the Contract Sum.
 5. AIA Document G706.
 6. AIA Document G706A.
 7. AIA Document G707.
 8. Evidence that claims have been settled.
 9. Final meter readings for utilities, a measured record of stored fuel, and similar data as of date of Substantial Completion or when Owner took possession of and assumed responsibility for corresponding elements of the Work.
 10. Final liquidated damages settlement statement.
 11. Proof that taxes, fees, and similar obligations are paid.
 12. Waivers and releases.



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PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION - 01 29 00



SECTION 01 29 73

SCHEDULE OF VALUES

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Procedure for submission of a certified Schedule of Values for review and approval by the OAR.

1.02 RELATED REQUIREMENTS

- A. Section 01 21 00: Allowances.
- B. Section 01 23 00: Alternates (Bid Items).
- C. Section 01 29 76: Progress Payment Procedures.
- D. Section 01 31 13: Project Coordination.
- E. Section 01 32 13: Construction Schedule.
- F. Section 01 3150: Project Management Control System
- G. Section 01 32 29: Project Forms.
- H. Section 01 33 00: Submittal Procedures.

PART 2 - PRODUCTS (Not used)

PART 3 - EXECUTION

3.01 PREPARATION

- A. Upon receipt of the Notice of Intent to Award, CONTRACTOR shall commence preparation of a Schedule of Values in accordance with the form included in Section 01 3229.
- B. CONTRACTOR shall coordinate the preparation of a Schedule of Values with preparation of the Construction Schedule as set forth in Section 01 3213.
- C. Include the following Project identification on a certified Schedule of Values:
 - 1. Project name and location.



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2. Project Number.
 3. Contract #.
 4. CONTRACTOR name.
 5. Date of Submittal.
- D. The Schedule of Values shall be in tabular form with separate columns and shall include the following items:
1. Related Specification Section and Division.
 2. Description of Work.
 3. Name of Subcontractor, manufacturer or supplier.
 4. Dollar value, quantity and unit of measure of each line item.
 5. Percentage of Contract amount to nearest one-hundredth percent, adjusted to total 100 percent.
- E. Round amounts to the nearest whole dollar; the total shall equal the Contract Amount.
- F. Provide a breakdown of the Contract Amount in enough detail acceptable to OAR to facilitate continued evaluation of Application for Payment and progress reports. Coordinate with the Project Manual table of content and Schedule of Values form under Section 01 3229. Provide line items for subcontract amounts, where appropriate.
- G. Provide separate line items for items in the Schedule of Values for total installed value of that part of the Work.
- H. Provide separate line item for labor and material when required by the OAR.
- I. Each item in the Schedule of Values and Applications for Payment shall be complete. Include total cost and proportionate share of general overhead and profit for each item except the amounts shown as separate line items as indicated under Schedule of Values form under Section 01 3229.
- J. Temporary facilities and other cost items that are not direct cost of actual work-in-place shall be shown as separate line items as indicated under Schedule of Values form under Section 01 3229.
- K. An approved certified Schedule of Values shall serve as the basis for the monthly certified Application for Payment.
- L. If at any time, OWNER determines, in its reasonable discretion, that the schedule of Values does not approximate the actual cost being incurred by CONTRACTOR to perform the Work, CONTRACTOR shall prepare, for OAR approval, a revised Schedule of Values, which then shall be used as the basis for future progress



payments. Without changing the Contract Amount, OWNER reserves the right to require CONTRACTOR:

1. To increase or decrease amounts within the line items in the Schedule of Values; and,
2. To conform the price breakdown to OWNER accounting practice.

3.02 SUBMITTAL

- A. CONTRACTOR shall submit five certified copies of a Schedule of Values for review and approval by the OAR at least 14 days before the first Application for Payment.
- B. OAR will review and if necessary, return the submitted Schedule of Values with summary comments noting items not in compliance with the requirements of the Contract Documents. CONTRACTOR shall revise the submitted Schedule of Values and return five copies within three days of receipt of summary comments.
- C. Signature by OAR shall constitute acceptance of the submitted Schedule of Values.
- D. An approved copy of the Schedule of Values by OAR will be transmitted to CONTRACTOR, and Inspector.

END OF SECTION – 01 2973



SECTION 01 31 00

PROJECT MANAGEMENT AND COORDINATION

PART 1 - GENERAL

1.01 SUMMARY

- A. Section includes administrative provisions for coordinating construction operations on Project, including, but not limited to, the following:
 - 1. General coordination procedures.
 - 2. Coordination drawings.
 - 3. RFIs.
 - 4. Digital project management procedures.
 - 5. Web-based Project management software package.
 - 6. Project meetings.
- B. Each contractor shall participate in coordination requirements. Certain areas of responsibility are assigned to a specific contractor.
- C. Related Requirements:
 - 1. Section 011200 "Multiple Contract Summary" for a description of the division of work among separate contracts and responsibility for coordination activities not in this Section.
 - 2. Section 013200 "Construction Progress Documentation" for preparing and submitting Contractor's construction schedule.
 - 3. Section 017300 "Execution" for procedures for coordinating general installation and field-engineering services, including establishment of benchmarks and control points.
 - 4. Section 017700 "Closeout Procedures" for coordinating closeout of the Contract.
 - 5. Section 019113 "General Commissioning Requirements" for coordinating the Work with Owner's Commissioning Authority.

1.2 DEFINITIONS

- A. BIM: Building Information Modeling.
- B. RFC: Request for Clarification. Request from Contractor seeking information required by or clarifications of the Contract Documents.



1.3 INFORMATIONAL SUBMITTALS

- A. Subcontract List: Prepare a written summary identifying individuals or firms proposed for each portion of the Work, including those who are to furnish products or equipment fabricated to a special design. Include the following information in tabular form:
1. Name, address, telephone number, and email address of entity performing subcontract or supplying products.
 2. Number and title of related Specification Section(s) covered by subcontract.
 3. Drawing number and detail references, as appropriate, covered by subcontract.
- B. Key Personnel Names: Within 15 calendar days of starting construction operations, submit a list of key personnel assignments, including superintendent and other personnel in attendance at Project site. Identify individuals and their duties and responsibilities; list addresses, cellular telephone numbers, and e-mail addresses. Provide names, addresses, and telephone numbers of individuals assigned as alternates in the absence of individuals assigned to Project.
1. Post copies of list in Project meeting room, in temporary field office, in web-based Project software directory. Always keep list current.

1.4 GENERAL COORDINATION PROCEDURES

- A. Coordination: Coordinate construction operations included in different Sections of the Specifications to ensure efficient and orderly installation of each part of the Work. Coordinate construction operations included in different Sections that depend on each other for proper installation, connection, and operation.
1. Schedule construction operations in sequence required to obtain the best results, where installation of one part of the Work depends on installation of other components, before or after its own installation.
 2. Coordinate installation of different components to ensure maximum performance and accessibility for required maintenance, service, and repair.
 3. Make adequate provisions to accommodate items scheduled for later installation.
- B. Coordination of Multiple Contracts: Each contractor shall cooperate with project coordinator, who shall coordinate its construction operations with those of other contractors and entities to ensure efficient and orderly installation of each part of the Work. Each contractor shall coordinate its own operations with operations included in different Sections that depend on each other for proper installation, connection, and operation.
1. Schedule construction operations in sequence required to obtain the best results, where installation of one part of the Work depends on installation of other components, before or after its own installation.
 2. Coordinate installation of different components with other contractors to ensure



- maximum performance and accessibility for required maintenance, service, and repair.
 3. Make adequate provisions to accommodate items scheduled for later installation.
- C. Prepare memoranda for distribution to each party involved, outlining special procedures required for coordination. Include such items as required notices, reports, and list of attendees at meetings.
1. Prepare similar memoranda for Owner and separate contractors if coordination of their Work is required.
- D. Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities and scheduled activities of other contractors with Construction Manager to avoid conflicts and to ensure orderly progress of the Work. Such administrative activities include, but are not limited to, the following:
1. Preparation of Contractor's construction schedule.
 2. Preparation of the schedule of values.
 3. Installation and removal of temporary facilities and controls.
 4. Buy out of Subcontracts and Materials.
 5. Delivery and processing of submittals including durations for review.
 6. Progress meetings.
 7. Preinstallation conferences.
 8. Project closeout activities.
 9. Startup and adjustment of systems.

1.5 COORDINATION DRAWINGS

- A. Coordination Drawings, General: Prepare coordination drawings according to requirements in individual Sections, and additionally where installation is not completely indicated on Shop Drawings, where limited space availability necessitates coordination, or if coordination is required to facilitate integration of products and materials fabricated or installed by more than one entity.
1. Content: Project-specific information, drawn accurately to a scale large enough to indicate and resolve conflicts. Do not base coordination drawings on standard printed data. Include the following information, as applicable:
 - a. Use applicable Drawings as a basis for preparation of coordination drawings. Prepare sections, elevations, and details as needed to describe relationship of various systems and components.
 - b. Coordinate the addition of trade-specific information to coordination drawings in a sequence that best provides for coordination of the information and resolution of conflicts between installed components before submitting for review.



- c. Indicate functional and spatial relationships of components of architectural, structural, civil, mechanical, and electrical systems.
- d. Indicate space requirements for routine maintenance and for anticipated replacement of components during the life of the installation.
- e. Show location and size of access doors required for access to concealed dampers, valves, and other controls.
- f. Indicate required installation sequences.
- g. Indicate dimensions shown on Drawings. Specifically note dimensions that appear to be in conflict with submitted equipment and minimum clearance requirements. Provide alternative sketches to Architect indicating proposed resolution of such conflicts. Minor dimension changes and difficult installations will not be considered changes to the Contract.

B. Coordination Drawing Organization: Organize coordination drawings as follows:

1. **Floor Plans and Reflected Ceiling Plans:** Show architectural and structural elements, and mechanical, plumbing, fire-protection, fire-alarm, and electrical Work. Show locations of visible ceiling-mounted devices relative to acoustical ceiling grid. Supplement plan drawings with section drawings where required to adequately represent the Work.
2. **Plenum Space:** Indicate subframing for support of ceiling, and wall systems, mechanical and electrical equipment, and related Work. Locate components within plenums to accommodate layout of light fixtures and other components indicated on Drawings. Indicate areas of conflict between light fixtures and other components.
3. **Mechanical Rooms:** Provide coordination drawings for mechanical rooms, showing plans and elevations of mechanical, plumbing, fire-protection, fire-alarm, and electrical equipment.
4. **Structural Penetrations:** Indicate penetrations and openings required for all disciplines.
5. **Slab Edge and Embedded Items:** Indicate slab edge locations and sizes and locations of embedded items for metal fabrications, sleeves, anchor bolts, bearing plates, angles, door floor closers, slab depressions for floor finishes, curbs and housekeeping pads, and similar items.
6. **Mechanical and Plumbing Work:** Show the following:
 - a. Sizes and bottom elevations of ductwork, piping, and conduit runs, including insulation, bracing, flanges, and support systems.
 - b. Dimensions of major components, such as dampers, valves, diffusers, access doors, cleanouts and electrical distribution equipment.
 - c. Fire-rated enclosures around ductwork.
7. **Electrical Work:** Show the following:
 - a. Runs of vertical and horizontal conduit 1-1/4 inches in diameter and larger.
 - b. Light fixture, exit light, emergency battery pack, smoke detector, and other



- fire-alarm locations.
 - c. Panel board, switchboard, switchgear, transformer, busway, generator, and motor-control center locations.
 - d. Location of pull boxes and junction boxes, dimensioned from column center lines.
 - e. Low
8. Fire-Protection System: Show the following:
- a. Locations of standpipes, mains piping, branch lines, pipe drops, and sprinkler heads.
9. Review: Architect will review coordination drawings to confirm that, in general, the Work is being coordinated, but not for the details of the coordination, which are Contractor's responsibility. If Architect determines that coordination drawings are not being prepared in sufficient scope or detail, or are otherwise deficient, Architect will so inform Contractor, who shall make suitable modifications and resubmit.
10. Coordination Drawing Prints: Prepare coordination drawing prints according to requirements in Section 013300 "Submittal Procedures."
- C. Coordination Drawing Process: Prepare coordination drawings in the following manner:
- 1. Schedule submittal and review of Fire Sprinkler, Plumbing, HVAC, and Electrical Shop Drawings to make required changes prior to preparation of coordination drawings.
 - 2. Commence routing of coordination drawing files with HVAC Installer, who will provide drawing plan files denoting approved ductwork. HVAC Installer will locate ductwork and piping on a single layer, using orange color. Forward drawings to Plumbing Installer.
 - 3. Plumbing Installer will locate plumbing and equipment on a single layer, using blue color.
 - 4. Fire Sprinkler Installer will locate piping and equipment, using red color. Fire Sprinkler Installer shall forward drawing files to Electrical Installer.
 - 5. Electrical Installer will indicate service and feeder conduit runs and equipment in green color. Electrical Installer shall forward drawing files to Communications and Electronic Safety and Security Installer.
 - 6. Communications and Electronic Safety and Security Installer will indicate cable trays and cabling runs and equipment in purple color. Communications and Electronic Safety and Security Installer shall forward completed drawing files to Contractor.
 - 7. Contractor shall perform the final coordination review. As each coordination drawing is completed, Contractor will meet with Architect to review and resolve conflicts on the coordination drawings.
- D. Coordination Digital Data Files: Prepare coordination digital data files according to the following requirements:



1. File Preparation Format:
 - a. Same digital data software program, version, and operating system as original Drawings.
 - b. DWG Latest Version, operating in Microsoft Windows operating system.
2. File Submittal Format: Submit or post coordination drawing files using PDF format.
3. BIM File Incorporation: Develop and incorporate coordination drawing files into BIM established for Project.
 - a. Perform three-dimensional component conflict analysis as part of preparation of coordination drawings. Resolve component conflicts prior to submittal. Indicate where conflict resolution requires modification of design requirements by Architect.
4. Architect will furnish Contractor one set of digital data files of Drawings for use in preparing coordination digital data files.
 - a. Architect makes no representations as to the accuracy or completeness of digital data files as they relate to Drawings.
 - b. Contractor shall execute a data licensing agreement in the form acceptable to Owner and Architect.

1.6 REQUEST FOR CLARIFICATION(RFC)

- A. General: Immediately on discovery of the need for additional information, clarification, or interpretation of the Contract Documents, Contractor shall prepare and submit an RFC in the form specified.
 1. Architect will return without response those RFCs submitted to Architect by other entities controlled by Contractor.
 2. Coordinate and submit RFCs in a prompt manner to avoid delays in Contractor's work or work of subcontractors.
- B. Content of the RFC: Include a detailed, legible description of item needing information or interpretation and the following:
 1. Project name.
 2. Owner name.
 3. Owner's Project number.
 4. Name of Architect and Construction Manager.
 5. Architect's Project number.
 6. Date.
 7. Name of Contractor.
 8. RFC number, numbered sequentially.



9. RFC subject.
 10. Specification Section number and title and related paragraphs, as appropriate.
 11. Drawing number and detail references, as appropriate.
 12. Field dimensions and conditions, as appropriate.
 13. Contractor's suggested resolution. If Contractor's suggested resolution impacts the Contract Time or the Contract Sum, Contractor shall state impact in the RFC.
 14. Contractor's signature.
 15. Attachments: Include sketches, descriptions, measurements, photos, Product Data, Shop Drawings, coordination drawings, and other information necessary to fully describe items needing interpretation.
 - a. Include dimensions, thicknesses, structural grid references, and details of affected materials, assemblies, and attachments on attached sketches.
- C. RFC Forms: As provided or approved by Owner.
1. Attachments shall be electronic files in PDF format.
- D. Architect's and Construction Manager's Action: Architect and Construction Manager will review each RFC, determine action required, and respond. Allow fourteen calendar days for Architect's response for each RFC. RFCs received by Construction Manager after 1:00 p.m. will be considered as received the following working day.
1. The following Contractor-generated RFCs will be returned without action:
 - a. Requests for approval of submittals.
 - b. Requests for approval of substitutions.
 - c. Requests for approval of Contractor's means and methods.
 - d. Requests for coordination information already indicated in the Contract Documents.
 - e. Requests for adjustments in the Contract Time or the Contract Sum.
 - f. Requests for interpretation of Architect's actions on submittals.
 - g. Incomplete RFIs or inaccurately prepared RFCs.
 2. Architect's action may include a request for additional information, in which case Architect's time for response will date from time of receipt by Architect Construction Manager of additional information.
 3. Architect's action on RFCs that may result in a change to the Contract Time or the Contract Sum may be eligible for Contractor to submit Change Proposal according to Section 012600 "Contract Modification Procedures."
 - a. If Contractor believes the RFC response warrants change in the Contract Time or the Contract Sum, notify Construction Manager in writing within Three (3) Calendar days of receipt of the RFC response.
- E. RFC Log: Prepare, maintain, and submit a tabular log of RFCs organized by the RFC number. Submit log weekly. Use software log that is part of web-based Project



management software. Include the following.

1. Project name.
 2. Name and address of Contractor.
 3. Name and address of Architect and Construction Manager.
 4. RFI number, including RFCs that were returned without action or withdrawn.
 5. RFI description.
 6. Date the RFC was submitted.
 7. Date Architect's and Construction Manager's response was received.
 8. Identification of related Minor Change in the Work, Construction Change Directive, and Proposal Request, as appropriate.
 9. Identification of related Field Order, Work Change Directive, and Proposal Request, as appropriate.
- F. On receipt of Construction Manager's action, update the RFC log and immediately distribute the RFC response to affected parties. Review response and notify Construction Manager within three Calendar days if Contractor disagrees with response.

1.7 DIGITAL PROJECT MANAGEMENT PROCEDURES

- A. Use of Architect's Digital Data Files: Digital data files of Architect's CAD drawings will be provided by Architect for Contractor's use during construction.
1. Digital data files may be used by Contractor in preparing coordination drawings, Shop Drawings, and Project Record Drawings.
 2. Architect makes no representations as to the accuracy or completeness of digital data files as they relate to Contract Drawings.
 3. Contractor shall execute a data licensing agreement in the form acceptable to Owner and Architect.
 4. The following digital data files will be furnished for each appropriate discipline:
 - a. Floor plans.
 - b. Reflected ceiling plans.
 - c. Others as requested and approved by Owner.
- B. Web-Based Project Management Software Package: Provide and administer web-based Project management software package for purposes of hosting and managing Project communication and documentation until Final Completion.
1. Web-based Project management software includes, at a minimum, the following features:
 - a. Compilation of Project data, including Contractor, subcontractors, Architect, Architect's consultants, Owner, and other entities involved in Project. Include names of individuals and contact information.
 - b. Access control for each entity for each workflow process, to determine entity's digital rights to create, modify, view, and print documents.



- c. Document workflow planning, allowing customization of workflow between project entities.
 - d. Creation, logging, tracking, and notification for Project communications required in other Specification Sections, including, but not limited to, RFIs, submittals, Minor Changes in the Work, Construction Change Directives, and Change Orders.
 - e. Track status of each Project communication in real time, and log time and date when responses are provided.
 - f. Procedures for handling PDFs or similar file formats, allowing markups by each entity. Provide security features to lock markups against changes once submitted.
 - g. Processing and tracking of payment applications.
 - h. Processing and tracking of contract modifications.
 - i. Creating and distributing meeting minutes.
 - j. Document management for Drawings, Specifications, and coordination drawings, including revision control.
 - k. Management of construction progress photographs.
 - l. Mobile device compatibility, including smartphones and tablets.
2. Provide Project management software user licenses for use of Owner, Owner's Commissioning Authority, **Inspector(s)**, Construction Manager, Architect, and Architect's consultants. Provide four hours of software training at Architect's office for web-based Project software users.
 3. At completion of Project, provide digital archive in format that is readable by common desktop software applications in format acceptable to Architect. Provide data in locked format to prevent further changes.
 4. Manufacturers: Subject to compliance with requirements, provide products by available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Procore Technologies, Inc.
 - b. Autodesk, Inc.
 - c. Corecon Technologies, Inc.
 - d. Deltek Inc.
 - e. Meridian Systems, Inc.
 - f. Newforma, Inc.
 - g. Viewpoint, Inc.; a Trimble Company.
- C. PDF Document Preparation: Where PDFs are required to be submitted to Construction Manager, prepare as follows:
1. Assemble complete submittal package into a single indexed file, incorporating submittal requirements of a single Specification Section and transmittal form with links enabling navigation to each item.
 2. Name file with submittal number or other unique identifier, including revision identifier.



3. Certifications: Where digitally submitted certificates and certifications are required, provide a digital signature with digital certificate on where indicated.

1.8 PROJECT MEETINGS

- A. General: Construction Manager will schedule and conduct meetings and conferences at Project site unless otherwise indicated.
- B. Preconstruction Conference: Construction Manager will schedule and conduct a preconstruction conference before starting construction, at a time convenient to Owner, but no later than 15 calendar days after execution of the Agreement.
 1. Attendees: Authorized representatives of Owner, Owner's Commissioning Authority,, Construction Manager, Architect, their consultants; Contractor and its superintendent; major subcontractors; suppliers; and other concerned parties shall attend the conference. Participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.
 2. Agenda: Discuss items of significance that could affect progress, including the following:
 - a. Responsibilities and personnel assignments.
 - b. Tentative construction schedule.
 - c. Phasing.
 - d. Critical work sequencing and long lead items.
 - e. Designation of key personnel and their duties.
 - f. Lines of communications.
 - g. Use of web-based Project software.
 - h. Procedures for processing field decisions and Change Orders.
 - i. Procedures for RFCs.
 - j. Procedures for testing and inspecting.
 - k. Procedures for processing Applications for Payment.
 - l. Distribution of the Contract Documents.
 - m. Submittal procedures.
 - n. Sustainable design requirements.
 - o. Preparation of Record Documents.
 - p. Use of the premises.
 - q. Work restrictions.
 - r. Working hours.
 - s. Owner's occupancy requirements.
 - t. Responsibility for temporary facilities and controls.
 - u. Procedures for moisture and mold control.
 - v. Procedures for disruptions and shutdowns.
 - w. Construction waste management and recycling.
 - x. Parking availability.
 - y. Office, work, and storage areas.
 - z. Equipment deliveries and priorities.



- aa. First aid.
 - bb. Security.
 - cc. Progress cleaning.
 3. Minutes: Entity responsible for conducting meeting will record and distribute meeting minutes.
- C. Sustainable Design Requirements Coordination Conference: Construction Manager will schedule and conduct a sustainable design coordination conference before starting construction, at a time convenient to Owner, Construction Manager, Architect, and Contractor.
 1. Attendees: Authorized representatives of Owner, Owner's Commissioning Authority, Construction Manager, Inspectors, Architect, and their consultants; Contractor and its superintendent and sustainable design coordinator; major subcontractors; suppliers; and other concerned parties shall attend the conference. Participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.
 2. Agenda: Discuss items of significance that could affect meeting sustainable design requirements, including the following:
 - a. Sustainable design Project checklist.
 - b. General requirements for sustainable design-related procurement and documentation.
 - c. Project closeout requirements and sustainable design certification procedures.
 - d. Role of sustainable design coordinator.
 - e. Construction waste management.
 - f. Construction operations and sustainable design requirements and restrictions.
 3. Minutes: Entity responsible for conducting meeting will record and distribute meeting minutes.
- D. Preinstallation Conferences: Conduct a preinstallation conference at Project site before each construction activity when required by other Sections and when required for coordination with other construction.
 1. Attendees: Installer and representatives of manufacturers and fabricators involved in or affected by the installation and its coordination or integration with other materials and installations that have preceded or will follow, shall attend the meeting. Advise Architect, Construction Manager, Inspectors, and Owner's Commissioning Authority] of scheduled meeting dates.
 2. Agenda: Review progress of other construction activities and preparations for the particular activity under consideration, including requirements for the following:



- a. Contract Documents.
 - b. Options.
 - c. Related RFCs.
 - d. Related Change Orders.
 - e. Purchases.
 - f. Deliveries.
 - g. Submittals.
 - h. Sustainable design requirements.
 - i. Review of mockups.
 - j. Possible conflicts.
 - k. Compatibility requirements.
 - l. Time schedules.
 - m. Weather limitations.
 - n. Manufacturer's written instructions.
 - o. Warranty requirements.
 - p. Compatibility of materials.
 - q. Acceptability of substrates.
 - r. Temporary facilities and controls.
 - s. Space and access limitations.
 - t. Regulations of authorities having jurisdiction.
 - u. Testing and inspecting requirements.
 - v. Installation procedures.
 - w. Coordination with other work.
 - x. Required performance results.
 - y. Protection of adjacent work.
 - z. Protection of construction and personnel.
3. Record significant conference discussions, agreements, and disagreements, including required corrective measures and actions.
 4. Reporting: Distribute minutes of the meeting to each party present and to other parties requiring information.
 5. Do not proceed with installation if the conference cannot be successfully concluded. Initiate whatever actions are necessary to resolve impediments to performance of the Work and reconvene the conference at earliest feasible date.
- E. Project Closeout Conference: Construction Manager will schedule and conduct a project closeout conference, at a time convenient to Owner and Architect, but no later than 60 calendar days prior to the scheduled date of Substantial Completion.
1. Conduct the conference to review requirements and responsibilities related to Project closeout.
 2. Attendees: Authorized representatives of Owner, Owner's Commissioning Authority, Construction Manager, Inspectors, Architect, and their consultants; Contractor and its superintendent; major subcontractors; suppliers; and other concerned parties shall attend the meeting. Participants at the meeting shall be familiar with Project and authorized to conclude matters relating to the Work.



3. Agenda: Discuss items of significance that could affect or delay Project closeout, including the following:
 - a. Preparation of Record Documents.
 - b. Procedures required prior to inspection for Substantial Completion and for final inspection for acceptance.
 - c. Procedures for completing and archiving web-based Project software site data files.
 - d. Submittal of written warranties.
 - e. Requirements for completing sustainable design documentation.
 - f. Requirements for preparing operations and maintenance data.
 - g. Requirements for delivery of material samples, attic stock, and spare parts.
 - h. Requirements for demonstration and training.
 - i. Preparation of Contractor's punch list.
 - j. Procedures for processing Applications for Payment at Substantial Completion and for final payment.
 - k. Submittal procedures.
 - l. Coordination of separate contracts.
 - m. Owner's partial occupancy requirements.
 - n. Installation of Owner's furniture, fixtures, and equipment.
 - o. Responsibility for removing temporary facilities and controls.
 4. Minutes: Entity conducting meeting will record and distribute meeting minutes.
- F. Progress Meetings: Construction Manager will conduct progress meetings at regular intervals.
1. Coordinate dates of meetings with preparation of payment requests.
 2. Attendees: In addition to representatives of Owner, Owner's Commissioning Authority, Construction Manager, Inspectors, and Architect, each contractor, subcontractor, supplier, and other entity concerned with current progress or involved in planning, coordination, or performance of future activities shall be represented at these meetings. All participants at the meeting shall be familiar with Project and authorized to conclude matters relating to the Work.
 3. Agenda: Review and correct or approve minutes of previous progress meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to status of Project.
 - a. Contractor's Construction Schedule: Review progress since the last meeting. Determine whether each activity is on time, ahead of schedule, or behind schedule, in relation to Contractor's construction schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.
 - 1) Review schedule for next period.



- b. Review present and future needs of each entity present, including the following:
 - 1) Interface requirements.
 - 2) Sequence of operations.
 - 3) Resolution of BIM component conflicts.
 - 4) Status of submittals.
 - 5) Status of sustainable design documentation.
 - 6) Deliveries.
 - 7) Off-site fabrication.
 - 8) Access.
 - 9) Site use.
 - 10) Temporary facilities and controls.
 - 11) Progress cleaning.
 - 12) Quality and work standards.
 - 13) Status of correction of deficient items.
 - 14) Field observations.
 - 15) Status of RFIs.
 - 16) Status of Proposal Requests.
 - 17) Pending changes.
 - 18) Status of Change Orders.
 - 19) Pending claims and disputes.
 - 20) Documentation of information for payment requests.
4. Minutes: Entity responsible for conducting the meeting will record and distribute the meeting minutes to each party present and to parties requiring information.
 - a. Schedule Updating: Revise Contractor's construction schedule after each progress meeting, where revisions to the schedule have been made or recognized. Issue revised schedule concurrently with the report of each meeting.
- G. Coordination Meetings: Construction Manager will conduct] regular intervals. Project coordination meetings are in addition to specific meetings held for other purposes, such as progress meetings and preinstallation conferences.
 1. Attendees: In addition to representatives of Owner[, Owner's Commissioning Authority, Construction Manager, Inspectors, and Architect, each contractor, subcontractor, supplier, and other entity concerned with current progress or involved in planning, coordination, or performance of future activities shall be represented at these meetings. All participants at the meetings shall be familiar with Project and authorized to conclude matters relating to the Work.
 2. Agenda: Review and correct or approve minutes of the previous coordination meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to status of Project.



- a. Combined Contractor's Construction Schedule: Review progress since the last coordination meeting. Determine whether each contract is on time, ahead of schedule, or behind schedule, in relation to combined Contractor's construction schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.
 - b. Schedule Updating: Revise combined Contractor's construction schedule after each coordination meeting, where revisions to the schedule have been made or recognized. Issue revised schedule concurrently with report of each meeting.
 - c. Review present and future needs of each contractor present, including the following:
 - 1) Interface requirements.
 - 2) Sequence of operations.
 - 3) Resolution of BIM component conflicts.
 - 4) Status of submittals.
 - 5) Deliveries.
 - 6) Off-site fabrication.
 - 7) Access.
 - 8) Site use.
 - 9) Temporary facilities and controls.
 - 10) Work hours.
 - 11) Hazards and risks.
 - 12) Progress cleaning.
 - 13) Quality and work standards.
 - 14) Status of RFCs.
 - 15) Proposal Requests.
 - 16) Change Orders.
 - 17) Pending changes.
3. Reporting: Record meeting results and distribute copies to everyone in attendance and to others affected by decisions or actions resulting from each meeting.

PART 2 - PRODUCTS (Not Used)
PART 3 - EXECUTION (Not Used)

END OF SECTION - 01 31 00



SECTION 01 31 13

PROJECT COORDINATION

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. This Section specifies administrative and procedural requirements necessary for coordinating Work operations including, but not limited to, the following:
 - 1. General coordination procedures.
 - 2. Coordination drawings.

1.02. RELATED REQUIREMENTS

- A. Section 01 12 16: Phasing of the Work.
- B. Section 01 32 13: Construction Schedule.
- C. Section 01 33 00: Submittal Procedures.
- D. Section 01 45 23: Test and Inspection.
- E. Section 01 45 25: Testing, Adjusting, and Balancing for HVAC.
- F. Section 01 77 00: Contract Closeout.

PART 2 - PRODUCTS (Not used)

PART 3 - EXECUTION

3.01 COORDINATION

- A. CONTRACTOR shall coordinate operations included in various sections of Contract Documents to assure efficient and orderly installation of each part of Work. Coordinate Work operations included under related sections of Contract Documents that depend on each other for proper installation, connection, and operation of Work, including but not limited to:
 - 1. Schedule construction operations in sequence required where installation of one part of Work depends on installation of other components, before or after its own installation.
 - 2. Coordinate installation of different components to assure maximum accessibility for required maintenance, service, and repair.



3. Provide provisions to accommodate items scheduled for later installation.
 4. Prepare and administer provisions for coordination drawings.
- B. Where necessary, prepare memoranda for distribution to each party involved, outlining special procedures required for coordination. Include such items as required in notices, reports, attendance at meetings, and:
1. Prepare similar memoranda for OAR and Separate Work Contract where coordination of their Work is required.
- C. Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities to avoid conflicts and assure orderly progress of Work. Such administrative activities include, but are not limited to, following:
1. Preparation of schedules.
 2. Installation, relocation, and removal of temporary facilities.
 3. Delivery and processing of submittals.
 4. Progress meetings.
 5. Project closeout activities.
- D. Conservation: Coordinate Work operations to assure operations are carried out with consideration given to conservation of energy, water, materials, and:
1. Salvage materials and equipment involved in performance of, but not actually incorporated into Work.

3.02 SUBMITTALS

- A. Coordination Drawings: CONTRACTOR shall prepare coordination drawings to coordinate the installation of products and materials fabricated, furnished and installed by separate entities, under different parts of the Contract. CONTRACTOR shall notify OAR and ARCHITECT of all major conflicts in writing in a timely manner so that the design team can respond without construction delays. Coordination drawings shall address the following at a minimum:
1. Limitations in available space for installation or service. CONTRACTOR shall overlay plans of each trade and verify space requirements and conflicts between trades. Minor changes and adjustments that do not affect design intent shall be made by CONTRACTOR and shall be highlighted for ARCHITECT'S review.
 2. Incompatibility between items provided under different trades (such as difference in voltage between equipment specified under Divisions 22 and 23 and electrical power provided under Division 26.)
 3. Inconsistencies between drawings, specifications and codes (between trades and within each trade).



4. Additional items required for existing facilities construction projects shall be designed and prepared from available as-built drawings that are verified through non-invasive and non-destructive, visual observation only. CONTRACTOR shall field verify actual existing conditions during and upon completion of demolition work and incorporate findings into preparation of co-ordination drawings. Minor changes and adjustments that do not affect design intent shall be made by Sub-Contractor and shall be highlighted for OAR and ARCHITECT'S reviews.
- B. Prepare coordination drawings in CAD with each trade on a separate layer, in specified color and scale. CONTRACTOR and each Subcontractor shall provide and forward reproducible copies and CAD drawing files in the order described here:
1. Structural shop drawings shall indicate location and sizes of columns, beams and other structural members, as well as wall, roof and slab penetrations, and will be provided to mechanical, electrical, low voltage and plumbing Sub-contractors for co-ordination. Structural items shall be indicated using black lines.
 2. HVAC Subcontractor will indicate all ductwork, piping and equipment complete with installation and dimensioned service clearances, duct and pipe sizes, fitting types and sizes, top or bottom of duct and pipe elevations, distances of ducts, pipes and equipment from building reference points and hanger and support locations. Minor changes and adjustments that do not affect design intent shall be made by Subcontractor and shall be highlighted for OAR and ARCHITECT'S reviews. Forward drawings to plumbing Subcontractor for further co-ordination. HVAC items shall be indicated using orange lines.
 3. Plumbing Subcontractor will indicate all plumbing lines, and equipment complete with installation and dimensioned service clearances, pipe sizes, fitting types and sizes, top or bottom of pipe elevations, distances of pipes and equipment from building reference points and hanger/support locations Co-ordinate with HVAC Subcontractor. Minor changes and adjustments that do not affect design intent shall be made by Sub-contractor and shall be highlighted for OAR and ARCHITECT'S reviews Upon completion drawings shall be forwarded to Fire Sprinkler Subcontractor for further co-ordination. All Plumbing items shall be indicated using blue lines.
 4. Fire sprinkler Subcontractor will indicate fire sprinkler piping and equipment complete with installation and dimensioned service clearances, pipe sizes, fitting types and sizes, top or bottom of pipe elevations, distances of pipes and equipment from building reference points and hanger or support locations. Co-ordinate with Plumbing and HVAC Subcontractors. Minor changes and adjustments that do not affect design intent shall be made by sub-contractors and shall be highlighted for OAR and ARCHITECT'S reviews. Upon completion drawings shall be forwarded to Electrical CONTRACTOR for further co-ordination. Fire sprinkler equipment shall be indicated using red lines.



5. Electrical and Low Voltage Subcontractors will indicate service and feeder conduit runs and other electrical equipment complete, including low voltage with installation and dimensioned service clearances, sizes, top or bottom of conduit and rack elevations, distances of conduits and equipment from building reference points and hanger and support locations. Co-ordinate with Fire Sprinkler, Plumbing and HVAC Subcontractors. Minor changes and adjustments that do not affect design intent shall be made by sub-contractors and shall be highlighted for OAR and ARCHITECT'S reviews. Upon completion drawings shall be forwarded to CONTRACTOR for further co-ordination. Electrical work shall be indicated in dark green lines. Low voltage work shall be indicated in light green lines.
6. CONTRACTOR will be responsible for the overall coordination review. As each coordination drawing is completed, CONTRACTOR will meet with OAR to review and resolve all conflicts on coordination drawings.
7. Coordination meetings will be held in Project field office of CONTRACTOR. CONTRACTOR is required to distribute Shop Drawings, cut sheets and submittals to Subcontractors where appropriate. Reviewed coordination drawings will be maintained in Project field office of CONTRACTOR. Meeting minutes shall be developed by CONTRACTOR and submitted to OAR within 5 days.

END OF SECTION – 01 31 13



SECTION 01 31 19

PROJECT MEETINGS

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. This Section specifies administrative and procedural requirements for Project meetings, including but not limited to, the following:
 - 1. Preconstruction meeting.
 - 2. Pre-installation conferences.
 - 3. Progress meetings.
 - 4. Meetings as required by OAR.

1.02 RELATED REQUIREMENTS

- A. Section 01 12 16: Phasing of the Work.
- B. Section 01 31 13: Project Coordination.
- C. Section 01 32 13: Construction Schedule.
- D. Section 01 32 29: Project Forms.
- E. Section 01 33 00: Submittal Procedures.

PART 2 – PRODUCTS (Not used)

PART 3 - EXECUTION

3.01 PRECONSTRUCTION MEETING

- A. In accordance with General Provisions, OAR will schedule a preconstruction meeting before starting the Work, at a time and date determined by OAR. Meeting shall be held at the Project site or another location as determined by OAR. Meeting will be held in order to review responsibilities, procedures, and other administrative requirements contained within the Contract Documents.



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- B. Authorized representatives of OWNER, INSPECTOR, ARCHITECT, CONTRACTOR and other parties shall attend the meeting. All participants at the meeting shall be familiar with the Project and authorized to conclude matters relating to the Work.
- C. Agenda items shall include significant items which could affect progress of the Work, including, but not limited to the following:
1. Preliminary Construction Schedule.
 2. Critical work sequencing.
 3. Designation of responsible personnel.
 4. Identification of OAR.
 5. Procedures for processing field decisions.
 6. Request for Proposal.
 7. Request for Clarification.
 8. Construction Directive and Change Order.
 9. Procedures for processing Applications for Payment.
 10. Prevailing wages.
 11. Submittal and review of Shop Drawings, Product Data, material lists, and Samples.
 12. Preparation of project record documents.
 13. Use of the Project site and/or premises.
 14. Parking availability.
 15. Office, work, and storage areas.
 16. Equipment deliveries and priorities.
 17. Safety procedures.
 18. First Aid.
 19. Security.
 20. Housekeeping.
 21. Working hours.



22. Contract Compliance Officer.
 23. Insurance Services.
 24. Environmental Health and Safety.
 25. Substantial Completion, Administrative Closeout and Contract Completion requirements and procedures.
 26. Procedures for Mandatory Dispute and Claim Resolution.
 27. Storm Water Pollution Prevention Plan (SWPPP).
 28. CEQA Compliance.
- D. OAR shall prepare and issue meeting minutes to attendees and interested parties no later than five calendar days after the meeting date.

3.02 PRE-INSTALLATION CONFERENCES

- A. CONTRACTOR shall coordinate and conduct pre-installation conferences at the Project site before each construction activity that requires coordination with other construction and as required by related Sections of the Contract Documents.
- B. CONTRACTOR, manufacturers, and fabricators involved in or affected by the installation and its coordination or integration with other pre-ceding and/or subsequent installations of Work shall attend the meeting. CONTRACTOR shall advise OAR, INSPECTOR, and ARCHITECT of scheduled meeting dates in order to secure their attendance.
 1. CONTRACTOR shall review the progress of construction activities and preparations for the particular activity under consideration at each pre-installation conference, including requirements for the following:
 - a. Contract Documents.
 - b. Options.
 - c. Related Construction Directives and Change Orders.
 - d. Purchases.
 - e. Deliveries.
 - f. Shop Drawings, Product Data, and quality-control samples.
 - g. Review of mockups.
 - h. Possible conflicts.
 - i. Compatibility problems.
 - j. Time schedules.



- k. Weather limitations.
 - l. Manufacturer's recommendations.
 - m. Warranty requirements.
 - n. Compatibility of materials.
 - o. Acceptability of substrates.
 - p. Temporary facilities.
 - q. Space and access limitations.
 - r. Governing regulations.
 - s. Safety.
 - t. Inspecting and testing requirements.
 - u. Required performance results.
 - v. Recording requirements.
 - w. Protection.
2. CONTRACTOR shall record significant discussions and directives received from each conference. CONTRACTOR shall, within three (3) calendar days after the meeting date, distribute the minutes of the meeting to all concerned parties, including but not limited to, OAR, INSPECTOR, and ARCHITECT.

3.03 PROGRESS MEETINGS

- A. Progress meetings will be held at the Project site at regular intervals, typically weekly, as determined by the OAR.
- B. In addition to representatives of CONTRACTOR, OWNER, and ARCHITECT, each Subcontractor, supplier, or other entity concerned with current progress or involved in planning, coordination, or performance of the Work shall, if requested by OAR, be represented at these meetings. All participants at the conference shall be familiar with the Project and authorized to conclude all matters relating to the Work.
- C. Failure of CONTRACTOR to be so represented at any progress meeting which is held at a mutually agreed time or for which a written notice is given, shall not relieve CONTRACTOR from abiding by any and all OAR determinations or directives issued at such meeting.
- D. OAR will review and correct or approve minutes of the previous progress meeting and will review other significant items affecting progress. Topics for discussion as appropriate to the status of the Project include but are not limited to:
 1. Interface requirements.
 2. Construction Schedule.



3. Sequence and coordination.
 4. Status of submittals / RFCs.
 5. Deliveries.
 6. Off-site fabrication.
 7. Access.
 8. Site utilization.
 9. Temporary Construction Facilities and Controls.
 10. Hours of work.
 11. Hazards and risks.
 12. Housekeeping.
 13. Quality of materials, fabrication, and execution.
 14. Unforeseen conditions.
 15. Testing and Inspection.
 16. Defective Work.
 17. Construction Directive.
 18. Request for Proposal.
 19. Change Order Proposals and Change Orders.
 20. Documentation of information for payment requests.
 21. Application for Payment.
 22. Other items as required or as brought forth.
 23. Initial Notice of Start of Issue, Event, Condition, Circumstance, or Cause of Perceived Delay, Disruption, Interference, Hindrance, Acceleration. (Article 12.2.1 of the General Conditions).
 24. Final Notice of End of Issue, Event, Condition, Circumstance, or Cause of Perceived Delay, Disruption, Interference, Hindrance, Acceleration (Article 12.2.2 of the General Conditions).
 25. Storm Water Pollution Prevention.
 26. CEQA Compliance.
- E. No later than three (3) calendar days after each progress meeting, OAR will prepare and distribute minutes of the meeting to each present and absent party. Include a brief summary, in narrative form, of progress, decisions, directives, actions taken, and all other issues since the previous meeting and report.



1. Schedule Updating: CONTRACTOR shall revise the Construction Schedule after each progress meeting where revisions to the schedule have been made or recognized, and issue the revised schedule at the next scheduled progress meeting.

3.04 ADDITIONAL MEETINGS

- A. OAR, upon giving notice to the intended parties and without further obligation, may require additional meetings to discuss Work and/or Project related activities.

3.05 OWNER'S RIGHT TO RECORD

- A. CONTRACTOR agrees on behalf of itself and all its subcontractors that the OWNER may audiotape or videotape any meetings, training and any work at any time during the Project

END OF SECTION – 01 31 19



SECTION 01 32 13 CONSTRUCTION SCHEDULE

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Required procedures, preparation, submittals, reviews, updates, and revisions to the cost/schedule integrated construction schedule. The purpose of this section is to:
1. Ensure adequate planning and execution of the Work by CONTRACTOR.
 2. Establish a standard against which satisfactory completion of the Project can be measured by OWNER.
 3. Assist CONTRACTOR and OAR in monitoring progress.
 4. Aid in assessing the impact of any changes to the Contract.
 5. Provide justification for progress payments.

1.02 RELATED REQUIREMENTS

- A. Section 01 11 00: Summary of Work.
- B. Section 01 12 16: Phasing of the Work.
- C. Section 01 23 00: Alternates (Bid Items).
- D. Section 01 29 73: Schedule of Values.
- E. Section 01 29 76: Progress Payment Procedures.
- F. Section 01 31 13: Project Coordination.
- G. Section 01 33 00: Submittal Procedures.
- H. Section 01 45 23: Testing and Inspection.
- I. Section 01 45 25: Testing, Adjusting, and Balancing for HVAC.
- J. Section 01 50 00: Construction Facilities and Temporary Controls.
- K. Section 01 77 00: Contract Closeout.
- L. Section 01 78 36: Warranties.

PART 2 – PRODUCTS

2.01 SCHEDULING SOFTWARE

- A. CONTRACTOR shall utilize Primavera Scheduling Software (P6) to employ the Critical Path Method (CPM) in the development and maintenance of the construction schedule. If the version of Primavera Scheduling Software (P6) used is greater than Version 15.1, the CONTRACTOR shall save & export schedules in Version 15.1 before submitting to



OWNER for review. The scheduling software shall be capable of being resource loaded with manpower, costs and materials. It shall also be capable of generating time-scaled logic diagrams, resource histograms and profiles, bar charts, layouts and reports with any and/or all activity detail.

- B. All schedule calculation rules, auto cost rules and resource calculation rules shall be in a format acceptable to OAR. When schedule calculations are performed, the “Retained Logic” setting shall be used. CONTRACTOR shall use the zero “Decimal Places” setting.

PART 3 – EXECUTION

3.01 SUBMITTALS

- A. CONTRACTOR shall retain a construction scheduler who has enough capacity to perform all of the requirements outlined in this Section. CONTRACTOR shall submit a resume of the proposed Scheduler for review and acceptance prior to the preparation of any Schedule. The resume shall demonstrate the proposed scheduler’s capability to plan, coordinate, execute, and monitor a cost/resource loaded CPM schedule as required for this Project and have a minimum of five years direct experience using Primavera Project Planner. Scheduler will cooperate with OAR and shall be available on site for monitoring, maintaining and updating schedules in a timely manner. OAR has the right to refuse to accept the Scheduler based upon a lack of experience as required by this Section or based on lack of on-site performance and timeliness of schedule submittals. If OAR does not accept the proposed Scheduler, CONTRACTOR shall within one week of disapproval, propose another scheduler who meets the experience requirements stated above.
- B. CONTRACTOR shall submit two color originals and three copies of all bar charts, reports and/or other required schedule data as outlined in this Section. CONTRACTOR shall electronically deliver the schedule file in its original format at the time of submittal.
- C. CONTRACTOR shall attend a pre-construction scheduling conference with OAR within 7 days after Notice to Proceed. Contractor shall then develop and submit the Preliminary Construction Schedule within 14 days after Notice to Proceed.
- D. CONTRACTOR shall submit the Proposed Baseline Schedule no later than thirty days from the Notice to Proceed (or as stipulated in the milestones under Section 01 1219 Phasing of the Work Appendix A).
- E. CONTRACTOR shall submit the Monthly Schedule Updates, Four-Week Rolling Schedules, and Recovery Schedules as required.

3.02 PRELIMINARY CONSTRUCTION SCHEDULE

- A. The purpose of the cost-loaded Preliminary Construction Schedule is to provide a interim mechanism in which to measure performance on individual activities and to validate the CONTRACTOR’S monthly Application for Payment on work performed (starting with month one) during the first three months of the job until the complete Baseline Schedule is approved by the OAR.



- B. CONTRACTOR shall develop and submit a cost loaded Preliminary Construction Schedule as required by this Section. It shall be submitted in computer generated network format and shall be organized by Activity Codes representing the CONTRACTOR'S intended sequencing of the Work. The Preliminary Construction Schedule shall include activities for the first 90 calendar days following the NTP such as mobilization, preparation of submittals, specified review periods, procurement items, fabrication items, milestones, and detailed construction activities.
- C. Upon OAR'S acceptance of the Preliminary Construction Schedule, CONTRACTOR shall update the accepted Preliminary Construction Schedule each month (beginning with month 1) and submit these updates until CONTRACTOR'S Baseline Schedule is fully developed and accepted.
- D. Provide a written narrative describing CONTRACTOR'S approach to mobilization, procurement, and construction during the first 90 calendar days including crew sizes, equipment and material delivery, site access, submittals, and permits.
- E. Submit Bar Charts, Tabular Reports, a Cost flow Histogram, Electronic Data, and Plots in accordance with Article 3.04-L.

3.03 SCHEDULE OF VALUES

- A. CONTRACTOR shall cost load activities in the Construction Baseline Schedule and allocate costs to the cost accounts of all activities. The cost accounts shall match the CSI sections listed in the Table Of Contents of the Specifications. The format shall be coordinated with Specification Section 01 2973 (Schedule of Values), Specification Section 01 3229 (Project Forms), and Specification Section 01 2976 (Progress Payment Procedures).
- B. Submit a computer generated report from the Construction Baseline Schedule using the P6 scheduling software. The report shall contain the following data for each activity: Cost Account Number (by CSI section), Cost Account Description, Cost Account Budget, Cost to Date, Cost this Period, and Cost to complete. Total costs shall be organized and totaled by CSI section. This report shall be the source of the data CONTRACTOR reports on the Schedule of Values.
- C. The cost loading associated with the activities shall be based on CONTRACTOR estimates of costs that CONTRACTOR will incur performing the specific activities. If OAR determines that the costs are front loaded and/or the distribution of costs is unreasonable, CONTRACTOR shall revise accordingly and resubmit the Schedule of Values within five (5) days for OAR review.

3.04 BASELINE SCHEDULE CPM NETWORK

- A. No later than thirty days from the Notice to Proceed (or as stipulated in the milestones under Section 01 1219 Phasing of the Work Appendix A), CONTRACTOR shall submit a detailed Proposed Baseline Schedule that covers the entire duration of the Project. This schedule shall convey CONTRACTOR'S plan for organizing, managing, and executing the Work.



- B. The Proposed Baseline Schedule shall include activity descriptions, sequencing, logic relationships, duration estimates, cost loading by CSI section in accordance with Article 3.03, resource loading of manpower, and other information as set forth in this Section.
1. The Proposed Baseline Schedule shall include all Milestones stipulated in Specification Section 01 1219, Phasing of the Work, Appendix A, as well as all activities required to achieve timely completion of the Milestones.
 2. The Proposed Baseline Schedule shall include activities for: all construction activities, the NTP, Milestones, submittals, coordination drawings, re-submittals, procurement of materials and equipment, manufacturing, fabrication & delivery, owner furnished contractor installed items (OFCD), access restrictions, work restrictions, phased occupancy, testing, start-up, and contract closeout activities. The Proposed Baseline Schedule shall allow a period for OAR and ARCHITECT to review each submittal, as required by Section 01 3300 and other sections which require additional time for OWNER reviews.
 3. The Proposed Baseline Schedule shall include start and completion dates for: temporary facilities, construction of mock-ups, prototypes, samples, punch list, OWNER interfaces and furnishing of items, separate work contracts, regulatory agency approvals, and permits required for performance of the Work.
 4. The Proposed Baseline Schedule shall allow for all foreseeable factors and risks which affect performance of the Work. Include allowances for weather conditions in accordance with Article 3.04-J, applicable laws, transportation, traffic, air quality, noise, or any other applicable regulatory requirements, regulations or collective bargaining agreements pertaining to labor.
 5. The Proposed Baseline Schedule shall include an activity with a minimum review period of one hundred days for all Deferred Approvals. In addition, as a predecessor to this activity, a separate 18 day OWNER review period shall be included in the Proposed Baseline Schedule.
 6. CONTRACTOR shall not use any float suppression techniques such as preferential sequencing or logic, special hidden lag time between activities or milestones, float absorption activities, or unjustifiable over-estimating of activity durations in preparing the Proposed Baseline Schedule. Finish Milestones should be constrained to a “Finish on or before” constraint. No “Zero Free Float” constraints, No “Early” Constraints, and No “Mandatory Finish” constraints shall be utilized.
 7. The Proposed Baseline Schedule shall include activity durations based on the crew sizes and equipment utilization that CONTRACTOR will maintain during the Project. No activity durations shall exceed fifteen (15) working days unless approved by the OAR. Non-construction activities such as procurement, delivery, or submittal activities are exempted. CONTRACTOR will need to perform their due-diligence to make sure that the activity man-power loading and activity durations are directly integrated.



- 8. CONTRACTOR shall include with the Proposed Baseline Schedule a written narrative report sufficiently comprehensive to explain the rationale behind CONTRACTOR’S approach to the Work including but not limited to: activity durations, manpower flow, average crew sizes (by trade), equipment requirements, anticipated production rates, constraints, holidays and other non-work days, potential problem areas, permits, coordination with regulatory authorities, utilities, separate work contracts and other parties, and long lead delivery items requiring more than thirty days from the date of order to delivery to the Project site.
- C. At the OAR’S request, furnish a detailed written explanation of CONTRACTOR’S basis for specific durations, logic, phasing, or other information. Such an explanation shall include CONTRACTOR’S rationale for selecting the number of crews, crew composition, number of shifts per day, number of hours in a shift, number of work days per week, construction equipment, and similar factors.
- D. The Proposed Baseline Schedule activities shall contain the following data:
 - 1. Activity ID numbers shall consist of a built-in intelligence scheme. Following OAR acceptance of the Baseline Schedule, Activity ID numbers shall not be changed.
 - 2. Activity Descriptions shall provide adequate information that readily identifies each activity, work scope, and location.
 - 3. At a minimum, activity codes specified in Article 3.04-G shall be applied to each activity. This is at the activity level and is different than WBS coding structure.
 - 4. Cost accounts (in CSI Master Format) and Resource accounts shall be applied to each activity. They shall include lump sum costs, and man-hours/man-days (where applicable).
- E. At OAR’S request, furnish a written explanation for each lead or lag relationship and each constrained date. Unjustifiable leads, lags, and constraints will result in OAR’S rejection of the Proposed Baseline Schedule.
- F. Calendar Identification: In the scheduling software, identify all activities that will require overtime shifts, double shifts, and work on weekends or holidays. Identify non-work days and holidays in the schedule calendar. All milestones stipulated in Specification Section 01 1219, Phasing of the Work, Appendix A, shall be placed on a calendar with seven days per week. No holiday or non work-day restrictions are permitted on this calendar. Within the schedule software, the CONTRACTOR shall not use Primavera Global Calendars from past projects, but rather shall use project specific calendars created for this specific contract. The Calendar coding shall be transferable and compatible with the OWNER calendars as to not distort any start/finish dates and “total float” values upon schedule re-calculation.
- G. Activity Codes: As a minimum, the Activity Codes shown in the Table 1 below shall be assigned to each activity.

Table 1

Name	Length	Description
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TYPE	2	Type of activity (for example: mobilization, submittals, procurement/fabrication, construction, milestones, etcetera.)
AREA	2	Area or Building (for example: Depot, Courtyard, Parking Lot, Street Work, etcetera.)
STAG	2	Stage (for example: Foundations, Superstructure, Exterior, Interior, Roof, etcetera.)
RESP	7	Responsible Party (subcontractor and/or trade)
DIV	2	CSI Division
SPEC	5	CSI Specification Section number

1. OAR may require additional coding of activities. The mandatory activity code requirements listed in Table 1 are not to be construed as setting limits on CONTRACTOR'S management and coordination responsibilities, but are intended to guide CONTRACTOR in the administration of its contractual responsibilities.
- H. Milestones: are designated dates as set forth in Specification Section 01 1219, Phasing of the Work, Appendix A, in which Work or portions thereof are required to start and complete in accordance with the Contract Documents.
1. Where the term completion or similar terms are used in regards to a Milestone, it shall be construed to mean all portions of the Work in the indicated phase, area, and zone are complete and acceptable to OAR. Where the term start or similar terms are used in the designation of a Milestone, it shall be construed to mean a portion of the Work in the indicated phase, area, or zone is required to be commenced.
 2. A Proposed Baseline Schedule extending beyond the Milestones or Contract Time will not be acceptable.
 3. Finish Milestones shall be constrained with "Finish on or before" type constraints in accordance with the dates stipulated in Specification Section 01 1219, Phasing of the Work, Appendix A.
 4. In the P6 scheduling software, prior to opening the project, click the "dates" tab and place a "must finish by" date to match the Contract Completion Milestone date stipulated in Specification Section 01 1219, Phasing of the Work, Appendix A.
 5. A Proposed Baseline Schedule indicating Work completed in less time than the Milestones and/or Contract Time will not be acceptable. Rather, CONTRACTOR shall show any unused contract time as float available to the project.
 6. Milestones shall be placed on a calendar with seven days per week. No Holiday or non work-day restrictions are permitted on this calendar.
- I. The Critical Path shall be clearly indicated on all schedules submitted. An activity is defined as critical when it is shown to be on the longest path from beginning to end.
- J. CONTRACTOR shall allow for inclement weather in the Proposed Baseline Schedule by incorporating an activity titled "Rain Day Impact Allowance" as the last activity prior to the Substantial Completion Milestone. No other activities may be concurrent with it. The



duration of the Rain Day Impact Allowance activity will be based on Table #2 below, and will be calculated from the Notice to Proceed until the original date of Substantial Completion.

Table 2: Cumulative Calendar Days “Rain Day Impact Allowance”:

January	6	July	0
February	5	August	0
March	5	September	1
April	4	October	1
May	1	November	3
June	0	December	5

1. When inclement weather at the Project site impacts Critical Path activities, CONTRACTOR may provide the OAR with a written request for a weather impact day describing the inclement weather delay on the Critical Path activities. The inclement weather delay must be clearly indicated by a 70 percent decrease in the field labor workforce hours on Critical Path activities on the day in question as indicated by CONTRACTOR’S Daily reports from the day in question and the scheduled work days prior to the day in question. Upon OAR’S independent confirmation of the amount of rainfall and impact, OAR will authorize CONTRACTOR to reduce the duration of the Rain Day Impact Allowance by one day.
2. Inclement weather on non-scheduled workdays shall not be granted as weather impact days. If CONTRACTOR asks to work a specific weekend or holiday and gives OAR advanced, written notification of critical path work to be performed and a substantial amount of precipitation occurs that prevents the work from being performed, then that day can be claimed as a weather impact day. If the effects of inclement weather from a non-scheduled work day carry forward to a scheduled work day and impacts the Critical Path as noted above, then the scheduled work day will be considered impacted by weather. Any unused rain day allowance at the end of the project will be shown as available float to the Substantial Completion Milestone. Excusable, non-compensable time extensions will be granted for inclement weather to Substantial Completion milestone only after the weather impact area affecting the critical path work has exhausted the allotted cumulative Rain Day Impact Allowance. On projects that have multiple phases with defined start & finish dates, the cumulative rain impact allowance may be split up (pro-rated) into their designated phases upon OAR Approval.

K. Cost loaded Activities:

1. Each activity included in the Proposed Baseline Schedule shall be assigned the cost CONTRACTOR estimates it will incur performing that activity. Each activity’s assigned cost will be inclusive of overhead and profit so CONTRACTOR’S total overhead and profit is distributed over all activities on a pro rata basis. The sum of



- the costs assigned to activities shall equal the total contract value. No activity costs shall be assigned to manufacturing or delivery activities unless approved by OAR. If OAR finds that the costs are front loaded and the distribution of costs is unreasonable, CONTRACTOR shall re-distribute the costs and resubmit the revised Schedule of Values within five days for OAR backcheck.
2. CONTRACTOR shall cost load activities in the Proposed Baseline Schedule and allocate costs to related resource/cost accounts associated with each activity. The cost accounts shall match the CSI sections listed in the Table of Contents of the Specifications. The format shall be coordinated with Specification Section 01 2973 (Schedule of Values), Specification Section 01 3229 (Project Forms), and Specification Section 01 2976 (Progress Payment Procedures). All cost-loaded activities shall roll-up to their designated CSI sections and shall be the basis for the data reported in the Schedule of Values (Section 01 2973), Project Forms (Section 01 3229), and Progress Payment Procedures (Section 01 2976).
 3. Submit computer generated reports using the scheduling software which will be the basis for the approved Schedule of Values. The reports shall contain the following data for each activity: Cost/Resource Account Number (by CSI section), Cost/Resource Account Description, Cost/Resource Account Budget, Cost to Date, Cost this Period, and Cost at Completion. Total Costs shall be organized and totaled by CSI section.
 4. Submit a Cost Flow Histogram in accordance with Article 3.04.L.3.
- L. CONTRACTOR shall submit computer generated reports and plots with the Proposed Baseline Schedule submittal package. Format shall display the following columns: Activity ID, Activity Description, Original Duration, Remaining Duration, Percent Complete, Early Start, Early Finish, Late Start, Late Finish, and Total Float. Unless otherwise noted, bar charts and reports shall be on 8 ½ by 11 paper and bound.
1. Color Bar charts shall be generated separately for:
 - a. Milestones only.
 - b. All Activities sorted by Early Start date and organized by Project, Area, Stage, and Substage. (The network shall be organized to show continuous flow of all activities from left to right). CONTRACTOR is reminded that during the monthly schedule update process, even the activities that have already been completed need to be shown in this “all activities” bar chart report.
 - c. Activities sorted by Responsibility.
 - d. Summary level of all activities sorted by craft/trade and area.
 - e. Critical Path (Longest Path). The network shall be organized to show continuous flow of all critical activities on the longest path from left to right (sorted by early start).
 2. Reports:



- a. Total Float sorted low to high.
 - b. Predecessors and Successors sorted by Activity ID.
3. Cost Flow Histogram
- a. Using the costs assigned to each activity, develop a Histogram that projects the estimated invoice amounts by month for the Project duration. The histogram shall be produced from the scheduling software on 11” by 17” paper (landscape mode). It shall contain both a monthly bar histogram and a cumulative cost curve on the same graph. The Total Costs shall be based on the Early Dates option.
4. Man Power Histogram
- a. Submit a planned man-power graphic bar histogram produced from the scheduling software on 11” by 17” paper (landscape mode) that displays total man-hours based on Early Dates. Show both a weekly bar histogram and a cumulative curve on same graph. In addition, provide a summary excel table of average crew sizes and peak crew sizes broken down by trade/subcontractor. CONTRACTOR will need to perform their due-diligence to make sure that the activity man-power loading is realistic and adequate based on material /labor cost estimates.
5. Provide a written narrative as required by Article 3.04.B.8.
6. Electronic data: Provide an electronic file in its original format of the Schedule. The electronic P6 files shall be saved in “XER” type format.(version 15.1)
7. Plots: Produce a color bar chart on E-size paper (30 by 42-inch) organized (at a minimum) by project, area, stage, and substage.
- M. OAR will notify CONTRACTOR of any adjustments that are required for the Proposed Baseline Schedule to be accepted. CONTRACTOR shall perform any required adjustments to the Proposed Baseline Schedule and resubmit it for acceptance certifying in writing that all information contained therein complies with the Contract Documents. OAR will review the Proposed Baseline Schedule for accuracy, reasonableness, and conformance with the Contract Documents and shall provide comments within ten days of receipt. Within five days after receiving OAR comments, CONTRACTOR shall both incorporate changes to address OAR concerns and resubmit the Proposed Baseline Schedule for OAR backcheck. This process will continue until the Proposed Baseline Schedule is accepted as the Baseline Schedule. Once accepted by OAR, the Baseline Schedule will be the basis upon which CONTRACTOR shall prepare updates that record and report actual performance and progress. The accepted Baseline Schedule and subsequent Monthly Updates (reference Articles 3.04 and 3.05 respectively) shall be the basis for consideration and analysis of requests for time extensions and CONTRACTOR progress payments.
- N. OAR acceptance of the Baseline Schedule or CONTRACTOR’S failure to identify or include an element of the Contract, shall not release CONTRACTOR’S obligation to complete all required Work in accordance with the Contract Documents.

3.05

REQUIREMENTS FOR MONTHLY/WEEKLY SCHEDULE UPDATING



- A. Once the Baseline Schedule is accepted by OAR, CONTRACTOR shall copy the Approved Baseline file to a new name, status the activities with actual as-built data through the end of the month & submit Monthly Schedule Updates beginning with month No. 1. The current month's schedule update cannot be accepted until the previous Monthly Schedule Update has been accepted by OAR. Each Monthly Schedule Update shall be submitted concurrently with the Monthly Pay Application no later than the fifth day of the succeeding month in accordance with Article 14 of the General Conditions.
- B. Monthly Schedule Update Format.
1. Initially, the contractor shall status a current Monthly Schedule Update with actual Work progress only. No logic ties shall be modified. Status all Actual Start and Finish dates, adjust Remaining Durations where needed, and update Percent Completion of cost and resource loaded activities. No activity Original Durations or Logic shall be changed unless authorized by OAR. No new activities shall be added (except for the addition of new activities for every re-submittal and re-review required) or unless authorized by the OAR.
 2. Once the schedule is statused in accordance with Article 3.05-B1, CONTRACTOR shall print (and submit with Monthly Schedule Update) a report of "out-of-sequence" logic that results from the updating process. CONTRACTOR shall then correct all "out-of-sequence" logic to reflect CONTRACTOR'S actual Work sequence. Prior to submission of the Monthly Schedule Update, CONTRACTOR shall review and validate that all remaining activities along with their schedule relationships are still accurate based on the actual work flow in the field. If CONTRACTOR chooses to modify logic or add activities (other than out-of-sequence corrections), it shall be done in accordance with Article 3.07 for OAR Review & Approval. CONTRACTOR shall also submit a comparison report between the previous monthly schedule update and the current monthly update that will document the overall changes (i.e. comparison software such as "Digger", or "Schedule Analyzer", etc.).
 3. During construction, CONTRACTOR may desire to break down specific activities into greater detail. If greater detail is necessary, then CONTRACTOR shall identify expanded activities such that the Baseline Schedule activities that the expanded activities originated from are readily apparent. CONTRACTOR shall not allow the aggregate duration of the expanded activities to exceed the duration assigned to the Baseline Schedule activity unless permitted by OAR in writing.
 4. Autocost rules and calculation rules shall link Remaining Duration and Percent Complete.
 5. The Data Date for the Monthly Schedule Updates shall be the first day of the succeeding month. At a minimum, three days prior to the submission of the Monthly Schedule Update, CONTRACTOR shall meet in person with OAR to present the proposed Percentages of Completion and Actual Start and Actual Finish dates. Once percentages of completion and actual dates have been agreed to, they shall be the basis of the Monthly Schedule Update.



6. CONTRACTOR shall submit a Cost Histogram that overlays the planned cost curve from the Baseline Schedule, against the monthly cumulative “cost to date” curve, and against the remaining activities planned curve from the current Monthly Schedule Update.
 7. Written Narrative Report: CONTRACTOR shall include a written report to explain the Monthly Schedule Update. The narrative shall, at a minimum include the following headings with appropriate discussions of each topic:
 - a. Introduction.
 - b. A Summary of Work which was on-going (This Pay Period).
 - c. Problem Areas and Proposed Solutions.
 - d. Critical Path.
 - e. Current and Anticipated Delays.
 - f. Coordination of Work with Others.
 - g. Milestone Status.
 - h. Revisions: the standard schedule comparison report that compares the current update to the previous update shall be submitted to help document any variances/changes. However this comparison report will not be accepted by OWNER in lieu of the above written narrative requirements outline above.
 8. In updating the Schedule, CONTRACTOR shall not modify Activity ID numbers, schedule calculation rules/criteria, or the Activity Coding Structure required.
 9. Submit bar charts, reports, a cost flow histogram, man-power histogram, written narrative, electronic data, and plots in accordance with Article 3.04-L.
 10. Submit a cost-loaded report (progressed monthly) produced from the scheduling software that displays all of the activities organized by the CSI section cost/resource accounts. This report shall be in compliance with Article 3.04-K, Section 01 2973 (Schedule of Values), Section 01 3229 (Project Forms), and Section 01 2976 (Progress Payment Procedures).
- C. Four-Week Rolling Schedule: At each Weekly Progress Meeting, CONTRACTOR shall present a Four-Week Schedule in Bar Chart format. It shall show one (1) week of actual and three (3) weeks of forecasted progress. The Four-Week Rolling Schedule shall be used as a basis for discussing progress and work planned during the three (3) weeks.
1. The Four-Week Rolling Schedule shall be based on the most recent OAR Accepted Monthly Schedule Update. It shall include weekly updates to all construction, submittal, fabrication and procurement, and separate work contract activities. CONTRACTOR shall ensure that it accurately reflects the current progress of the Work.
 2. CONTRACTOR shall discuss at the weekly Progress meeting the actual dates and any variances to critical or near critical activities.



3. Upon request by OAR, CONTRACTOR shall provide the Four-Week Rolling Schedule in electronic format.
4. If the Four-Week Rolling Schedule indicates activities are behind schedule, CONTRACTOR shall provide a Recovery Schedule in accordance with Article 3.06.
5. If the CONTRACTOR chooses to provide a Four-Week Rolling Schedule in a greater level of detail (by trade/subcontractor) outside of the monthly contractual P6 schedule database, then upon CONTRACTOR REQUEST and OAR written approval, the CONTRACTOR may proceed as long as the detailed activities roll-up to the contractual P6 monthly schedule updates. These detailed activities will need to be linked to the overall Substantial Completion date as to properly forecast whether the project is ahead or behind schedule during the weekly Progress Meetings. The Four-Week Rolling Schedule must accurately reflect the work that is going on during the current week and must accurately reflect what will happen in the next three weeks.

3.06 RECOVERY SCHEDULES

- A. If a Monthly Schedule Update indicates negative float greater than ten (10) days on a critical path as result of events not predicated by Articles 10 and 12 of the General Conditions CONTRACTOR shall prepare a Proposed Recovery Schedule demonstrating CONTRACTOR'S plan to regain the time lost. The Recovery Schedule shall be submitted either in advance of or concurrent with the Monthly Schedule Update and CONTRACTOR progress request. Both the Monthly Schedule Update and the Proposed Recovery Schedule shall be based on the same percentages of completion and actual dates accepted by OAR under Article 3.05 B.
- B. The Proposed Recovery Schedule shall be based on a copy of the Monthly Schedule Update for the calendar month during which the negative float first appears.
- C. The Proposed Recovery Schedule shall include a written narrative that identifies the causes of the negative float on the critical path and provides CONTRACTOR'S proposed corrective action to ensure timely completion of all Milestones and the Substantial Completion Date. CONTRACTOR'S corrective actions shall include but are not limited to increasing concurrent operations, increasing labor, adding multiple shifts in a 24-hour period, and adding overtime.
- D. During any period of time when CONTRACTOR is found to be behind schedule by OAR, the Monthly Schedule Update described above shall become a weekly requirement (at no additional cost to OWNER) to provide a greater degree of focus on the timely completion of the Work. These Updates shall be submitted to OAR every Monday morning. When CONTRACTOR is deemed by OAR to be back on schedule, CONTRACTOR may revert to submitting the schedule monthly.
- E. CONTRACTOR'S progress payment may not be processed until OAR accepts the Proposed Recovery Schedule. Following such an acceptance, the Proposed Recovery Schedule will be known as the Recovery Schedule and future Work will be performed by CONTRACTOR in accordance with it.



3.07 FRAGNETS AND TIME EXTENSION REQUESTS

- A. Float is not for exclusive use or benefit of either OWNER or CONTRACTOR but is an expiring resource available to both parties on a non-discriminatory basis. If required to meet specified Milestones, either party may utilize float. Adjustments to Milestones or Contract Time will only be authorized by Change Order and only to the extent the claimed adjustments exceed total float along the most critical path of the current Monthly Schedule Update in effect at the time of the claimed adjustments. The claimed adjustments to the Milestones and/or Contract Time must also cause the Substantial Completion Date to exceed that currently indicated in the Monthly Schedule Update. No time extensions will be granted nor delay damages paid under contract until all available float is used and the CONTRACTOR obtains a Time Extension Request approval from the OAR in accordance with Article 3.07 in its entirety. CONTRACTOR claimed adjustments to an existing negative float path will not receive consideration until the activity with the highest negative float is driven even further negative.
1. Claimed adjustments to the Milestones or Contract Time will be administered in conjunction with those set forth in the General Provisions.
- B. Pursuant to the float sharing requirements of this Section, the use of float suppression techniques such as preferential sequencing or logic, special lead or lag logic restraints, and extended activity times or durations are prohibited. The use of float time disclosed or implied by the use of alternate float suppression techniques shall be proportionally shared to benefit OWNER and CONTRACTOR. The use of any technique solely for the purpose of suppressing float will result in OWNER rejection of the submitted Monthly Schedule Update.
- C. In the event CONTRACTOR believes the Project has suffered an adverse impact arising from events predicated by the General Provisions, CONTRACTOR may prepare a Time Extension Request by submitting a Schedule Fragnet and a written narrative outlining the detail of the impact. A Schedule Fragnet must demonstrate a critical path delay. Such a delay must adversely impact the Substantial Completion Date for CONTRACTOR to receive a time extension. To demonstrate such an impact successfully, CONTRACTOR shall prepare a Schedule Fragnet based on a copy of OWNER accepted Monthly Schedule Update for the calendar month during which the adverse impact occurred. This “copy” of the OWNER accepted Monthly Schedule Update shall however first be updated (by OWNER and CONTRACTOR jointly) with both Percentages of Completion and Actual Dates up to the day the delay commenced. This process will provide the “pre-delay” project status. Once OWNER and CONTRACTOR have agreed to the “pre-delay” project status, CONTRACTOR should make a copy of this “pre-delay” schedule and this copy is to be the starting point for CONTRACTOR’S Schedule Fragnet development. OWNER will evaluate the activities, logic, durations, etcetera, in the Schedule Fragnet and will evaluate if the adverse impact arose from events described by the General Provisions. The Fragnet shall also include CONTRACTOR-caused delays that affect the critical or near critical path in the network and should be accounted for in the Time Impact Analysis if overlapped at any point in time with OWNER-caused delay. If rain impact days were granted between the Start and Finish of OWNER-caused delay period, they should be accounted for in the Time Impact



Analysis as well. Provided OWNER determines such an impact occurred, CONTRACTOR may be due a time extension equal to the number of proportioned days of variance/delay that resulted to the Substantial Completion Date.

- D. Activities added into a Schedule Fragnet to demonstrate the impact of adverse event shall be assigned a unique activity code. The Schedule shall be organized by this unique activity code.
- E. The Schedule Fragnet shall incorporate logic that accurately ties reflective of the adverse event to pre-event predecessor activities and post event successor activities.
- F. The format and components of a Schedule Fragnet submittal shall be in accordance with this Section and the General Provisions. It is crucial for the Fragnet to be submitted within the same month of discovery so it can be resolved during the monthly schedule update review. The notice shall be transmitted to OAR within the stipulations outlined in the General Provisions.
- G. If OWNER accepts CONTRACTOR'S Schedule Fragnet and an extension is granted, a Change Order will be prepared. OWNER will advise what change order number the time extension will become. When CONTRACTOR receives this Change Order number, all the activities added to the Schedule Fragnet shall be given Activity Identification Numbers that corresponds with the Change Order number. CONTRACTOR shall cost load and resource-load the activities if required by OWNER. If resource loading is required, the resource loading shall include a breakdown of labor, material, and equipment quantities.
- H. If OWNER rejects CONTRACTOR'S Schedule Fragnet in part based on improper forecast logic or activity tasks then it shall be revised accordingly to conform to OWNER'S review comments and resubmitted. If the forecast logic and activity tasks cannot be agreed to then the pre-delay schedule outlined in Article 3.07-C shall be compared to the actual as-built data in the succeeding month of the encountering issue, event, condition, circumstance, and/or cause. The variance to the project between the pre-delay and post delay schedules shall be discussed in CONTRACTOR'S written narrative and proportioned between the different parties involved in the delay.
- I. If OWNER rejects CONTRACTOR'S Schedule Fragnet in whole then CONTRACTOR may follow the procedures set forth in the General Provisions.

3.08 PAYMENT FOR SCHEDULING

- A. The Work of this Section will be included as part of the bid price.
- B. Preparation, revising, maintenance, and compliance with this Section and Section 01 2973 is an integral part of the Contract Documents and is specified to have a minimum value equal to 2 percent of the original Contract Amount or \$150,000, whichever is less. This amount shall be proportionally cost loaded into two activities in both the Proposed Baseline Schedule and the Schedule of Values described in Section 01 2973. One activity for the "Baseline Schedule" and the other activity for the "Monthly Schedule Update Process" as follows:



1. CONTRACTOR may allocate twenty percent (20 percent) of the total cost and place in the “Baseline Schedule” activity. It can then be billed against when the OAR accepts the Proposed Baseline Schedule as the Baseline Schedule.
2. The remaining eighty percent (80 percent) may be cost loaded into the “Monthly Schedule Update Process” activity. This amount may be billed in equal monthly increments. The amount of those increments is determined by dividing the remaining cost by the total number of months in the Contract Time. Payment of these incremental amounts is contingent upon OAR acceptance of CONTRACTOR Monthly Schedule Updates, Recovery Schedules, Four-Week Rolling Schedules, Fragnets, Time Impact Analysis, and the updated Log of Required Submittals.
3. The CONTRACTOR shall anticipate in their base contract scope that numerous Fragnets and written time impact analyses will be required during the duration of the project with the Monthly Schedule Updates. Requests for extra scheduling services will not be considered until the CONTRACTOR demonstrates that all of the costs stipulated in Article 3.08-B has been expended.

3.09 FAILURE TO COMPLY WITH REQUIREMENTS

- A. At any time during the project if CONTRACTOR fails to comply with the specified requirements, OWNER reserves the right to engage independent estimating and scheduling consultants to fulfill these requirements. Upon notice to CONTRACTOR, OWNER shall assess against CONTRACTOR, incurred costs for these additional services.
- B. In such an event, OWNER will require, and CONTRACTOR shall participate and provide requested information to ensure the resulting Milestones Schedule accurately reflects CONTRACTOR’s plan to execute the Work in compliance with the Contract Documents. If it becomes necessary for OWNER to recommend logic or duration revisions as a result of CONTRACTOR failure to furnish acceptable data, and if CONTRACTOR has objections to the recommendations, CONTRACTOR shall provide notice to OWNER within three days and CONTRACTOR shall provide an acceptable alternate plan. If CONTRACTOR fails to so note any objections and provide an acceptable alternate plan, or if CONTRACTOR implements the recommendations of OWNER without so noting any objections, CONTRACTOR will be deemed to have waived all objections and concurred with the recommended logic/duration revisions provided by ARCHITECT and/or OWNER.
- C. Submittal of any Monthly Schedule Updates are subject to review and acceptance by OWNER. OWNER retains the right, including, but not limited to the General Provisions, to withhold progress payments in whole or part until CONTRACTOR submits a Monthly Schedule Update acceptable to OWNER. If a Monthly Schedule Update is “Rejected” due to the OWNER not receiving a satisfactory schedule that accurately reflects the on-going work activities, the OWNER will mandate a separate meeting with the CONTRACTOR and approved Scheduler to remedy the non-conformance. If after the 2nd consecutive month the OWNER still has to “Reject” the monthly Schedule update due to non-conformance, then the CONTRACTOR’S Scheduler will need to be replaced at no additional cost to the OWNER. CONTRACTOR shall within one week of disapproval, propose another Scheduler who meets the experience requirements stated in this Section.



- 3.10 **CONTRACTOR RESPONSIBILITY**
- A. Nothing in this Section shall be construed to be a usurpation of CONTRACTOR authority, responsibility, and obligation to plan and schedule Work as CONTRACTOR deems necessary, subject to all other requirements of the Contract Documents.
 - B. CONTRACTOR shall involve the subcontractors, manufacturers, and suppliers in the development and periodic updating of the schedule.
- 3.11 **RECORD DOCUMENTS / FINAL AS-BUILT SCHEDULE**
- A. Prior to Contract Completion of the Work, CONTRACTOR shall submit a final as-built schedule, and a time-scaled network diagram reflecting the actual dates of all activities. This shall be submitted prior to the final application of payment and prior to the request to release retention.

END OF SECTION – 01 32 13



SECTION 01 32 29

PROJECT FORMS

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. The following, but not limited to, administrative forms and documents listed in this Section are to be utilized in the administration of the Work. Upon CONTRACTOR request, OAR may approve the use of alternate forms.
- B. From time to time, OWNER may release new revisions and new Project Forms. At any time during the Project, if requested by OAR, CONTRACTOR shall use the newly released Project Forms.

1.02 RELATED REQUIREMENTS

- A. Division 01: General Requirements.

PART 2 - PRODUCTS (Not used)

PART 3 - EXECUTION

3.01 FORMS

- A. The following examples of forms are contained within this Section:
 - 1. Allowance Disbursement Authorization.
 - 2. Application for Payment (2 pages) .
 - 3. Certification of Compliance with Project Stabilization Agreement and Labor Compliance.
 - 4. Certificate of Substantial Completion.
 - 5. Change Order.
 - 6. Change Order Proposal.
 - 7. Change Order Proposal – Compensable Delay Costs.
 - 8. Change Order Proposal Detail Sheet.



9. Change Order Proposal Guidelines.
10. Change Order Proposal – Labor Rate Calculation Form (Request for Rate Higher Than Fully burdened Labor Rates).
11. Conditional Waiver and Release – Final Payment.
12. Construction Directive.
13. Correction Notice.
14. Daily Construction Report.
15. Daily Time and Material Record.
16. Initial Notice of start of Issue, Event, Condition, Circumstance, or Cause of Perceived or Actual Delay, Disruption, Interference, Condition, Circumstance, or Cause of Perceived Delay, Disruption, Interference, Hindrance, Acceleration.
17. Final Notice of End of Issue, Event, Condition, Circumstance, or Cause of Perceived or Actual Delay, Disruption, Interference, Condition, Circumstance, or Cause of Perceived Delay, Disruption, Interference, Hindrance, Acceleration.
18. Five Day Notice.
19. List of Subcontractors.
20. Notice of Completion.
21. Notice of Partial Use or Occupancy.
23. Notice to Proceed.
24. “Or Equal” Request.
25. OWNER Assessment Summary.
26. Property Inventory.
27. Request for Certification of Substantial Completion.
28. Request for Clarification.
29. Request for Proposal.
30. Request for Reduction of Retention.
32. Schedule of Values.



33. Storm Water Pollution Prevention – Site Monitoring Report.
34. Submittal Log.
35. Substitution Request.
36. Transmittal.

3.02 PROCEDURES

- A. Allowance Disbursement Authorization: This form is used for the request and approval of Contract allowances.
- B. Application for Payment: This form is used in requesting a progress payment.
- C. Application for Payment (Multiple Projects): Alternate progress payment request form for contracts comprising more than one project.
- D. Certification of Compliance with Project Stabilization Agreement and Labor Compliance Code Section 1776: This form is used to certify that all contributions due and owing to appropriate trust funds have been paid by CONTRACTOR and all Subcontractors, as specified by the Project Stabilization Agreement (PSA) and General Conditions Article 6.49. This form is also used to certify that CONTRACTOR has submitted all certified payroll records mandated by Labor Code 1776, and General Conditions Article 6.49.
- F. Certificate of Substantial Completion: This form is used according to Article 14 of the General Conditions.
- G. Change Order: This form is used to adjust the Contract Amount, Milestones or Contract Time.
- H. Change Order Proposal: This form is used to communicate proposed adjustments to the Contract Amount, Milestones or Contract Time.
- I. Construction Directive: This form is used to issue a Construction Directive.
- J. Correction Notice: This form is used to provide notice of defective Work.
- K. Daily Construction Report: This form is used to report daily Work activities and manpower levels of CONTRACTOR or Subcontractor.
- L. Daily Time and Material Record: This form is used to provide daily records as set forth in Article 11.11 of the General Conditions.
- M. Initial Notice of Start of Issue, Event, Condition, Circumstance, or Cause of Perceived Delay, Disruption, Interference, Hindrance, Acceleration: This form is used to provide notice as set forth in Article 12.2.1 of the General Conditions.



- N. Final Notice of End of Issue, Event, Condition, Circumstance, or Cause of Perceived Delay, Disruption, Interference, Hindrance, Acceleration: This form is used to provide notice as set forth in Article 12.2.2 of the General Conditions.
- O. Five Day Notice: This notice is used according to Article 15.3.2 of the General Conditions.
- P. List of Subcontractors: This form is used according to Article 14.2 of the General Conditions.
- Q. Notice of Completion: This form is used according to Article 14.17 of the General Conditions.
- R. Notice of Partial Use or Occupancy: This form is used according to Article 14.15 of General Conditions.
- S. Notice To Proceed: This form is used to establish the date of Contract Time commencement and the date Contractor is authorized to commence performance of Contractor obligations.
- T. “Or Equal” Request: This form is used to submit a list of proposed “or equal” substitutions.
- U. Owner Assessment Summary: This form is used for all assessments or withholds by the Owner, permitted under the Contract or required by law, including without limitation, stop notices, prevailing wage violations, liquidated damages, additional consultant services, OCIP premiums, etc.
- V. Property Inventory: This form is used to establish Owner property in a space.
- W. “Request for Certification of Substantial Completion”: This form is used according to Article 14 of the General Conditions
- X. Request for Clarification: This form is to be used for clarification of the intent of the Contract Documents.
- Y. Request for Proposal: This form is used to request a proposed adjustment in the Contract Amount, Milestones or Contract Time in response to the Work contained within the Request for Proposal.
- Z. Request of Reduction of Retention: This form is used according to Article 14.8 of the General Conditions.
- AA. Schedule of Values: This form is used to establish the basis of the certified Application for Payment.



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- BB. Storm Water Pollution Prevention Plan (SWPPP): Site Monitoring Reports: These forms are used to certify that construction activities are in compliance with SWPPP (see Section 01 7416).
- CC. Submittal Log: This form is a format for the listing of the required submittals.
- DD. Substitution Request: This form is used to submit proposed substitutions of materials or equipment no longer manufactured or which cannot be acquired from existing inventories.
- EE. Transmittal: This form is used for transmission of items related to the Contract.

END OF SECTION – 01 32 29



SECTION 01 32 33

PHOTOGRAPHIC DOCUMENTATION

PART 1 - GENERAL

1.01 SUMMARY

- A. Section Includes:
1. Preconstruction photography.
 2. Construction photography and time-lapse photography of work-in-progress.

1.02 GENERAL

- A. Provide photographs at locations designated by ARCHITECT, including aerial views.
- B. Photographer: Specialist, experienced in taking construction photography and time-lapse photography.
- C. Equipment:
1. As necessary to photograph both interior and exterior exposures.
 2. Utilize full range of lenses, including wide angle, telephoto and 360 degree.
 3. If drones are used for aerial views, provide proof of FAA Certificated Drone Pilot and Drone Insurance.

1.03 SUBMITTAL REQUIREMENTS

- A. Make photo submittals, to CITY OF GOLETA and ARCHITECT, along with each monthly Application for Payment.
- B. Electronic Format:
1. Submit electronic files in jpeg format produced by digital camera with minimum resolution of not less than 3200 by 2400 pixels with minimum sensor size of 8 megapixels.
 2. Submit without alteration, manipulation, editing, or modifications using image-editing software.
 3. Date and Time: Include date and time in file name for each image.
- C. Cloud based web application for 360-degree images shared with CITY OF GOLETA, ARCHITECT and CONTRACTOR.

1.04 PRECONSTRUCTION PHOTOGRAPHS



- A. Take photographs prior to beginning Work of this Contract.
- B. Provide 20 Project Site photographs, including one aerial view.

1.05 CONSTRUCTION PHOTOGRAPHS

- A. Construction progress photography shall use both still and 360-degree photography to photo document work progress and site conditions. 360-degree photography shall use a cloud-based web application or program that allows photos to be organized and displayed on plan view drawings and accessed real time by the COUNTY OF SANTA BARBARA, ARCHITECT and project team. At project closeout, deliver to the CITY OF GOLETA and ARCHITECT a stand-alone PDF export of the entire project photo documentation.
 - 1. Take construction photographs, beginning two weeks after last preconstruction photograph, and continuing every other week for duration of the Work.
 - 2. Take a minimum of one photo per area within the structure. For areas greater than 500 square feet, take one photo for every 250 square feet of area. Take additional photographs as needed to fully document Project.
 - 3. Take one exterior photo every 300 feet of building perimeter. Take additional photographs as needed to fully document Project.
- B. Provide three (3) independent single point stationary time-lapse photography cameras. The stationary time-lapse cameras shall be mounted to allow a wide range of view of the entire project. The location of stationary time-lapse cameras shall be approved by the CITY OF GOLETA and ARCHITECT. Time-lapse photos shall be taken every 10 minutes 24 hours per day seven days per week through the course of construction. Time-lapse photos shall be accessible real-time on the web and integrated as part of the Electronic Project Management System. At project closeout, time-lapse photos shall be permanently archived and remain viewable by the CITY OF GOLETA and ARCHITECT.
- C. Provide bi-monthly ariel view photos of the project site.

PART 2 PRODUCTS (Not Used)

PART 3 EXECUTION (Not Used)

END OF SECTION – 01 32 33



SECTION 01 33 00

SUBMITTAL PROCEDURES

PART 1 – GENERAL

1.01 GENERAL

- A. Submittals are required for all materials called for in the Technical specifications, including tapping sleeves, vaults, vault lids, combination air valve covers, and where called for in the GOLETA WATER DISTRICT Technical Specifications. Submittals are also required for all materials not otherwise specified in the Technical Specifications, or whenever an “or equal” item is requested for use by the Contractor.
- B. Related Sections:
 - 1. Division 00 - Procurement and Contracting Requirements
 - 2. Division 01 - General Requirements
 - 3. Technical Specification Sections identifying required submittals

1.02 PRECONSTRUCTION CONFERENCE SUBMITTALS

- A. At the preconstruction conference, the Contractor shall submit the following items for review:
 - 1. A preliminary schedule of Shop Drawing, Sample, and proposed Substitute ("Or-Equal") submittals.
 - 2. A list of all required submittals for the project from Contractor and all subcontractors and suppliers, including delivery and sample review and approval form if sample is not provided by Engineer.
 - 3. A list of all permits and licenses the Contractor shall obtain indicating the agency required to grant the permit, the expected date of submittal for the permit, and required date for receipt of the permit.
 - 4. A project overview bar chart.

1.03 SHOP DRAWINGS

- A. Wherever called for in the Contract Documents, the Contractor shall furnish for review, two (2) physical copies of each Shop Drawing submittal and one (1) electronic copy. The term "Shop Drawings" as used herein shall be understood to include detail design calculations, shop-prepared drawings, fabrication and installation drawings, erection drawings, lists, graphs, catalog sheets, data sheets, and similar items. Whenever the Contractor is required to submit design calculations as part of a submittal, such



calculations shall bear the signature and seal of an engineer registered in the State of California in the appropriate area of expertise.

B. Organization

1. A single submittal transmittal form shall be used for each technical specification section or item or class of material or equipment for which a submittal is required. A single submittal covering multiple sections will not be acceptable unless the primary specification references other sections for components.
2. On the transmittal form, index the components of the submittal and insert tabs in the submittal to match the components. Relate the submittal components to Technical Specification paragraph and subparagraph, Drawing number, detail number, schedule title, as applicable.
3. Unless indicated otherwise, terminology and equipment names and numbers used in submittals shall match the Contract Documents.

C. Format

1. Minimum sheet size shall be 8.5 inches by 11 inches. Maximum sheet size shall be 24 inches by 36 inches. Every page in a submittal shall be numbered in sequence. Each copy of a submittal shall be collated and stapled or bound, as appropriate.
2. Where product data from a manufacturer is submitted, clearly mark which model is proposed, with all pertinent data, capacities, dimensions, clearances, diagrams, controls, connections, anchorage, and supports. Sufficient level of detail shall be presented for assessment of compliance with the Contract Documents.
3. Each submittal shall be assigned a unique number. Submittals shall be numbered sequentially. The submittal numbers shall be clearly noted on the transmittal. Original submittals shall be assigned a numeric submittal number. Resubmittals shall bear an alpha-numeric system which consists of the number assigned to the original submittal for that item followed by a letter of the alphabet to represent that it is a subsequent submittal of the original. For example, if submittal 25 requires a resubmittal, the first resubmittal will bear the designation "25-A" and the second resubmittal will bear the designation "25-B" and so on.
4. A submittal log will be maintained by the Contractor and submitted to the City or agency that includes, at a minimum, the unique number, subject, anticipated date of submittal, date submitted, date returned, and City or agency response.

- D. Disorganized submittals that do not meet the requirements above will be returned without review.**



- E. Except as may otherwise be indicated herein, the City will return prints of each submittal to the Contractor with its comments noted thereon, within 14 calendar days following receipt. It is considered reasonable that the Contractor shall make a complete and acceptable submittal by the second submission of a submittal item.
- F. If a submittal is returned to the Contractor marked "NO EXCEPTIONS TAKEN," formal revision and resubmission of said submittal is not required.
- G. If a submittal is returned marked "MAKE CORRECTIONS NOTED," Contractor shall make the corrections on the submittal, but formal revision and resubmission of said submittal is not required.
- H. If a submittal is returned marked "AMEND-RESUBMIT," the Contractor shall revise said submittal and shall resubmit the required number of copies of said revised submittal for review.
- I. If a submittal is returned marked "REJECTED-RESUBMIT," it shall mean that the submitted material or product does not satisfy the specification, the submittal is so incomplete that it cannot be reviewed, or is a substitution request not submitted in accordance with Section 016000 - Products, Materials, Equipment, and Substitutions. The Contractor shall prepare a new submittal and shall resubmit the required number of copies of said revised submittal for review.
- J. Fabrication of an item shall be commenced only after the City or agency has reviewed the pertinent submittals and returned copies to the Contractor marked either "NO EXCEPTIONS TAKEN" or "MAKE CORRECTIONS NOTED." Corrections indicated on submittals shall be considered as changes necessary to meet the requirements of the Contract Documents and shall not be taken as changes to the contract requirements.
- K. The review of submittals shall not relieve the Contractor of the entire responsibility for the correctness of details and dimensions. The Contractor shall assume all responsibility and risk for any misfits due to any errors in submittals. The Contractor shall be responsible for the dimensions and the design of adequate connections and details.

1.04 SAMPLES

- A. Whenever in the Specifications samples are required, the Contractor shall submit not less than two samples of each item or material for acceptance. Unless otherwise indicated, samples, shall be submitted a minimum of 14 days prior to ordering such material.
- B. Samples shall be individually and indelibly labeled or tagged, indicating thereon all specified physical characteristics and Manufacturer's name. Upon receiving acceptance of the City or agency, one set of the samples will be stamped and dated by the City or agency and returned to the Contractor, and one set of samples will be retained by the City or agency.



- C. Colors and textures of items presented in sample submittals shall be as indicated on the plans or described in the specifications for that particular item. Unless indicated otherwise, samples shall be provided from the manufacturer's standard colors and standard materials, products, or equipment lines.

1.05 OPERATIONS & MAINTENANCE MANUAL

- A. When so specified in the Contract documents, the Contractor shall submit technical operation and maintenance information for each item of mechanical and electrical equipment in an organized manner in the Operations & Maintenance (O&M) Manual. Additional instructions above and beyond that provided by the manufacturer shall be provided as indicated below and written in a clear and concise manner.
- B. The O&M Manual shall be subdivided first by specification section number; second, by equipment item; and last, by "Category" with the following information provided for each item of equipment (as applicable):
1. Category 1 - Equipment Summary: A summary table shall indicate the equipment name, equipment number, and location in which the equipment is installed.
 2. Category 2 - Operational Procedures: Manufacturer-recommended procedures shall be included covering: Installation, Adjustment, Operation procedures, Troubleshooting, Disassembly, Re-assembly; and Tabulation of proper settings for all pressure relief valves, low and high pressure switches, and other protection devices.
 3. Category 3 - Preventative Maintenance Procedures: Preventative maintenance procedures shall include all manufacturer-recommended procedures to be performed and recommended frequency of preventative maintenance procedures shall be included.
 4. Category 4 - Parts List and Drawings: A complete parts list shall be furnished, including a generic description and manufacturer's identification number for each part. Addresses and telephone numbers of the nearest supplier and parts warehouse shall be included. Cross-sectional or exploded view drawings shall accompany the parts list.
 5. Category 5 – Safety Procedures: Engineering, industry, and manufacturer-recommended safety procedures shall be provided covering the safety precautions to be taken when operating and maintaining the equipment or working near it.
 6. Category 6 - Documentation: All equipment warranties, affidavits, and certifications required by the Technical Specifications shall be placed in this category.
 7. Spare Parts List: The spare parts list shall include those spare parts which each manufacturer recommends be maintained in inventory at the project site. The Contractor shall cross-reference all spare parts lists to the equipment numbers



designated in the Contract Documents. Each manufacturer or supplier shall indicate the name, address, and telephone number of its nearest outlet of spare parts to assist the City in ordering spare parts. The list shall include the current list price of each spare part.

- C. The Contractor shall furnish to the City or agency 3 identical physical O&M Manuals and one (1) electronic copy. Each set shall consist of one or more volumes, each of which shall be bound in a standard size, 3-ring, loose leaf, vinyl plastic hard cover binder suitable for bookshelf storage. Binder ring size shall not exceed 2.5 inches. A table of contents indicating all equipment in the manuals shall be included.
- D. Manuals shall be submitted in final form not later than the 75 percent of construction completion date. All discrepancies found by the City or agency shall be corrected within 30 days from the date of written notification by the City or agency.

1.06 RECORD DRAWINGS

- A. The Contractor shall maintain one record set of Drawings at the Site. On these, it shall mark all project conditions, locations, configurations, and any other changes or deviations which may vary from the information represented on the original Contract Drawings, including buried or concealed construction and utility features which are revealed during the course of construction. Special attention shall be given to recording the horizontal and vertical location of all buried utilities that differ from the locations indicated, or which were not indicated on the Contract Drawings. The Contractor shall provide supplemental detailed sketches as necessary or directed to fully indicate the work as actually constructed. These master record drawings of the Contractor's representation of record drawing conditions, including all revisions made necessary by addenda and change orders shall be maintained up-to-date during the progress of the work. Red ink shall be used for alterations and notes.
- B. In the case of those drawings which depict the detail requirement for equipment to be assembled and wired in the factory, such as motor control centers and the like, the record drawings shall be updated by indicating those portions which are superseded by change order drawings or final Shop Drawings, and by including appropriate reference information describing the change orders by number and the Shop Drawings by manufacturer, drawing, and revision numbers.
- C. Record drawings shall be accessible at all times during the construction period. Said up-to-date record drawings shall be in the form of a set of prints with carefully plotted information overlaid.
- D. Upon Substantial Completion of the work and prior to final acceptance, the Contractor shall finalize and deliver a complete set of record drawings to the Project Engineer, City or agency as applicable. This set of drawings shall consist of corrected Drawings showing the reported location of the work. The information submitted by the Contractor and incorporated by the Project Engineer into the record drawings will be assumed to be correct, and the Contractor shall be responsible for the accuracy of such information, and for any errors or omissions which may appear on the record drawings as a result.



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PART 2 – PRODUCTS [NOT USED]

PART 3 – EXECUTION

END OF SECTION – 01 3300



SECTION 01 35 70 ENVIRONMENTAL REQUIREMENTS

PART 1 - GENERAL

1.01 SUMMARY

- A. Section Includes: General requirements and procedures for compliance with certain prerequisites and credits needed for Project to obtain the targeted LEED Silver certification under the LEED for New Construction and Major Renovations (LEED-NC) version 4 (v4) as administered by the U.S. Green Building Council (USGBC).
1. Some LEED prerequisites and credits needed to obtain LEED certification depend on product selections and may not be specifically identified as LEED requirements. Compliance with requirements needed to obtain LEED prerequisites and credits may be used as one criterion to evaluate substitution requests and comparable product requests.
 2. A copy of the LEED Project checklist is attached at the end of this Section for information only.
 - a. Some LEED prerequisites and credits needed to obtain the indicated LEED certification depend on aspects of Project that are not part of the Work of the Contract.
 3. Definitions included in the "LEED Version 4 for Building Design and Construction" (LEED v4 BD+C) Reference Guide and online amendments apply to this Section.
- B. Related Specification Sections include but are not necessarily limited to:
1. Division 00 - Bidding Requirements, Contract Forms, and Conditions of the Contract.
 2. Division 01 - General Requirements.
 3. Section 01 74 19 Construction Waste Management and Disposal
 4. Section 01 81 19 Indoor Air Quality Procedures.



1.02 DEFINITIONS

- A. **Bio-Based Materials:** Materials that meet the Sustainable Agriculture Network's Sustainable Agriculture Standard. Bio-based raw materials shall be tested using ASTM D 6866 and be legally harvested, as defined by the exporting and receiving country.
- B. **CDPH Standard Method v1.2:** California Department of Public Health (CDPH) Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers, v. 1.2–2017, for the emissions testing and requirements of products and materials.
- C. **Chain-of-Custody Certificates:** Certificates signed by manufacturers and fabricators certifying that wood used to make products was obtained from forests certified by an FSC-accredited certification body to comply with FSC STD-01-001.
- D. **Environmental Product Declaration (EPD):** An independently verified report based on life-cycle assessment studies that have been conducted according to a set of common rules for each product category and peer-reviewed.
 - 1. **Product-Specific Declaration:** A product with a publicly available, critically reviewed life-cycle assessment conforming to ISO 14044 that has at least a cradle to gate scope.
 - 2. **Industry-Wide (Generic) EPD:** Provide products with third-party certification (Type III), including external verification, in which the manufacturer is explicitly recognized as a participant by the program operator. EPD must conform to ISO 14025, 14040, 14044, and EN 15804 or ISO 21930 and have at least a cradle to gate scope.
 - 3. **Product-Specific Type III EPD:** A product with a third-party certification, including external verification, in which the manufacturer is explicitly recognized by the program operator. EPD must conform to ISO 14025, 14040, 14044, and EN 15804 or ISO 21930 and have at least a cradle to gate scope.
- E. **Extended Producer Responsibility (EPR):** Measures undertaken by the maker of a product to accept its own and sometimes other manufacturers' products as postconsumer waste at the end of the products' useful life.
- F. **Health Product Declaration Open Standard (HPD):** A standard format for reporting product content and associated health information for building products and materials.



- G. **Material Cost:** The dollar value of materials being provided to the site, after Contractor mark-ups, including transportation costs, taxes, fees, and shop labor, but excluding field equipment and field labor costs.
- H. **Recycled Content:** Recycled content is the sum of postconsumer recycled content plus one-half the preconsumer recycled content, based on cost.
 - 1. "Postconsumer" material is defined as waste material generated by households or by commercial, industrial, and institutional facilities in their role as end users of the product, which can no longer be used for its intended purpose.
 - 2. "Preconsumer" material is defined as material diverted from the waste stream during the manufacturing process. Excluded is reutilization of materials, such as rework, regrind, or scrap, generated in a process and capable of being reclaimed within the same process that generated it.
- I. **Regional Materials:** Materials that are extracted, harvested, recovered, and manufactured within a radius of 100 miles from the Project site.
- J. **Volatile Organic Compounds (VOC) Emissions Test:** Refer to CDPH Standard Method v1.2 definition.
- K. Additional definitions are listed in "Glossary of Terms" in the USGBC Reference Guide.

1.03 ADMINISTRATIVE REQUIREMENTS

- A. Work of this project includes completed building and application for LEED certification. Work is not complete until Owner has accepted LEED's final review of LEED certification.
- B. Provide documentation required by LEED and LEED review.
- C. Comply with LEED requirements and requirements specified in other Sections.
 - 1. Refer any discrepancy to the Architect for clarification.
 - 2. Coordinate the Work specified in This Section and the requirements applicable and effecting Work in other Sections.
- D. Provide materials and procedures necessary to obtain LEED prerequisites and credits required in this Section. Other Sections may specify requirements that contribute to LEED prerequisites and credits. Refer to other sections for



additional materials and procedures necessary to obtain LEED prerequisites and credits.

- E. Respond to questions and requests for additional information from Architect and the LEED regarding LEED credits until the LEED has made its determination on the project's LEED certification application.
- F. LEED Online Submittals: Upload LEED documentation submittal data directly to LEED project "LEED Online" website. Complete online forms at least monthly and as necessary to document LEED credits for submittals required in this Section.
- G. LEED Conference: Schedule and conduct a conference at a time convenient to Owner and Architect within 21 days prior to commencement of the work. Advise Architect, Engineer, and Owner's Commissioning Authority of scheduled meeting dates.
 - 1. Attendees: Authorized representatives of Owner, Owner's Commissioning Authority, Architect, and their consultants; Contractor and its superintendent; major subcontractors; suppliers; and other concerned parties shall attend the conference. Participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.
 - 2. Agenda: LEED goals for the project, Contractor's action plans, and discussion of targeted LEED Prerequisites and Credits.
 - 3. Minutes: Record and distribute minutes to attendees and other entities with responsibilities for obtaining LEED Credits.
- H. LEED Coordination Meetings: Contractor shall schedule and conduct LEED Certification coordination meetings, held every four to six weeks. At the Owner Representative's discretion, the LEED Certification meetings may be combined with other Project meetings. Meeting attendees shall include:
 - 1. Contractor's Project Manager
 - 2. Contractor's LEED Coordinator
 - 3. All other attendees designated by the Owner
 - 4. Sub-Contractor Representatives as appropriate to stage of work



1.04 SUBMITTALS

- A. Action Submittals:
1. Submit each LEED submittal simultaneously with applicable product submittal.
- B. Project Materials Cost Data: Deliver the necessary material and cost data required for credit calculations on the LEED Material Buyout Form. Include total cost and shop labor for project materials and itemized costs of specific materials being tracked for LEED credits. Material costs exclude site labor, overhead, profit and construction equipment. Include Divisions 03-10 and 12, if applicable to the Project scope of work (the total materials cost is exclusive of specialties: Conveying Systems and Mechanical and Electrical components).
- C. LEED Action Plans: Within 30 days of Notice to Proceed submit the following action plans to the Owner's Representative:
1. Prerequisite SS 1, Construction Activity Pollution Prevention: Erosion and Sedimentation Control plan.
 2. Prerequisite MR 2 and Credit 5, Construction and Demolition Waste Management: Construction Waste Management Plan complying with Section 017419 "Construction Waste Management".
 3. Credit EQ 2, Low-Emitting Materials: Low Emitting Materials Tracking Sheet indicating all adhesives, sealants, paints, coatings, composite wood, flooring, insulation, wall and ceiling products anticipated to be used on the project.
- D. LEED Documentation Submittals:
1. General, Sustainable Materials Attributes Form: Project submittals must be accompanied by a completed Sustainable Materials Attributes Form (Material Buyout Form). Submittal packages must also include highlighted documentation supporting the sustainability claims made on the Sustainable Materials Attributes Form.
 2. Provide declarations complying with LEED requirements, as identified in the product specification section, including:
 - a. Credit MR 2, Environmental Environmental Product Declarations, Option 1, Environmental Product Declarations (EPD's):



- 1) Manufacturers Life Cycle Analysis conforming to ISO 14044, Industry-wide (generic) EPD with third-party Type III certification, or Product-specific Type III EPD.
- b. Credit MR 3, Sourcing of Raw Materials:
 - 1) Recycled Content: Product data and certification letter from product manufacturers, indicating percentages by weight of postconsumer and preconsumer recycled content for products having recycled content. Include statement of costs
 - 2) Bio-Based Materials: Product data and certification for bio-based materials, indicating that they comply with requirements. Include statement of costs.
 - 3) FSC Certified Wood: Product data and chain-of-custody certificates for products containing certified wood. Include statement indicating cost for each certified wood product.
 - 4) Materials Reuse: Receipts for salvaged and refurbished materials used for Project, indicating sources and costs.
 - 5) Local/Regional Material: For any materials contributing to MRc3 that are manufactured and extracted within 100 miles of the project site, submit cutsheet, product literature or letter from manufacturer indicating the location of harvest, processing and manufacturer and proximity from the project site.
- c. MR credit 4, Material Ingredients: Material ingredient reports for products that comply with LEED requirements for material ingredient reporting, including but not limited to the following:
 - 1) Manufacturer Inventory.
 - 2) Health Product Declaration.
 - 3) Cradle to Cradle certifications.
 - 4) Declare product labels.
 - 5) ANSI/BIFMA e3 Furniture Sustainability Standard.
- d. Low-Emitting Materials: Product data, indicating VOC content and emissions testing documents showing compliance with requirements for low-emitting materials, for the following materials:
 - 1) Adhesives, Sealants, Paints and Coatings:
 - a) Submit product MSDS, SDS or other documentation confirming the VOC emission information for on-site wet applied products.
 - b) Submit volume of all products used in Liters or Gallons.
 - 2) Adhesives, Sealants, Paints, Coatings, Flooring, Ceilings, Walls, Thermal, and Acoustic Insulation:
 - a) Submit manufacturers VOC Emissions Evaluation verification in accordance with California Department of Public Health (CDPH) Standard Method v1.2–2017 or equivalent verification method.



- 3) Composite Wood Products:
 - a) Submit CARB Executive Order for the specific manufacturing location of the composite wood product confirming No Added Formaldehyde (NAF) resins or Ultra Low Emitting Formaldehyde (ULEF) resins. In addition, provide a statement from the manufacturer that reads "The XX product is a HWPW-CC/-VC/PB/MDF manufactured in our XX location which is authorized under CARB EO #XX."
 - b) Wood structural panel manufactured according to PS 1-09 or PS 2-10 (or one of the standards considered by CARB to be equivalent to PS 1 or PS 2) and labeled bond classification Exposure 1 or Exterior
 - c) Structural wood product manufactured according to ASTM D 5456 (for structural composite lumber), ANSI A190.1 (for glued laminated timber), ASTM D 5055 (for I-joists), ANSI PRG 320 (for cross-laminated timber), or PS 20-15 (for finger-jointed lumber).

1.05 QUALITY ASSURANCE

- A. LEED Coordinator: Assign an individual knowledgeable of certification to coordinate LEED requirements with Project's LEED Consultant. The LEED Coordinator must have documented LEED experience on at least two building projects with a similar scope of work. The experience must include construction activities. LEED coordinator may also serve as waste management coordinator in Section 01 74 19. LEED coordinator shall attend all LEED certification meetings and shall be available as needed in the field for LEED-related site walks and inspections and to answer questions that may arise and as otherwise requested.



PART 2 - PRODUCTS

2.01 MATERIALS, GENERAL

- A. Provide products and procedures necessary to obtain LEED credits required in this Section. Although other Sections may specify some requirements that contribute to LEED credits, the Contractor shall determine additional materials and procedures necessary to obtain LEED credits indicated. Contractor to determine a combination of credit options best suited for achieving credits required.
1. Exclusions: Special equipment, such as elevators, escalators, process equipment, and fire suppression systems, is excluded from the credit calculations. Also excluded are products purchased for temporary use on the project, like formwork for concrete.

2.02 BUILDING PRODUCT DISCLOSURE AND OPTIMIZATION

- A. Credit MR 2, Environmental Product Declarations (EPD): Option 1. Provide at least 20 permanently installed products (sourced from at least 5 different manufacturers) which meet one of the disclosure criteria:
1. Product-Specific Declaration: Valued as one product.
 2. Industry-Wide (Generic) EPD: Valued as one product.
 3. Product-Specific Type III EPD: Valued as one product.
 4. Product-Specific Type III EPD with external verification and critical review: Valued as one and one-half product.
- B. Credit MR 3, Sourcing of Raw Materials: Provide products that meet at least one of the responsible extraction criteria below for at least 15%, by cost, of the total value of permanently installed building products in the project:
1. Recycled content.
 2. Extended producer responsibility program.
 3. Bio-based materials.
 4. Certified Wood: Wood-based materials include, but are not limited to, the following materials when made from wood, engineered wood products, or wood-based panel products



- C. Credit MR 4, Material Ingredients: Option 1, Material Ingredient Reporting. Provide at least 20 different permanently installed products from at least five different manufacturers that use any of the following programs to demonstrate the chemical inventory of the product to at least 0.1% (1000 ppm), which meet one of the following disclosure criteria:
1. Manufacturer Inventory.
 2. Health Product Declarations (HPDs).
 3. Cradle to Cradle (C2C) certifications.
 4. Declare product labels.
 5. ANSI/BIFMA e3 Furniture Sustainability Standard.

2.03 LOW-EMITTING MATERIALS

- A. Low-Emitting Materials, Paints and Coatings – VOC Content Evaluation: For field applications use paints and coatings that comply with the limits for VOC content when calculated according to the California Air Resources Board (CARB) 2007, Suggested Control Measure (SCM) for Architectural Coatings, or the South Coast Air Quality Management District (SCAQMD) Rule 1113, effective February 5, 2016.

Product Type:	Allowable VOC Content (g/L):
Bond Breaker	350
Clear wood finishes - Varnish	275
Clear wood finishes – Sanding Sealer	275
Clear wood finishes - Lacquer	275
Colorant – Architectural Coatings, excluding IM coatings	50
Colorant – Solvent Based IM	600
Colorant - Waterborne IM	50
Concrete – Curing compounds	100
Concrete – Curing compounds for roadways & bridges	350
Concrete surface retarder	50
Driveway Sealer	50
Dry-fog coatings	50
Faux finishing coatings - Clear topcoat	100
Faux finishing coatings – Decorative Coatings	350



Faux finishing coatings - Glazes	350
Faux finishing coatings – Trowel applied coatings	50
Fire-proof coatings	150
Flats	50
Floor coatings	50
Form release compounds	100
Graphic arts (sign) coatings	150
Industrial maintenance coatings	100
Industrial maintenance coatings – High temperature IM coatings	420
Industrial maintenance coatings – Non-sacrificial anti-graffiti coatings	100
Industrial maintenance coatings – Zinc rich IM primers	100
Mastic coatings	100
Metallic pigmented coatings	150
Multi-color coatings	250
Non-flat coatings	50
Pre-treatment wash primers	420
Primers, sealers and undercoaters	100
Reactive penetrating sealers	350
Recycled coatings	250
Roof coatings	50
Roof coatings, aluminum	100
Roof primers, bituminous	350
Rust preventative coatings	100
Stone consolidant	450
Sacrificial anti-graffiti coatings	50
Shellac- Clear	730
Shellac – Pigmented	550
Specialty primers	100
Stains	100
Stains, interior	250
Traffic Coatings	100
Waterproofing sealers	100
Waterproofing concrete/masonry sealers	100
Wood preservatives	350
Low solids coatings	120

- a. Low-Emitting Materials, Adhesives and Sealants – VOC Content Evaluation: For field applications that are inside the weatherproofing system, use adhesives and sealants that comply with the limits for VOC content when calculated according



to South Coast Air Quality Management District (SCAQMD) Rule #1168, requirements in effect on October 6, 2017:

Architectural Applications:	Allowable VOC Content (g/L):
Indoor carpet adhesives	50
Carpet pad adhesives	50
Outdoor carpet adhesives	150
Wood flooring adhesives	100
Rubber floor adhesives	60
Subfloor adhesives	50
Ceramic tile adhesives	65
VCT and asphalt tile adhesives	50
Dry wall and panel adhesives	50
Cove base adhesives	50
Multipurpose construction adhesives	70
Structural glazing adhesives	100
Single ply roof membrane adhesives	250
Specialty Applications:	
PVC welding	510
CPVC welding	490
ABS welding	325
Plastic cement welding	250
Adhesive primer for plastic	550
Computer diskette manufacturing	350
Contact adhesive	80
Special purpose contact adhesive	250
Tire retread	100
Adhesive primer for traffic marking tape	150
Structural wood member adhesive	140
Sheet applied rubber lining operations specialty	250
Top and Trim adhesive	250
Substrate Specific Applications:	
Metal to metal substrate specific adhesives	30
Plastic foam substrate specific adhesives	50
Porous material (except wood) substrate specific adhesives	50
Wood substrate specific adhesives	30
Fiberglass substrate specific adhesives	80
Sealants:	
Architectural sealant	250
Marine deck sealant	760
Nonmember roof sealant	300



Architectural Applications:	Allowable VOC Content (g/L):
Roadway sealant	250
Single-ply roof membrane sealant	450
Other sealant	420
Sealant Primers:	
Architectural non-porous sealant primer	250
Architectural porous sealant primer	775
Modified bituminous sealant primer	500
Marine deck sealant primer	760
Other sealant primer	750
Other:	
Other adhesives, adhesive bonding primers, adhesive primers or any other primers	250

- D. Low-Emitting Materials, VOC Emissions Evaluation: Products must demonstrate they have been tested and determined compliant in accordance with California Department of Public Health, (CDHP), Standard Method v1.2-2017, using the applicable exposure scenario. Manufacturer’s documentation demonstrating compliance must state the range of total VOCs (tVOC) after 14 days measured as specified in the CDPH Standard Method v1.2 (0.5mg/m³ or less; between 0.5 and 5.0 mg/m³; or 0.50 mg/m³ or more).
1. Paints and Coatings – VOC Emissions Evaluation: For field applications that are inside the weatherproofing system, 75 percent of paints and coatings shall comply with the VOC Emissions Evaluation. Acceptable third party verified labels confirming compliance include but are not limited to:
 - a. Greenguard Gold
 - b. MAS Certified Green
 - c. Intertek ETL Environmental VOC+
 2. Adhesives and Sealants – VOC Emissions Evaluation: For field applications that are inside the weatherproofing system, 75 percent of adhesives and sealants shall comply with the VOC Emissions Evaluation. Acceptable third party verified labels confirming compliance include but are not limited to:
 - a. Greenguard Gold
 - b. MAS Certified Green
 - c. Intertek ETL Environmental VOC+
 3. Flooring – VOC Emissions Evaluation: 90 percent of floorings shall comply with the VOC Emissions Evaluation. Acceptable third party verified labels confirming compliance include but are not limited to:



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- a. FloorScore
 - b. CRI Green Label Plus
 - c. Greenguard Gold
 - d. SCS Indoor Advantage Gold
 - e. MAS Certified Green
 - f. Intertek ETL Environmental VOC+
 - g. NSF/ ANSI 332
4. Composite Wood – Formaldehyde Emissions Evaluation: All interior grade plywood, composite hardwood, and agrifiber products that are architecturally rated shall meet EPA TSCA Title VI or California Air Resources Board (CARB) ATCM for formaldehyde requirements for ultra-low-emitting formaldehyde (ULEF) resins or no added formaldehyde (NAF).
5. Structural composite wood must meet one of the following:
- a. Manufactured according to PS 1-09 or PS 2-10 (or one of the standards considered by CARB to be equivalent to PS 1 or PS 2) and labeled bond classification Exposure 1 or Exterior
 - b. Manufactured according to ASTM D 5456 (for structural composite lumber), ANSI A190.1 (for glued laminated timber), ASTM D 5055 (for I-joists), ANSI PRG 320 (for cross-laminated timber), or PS 20-15 (for finger-jointed lumber).
6. Ceilings – VOC Emissions Evaluation: 90% of ceilings, by cost or surface area, comply with the requirements of the VOC Emissions Evaluation. Acceptable third party verified labels confirming compliance include but are not limited to:
- a. Greenguard Gold
 - b. SCS Indoor Advantage Gold
7. Walls Panels – VOC Emissions Evaluation: 75% of all wall panels, by cost or surface area, shall comply with the requirements of the VOC Emissions Evaluation. Wall panel product category included all finish wall treatments (wall coverings, wall paneling, wall, tile), surface wall structures such as gypsum or plaster, cubicle/ curtain/ partition walls, doors, frames, windows and window treatments. Acceptable third party verified labels confirming compliance include but are not limited to:
- a. Greenguard Gold
 - b. SCS Indoor Advantage Gold
8. Insulation – VOC Emissions Evaluation: 75% of all insulation shall comply with the requirements of the VOC Emissions Evaluation. The insulation material category includes all thermal and acoustic boards, batts, rolls, blankets, sound attention, foamed-in place, loose-fill, blown



and sprayed insulation. Acceptable third party verified labels confirming compliance include but are not limited to:

- a. Greenguard Gold
- b. SCS Indoor Advantage Gold

2.04 WATER USE REDUCTION

- A. Water Use Reduction, Irrigation: Do not exceed water flow requirements indicated on drawings.
- B. Water Use Reduction, Plumbing Fixtures: Do not exceed water flow requirements indicated in Division 22 - PLUMBING.

PART 3 - EXECUTION

3.01 NONSMOKING SITE AND BUILDING

- A. Construction Indoor Air Quality Management: Smoking is not permitted within the platform area or within 25 feet of entrances.

3.02 CONSTRUCTION WASTE MANAGEMENT

- A. Construction and Demolition Waste Management: Comply with requirements within Section 01 74 19 Construction Waste Management.

PART 4 - MEASUREMENT AND PAYMENT

Work of this Section is considered incidental to work under other payment items and no separate measurement and payment will be made to the Contractor for Work of this Section. Work of this section shall include furnishing all labor, materials, tools, equipment, supplies, supervision, and incidentals, and doing all work, as shown on the Plans, and as specified in these Specifications, and as directed by the OAR.

END OF SECTION – 01 35 70



SECTION 01 35 92

MITIGATION AND MONITORING PROCEDURES FOR ARCHAEOLOGICAL FINDINGS

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Mitigation procedures for the unanticipated discovery of archaeological or paleontological remains not identified by research or other investigations during pre-construction.
- B. Mitigation procedures for the unanticipated discovery of human remains and associated cultural materials.

1.02 REGULATORY REQUIREMENTS

- A. State of California Health and Safety Code Section 7050.5.
- B. Public Resources Code, Sections 5097.94, 5097.98, 5097.99.
- C. Secretary of the Interior's Standards and Guidelines.
- D. Professional Qualifications Standards (48 Federal Register 44738–39).
- E. South Central Coastal Information Center at the California State University, Fullerton.
- F. Native American Heritage Commission (NAHC).
- G. Archaeological Resource Management Reports (ARMR).
- H. ARMR Guidelines.

1.03 ARCHAEOLOGICAL FINDINGS

- A. Upon archaeological discoveries the CONTRACTOR shall stop construction activities in the immediate area and notify the OAR. OWNER will retain a qualified archeologist meeting the Secretary of the Interior's Professional Qualifications Standards (48 Federal Register 44738–39), to make an immediate evaluation of significance and appropriate treatment of the resource.
- B. To complete this assessment, CONTRACTOR shall allow the Archeologist shall the necessary time and access to the Site to recover, analyze, and curate the find. The Archeologist will recommend the extent of archeological monitoring necessary to ensure the protection of resources that may be in the area. Construction activities may continue on other parts of the site while evaluation and treatment of historical or unique archaeological resources takes place.
- C. OWNER will implement an archaeological monitoring program for the construction activities at the site prepared by the Archaeologist under the following conditions:
 - 1. When a Phase I Site Investigation shows a strong possibility that unique archaeological resources are buried on the site.



2. When unique architectural resources have been identified on a site, but OWNER does not implement a Phase III Data Recovery/Mitigation Program because the resources can be recovered through the archaeological monitoring program.
- D. Work shall stop within a 30-foot radius of the discovery. Work shall not continue until the discovery has been evaluated by the Archaeologist. The Archaeologist will assess the find and, if determined to be of value, will draft a monitoring program and oversee the remainder of the grading work. Archaeologist will monitor the project ground-disturbing activities if there is evidence that prehistoric or historic cultural resources may be found. Significant archaeological resources found will be preserved as determined necessary by the Archaeologist and offered to a local museum or repository. Resulting reports will be forwarded to the South Central Coastal Information Center at the California State University, Fullerton.
- E. Cultural resources sensitivity training will be conducted by the Archaeologist for the construction workers involved in moving soil or working near soil disturbance. This training will review the types of archaeological resources that might be found, along with laws for the protection of resources.
- F. OWNER will determine whether it is feasible to prepare and implement a Phase III Data Recovery/Mitigation Program. A Phase III Data Recovery/Mitigation Program would be designed by the Archaeologist to recover a statistically valid sample of the archaeological remains and to document the site to a level where the impacts can be determined to be less than significant. Documentation will be prepared in the standard format of the ARMR Guidelines, as prepared by the OHP. Once a Phase III Data Recovery/Mitigation Program is completed, an archaeological monitor will be present on site to oversee the grading, demolition activities, and/or initial construction activities to ensure that construction proceeds in accordance with the adopted Phase III Data Recovery/Mitigation Program. The extent of the Phase III Data Recovery/Mitigation Program and the extent and duration of the archaeological monitoring program depend on site-specific factors.
- G. Work shall stop within a 30-foot radius of the discovery. Work shall not continue until the discovery has been evaluated by a qualified Archaeologist and the local Native American representative has been contacted and consulted to assist in the accurate recordation and recovery of the resources.

1.04 PALEONTOLOGICAL FINDINGS

- A. Upon paleontological discoveries the CONTRACTOR shall stop construction activities in the immediate area and notify the OAR. OWNER will have a paleontological monitor on-call during construction activities. This monitor will provide the construction crew with a brief summary of the sensitivity, the rationale behind the need for protection of these resources, and information on the initial identification of paleontological resources. If paleontological resources are uncovered during construction, the on-call paleontologist shall be notified and afforded the necessary time to recover, analyze, and curate the find. Subsequently, the monitor will remain on site for the duration of the ground disturbances to ensure the protection of any other resources that may be in the area.



- B. The paleontological monitor will be on site for ground altering activities and will advise OWNER as to necessary means of protecting potentially significant paleontological resources, including, but not limited to, possible cessation of construction activities in the immediate area of a find. If resources are identified during the monitoring program, the CONTRACTOR shall provide the paleontologist the necessary time to recover, analyze, and curate the find. Subsequently, the monitor will remain on site for the duration of the ground disturbances to insure the protection of any other resources that may be in the area.

1.05 HUMAN REMAINS FINDINGS

- A. The State of California Health and Safety Code Section 7050.5 states that in the event that human remains are discovered during construction activities, the following procedure shall be observed:
1. All construction activity shall stop immediately and the Archaeologist will contact the Santa Barbara County Coroner. The Coroner has two working days to examine human remains after being notified by the OAR.
 2. If the coroner determines the remains to be Native American, the Coroner will contact the Native American Heritage Commission (NAHC) within 24 hours. The NAHC will immediately notify the person it believes to be the Most Likely Descendent (MLD) of the deceased Native American.
 3. The MLD has 48 hours to make recommendations to the OWNER for the treatment or disposition, with proper dignity, of the human remains and grave goods. If the MLD does not make recommendations within 48 hours the OWNER will reinter the remains in an area of the property secure from further disturbance following procedures required by the Public Resources Code, Sections 5097.94, 5097.98, 5097.99, and Health and Safety Code, Section 7050.5.
 4. If the County does not accept the descendant's recommendations, the OWNER or the descendent may request mediation by the NAHC.

PART 2 – PRODUCTS – Not Used

PART 3 – EXECUTION – Not Used

END OF SECTION – 01 3592



SECTION 01 35 93

OFF-SITE IMPROVEMENT PROCEDURES

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

1. Surface improvements including street, sidewalks, curbs and gutters.
2. Tree planting.
3. Utilities: Underground utilities, fire hydrants, streetlights, catch basins, parkway drains, and culverts.

B. Related Requirements:

1. Division 01 - General Requirements.
2. Division 31 – Earthwork.
3. Division 32 - Exterior Improvements.
4. Division 33 – Utilities.

1.02 SYSTEM DESCRIPTION

A. Regulatory Requirements:

1. Comply with requirements of authorities having jurisdiction over the area.
2. Obtain and pay for permits, licenses and inspections required by authorities having jurisdiction over the area.
3. Bonds: Post as required by authorities having jurisdiction over the area.

1.03 SUBMITTALS

- ###### A. Shop Drawings: Submit plans, sections and details of concrete Work. Submit design drawings and calculations signed and stamped by a civil and/or structural engineer licensed in the State of California.

1.04 QUALITY ASSURANCE

- ###### A. Comply with Standard Specifications for Public Works Construction, current edition.

PART 2 - PRODUCTS



2.01 MATERIALS

- A. Materials shall meet the requirements of the authorities having jurisdiction over the Work. (City of Goleta Department of Public Works)

PART 3 - EXECUTION

3.01 GENERAL

- A. Perform the Work in accordance with the requirements of the authorities having jurisdiction over the area.
- B. Match adjoining improvements, such as construction and expansion joints, sidewalk marking patterns, and trees.
- C. Foundry or other identifying stamps or markers are not permitted to be installed on exposed portions of the Work.

3.02 PROTECTION

- A. Protect the Work of this section until Substantial Completion.

3.03 CLEANUP

- A. Remove rubbish, debris, and waste materials and legally dispose of off the Project site.

END OF SECTION – 01 3593



SECTION 01 42 00

REFERENCE STANDARDS

PART 1 – GENERAL

1.01 GENERAL

- A. **Titles of Sections and Paragraphs:** Titles and subtitles accompanying specification sections and paragraphs are for convenience and reference only, and do not form a part of the Specifications.
- B. **Applicable Publications:** Whenever in these Specifications references are made to published specifications, codes, standards, or other requirements, it shall be understood that wherever no date is specified, only the latest specifications, standards, or requirements of the respective issuing agencies which have been published as of the date that construction is started shall apply; except to the extent that said standards or requirements may be in conflict with applicable laws, ordinances, or governing codes. No requirements set forth in the Standards & Specifications or shown on the Construction Drawings will be waived because of any provision of, or omission from, said standards or requirements.
- C. **Specialists, Assignments:** In certain instances, specification text requires (or implies) that specific work is to be assigned to specialists or expert entities, who must be engaged for the performance of that work. Such assignments shall be recognized as special requirements over which the Contractor has no choice or option. These requirements shall not be interpreted so as to conflict with the enforcement of building codes and similar regulations governing the work; also they are not intended to interfere with local union jurisdiction settlements and similar conventions. Such assignments are intended to establish which party or entity involved in a specific unit of work is recognized as "expert" for the indicated construction processes or operations. Nevertheless, the final responsibility for fulfillment of the entire set of contract requirements remains with the Contractor.

1.02 REFERENCE SPECIFICATIONS, CODES, AND STANDARDS

- A. The Contractor shall construct the work in accordance with the Contract Documents and the referenced portions of those referenced codes, standards, and specifications.
- B. References herein to "Building Code" or "Uniform Building Code" shall mean Uniform Building Code of the International Conference of Building Officials (ICBO). Similarly, references to "Mechanical Code" or "Uniform Mechanical Code," "Plumbing Code" or "Uniform Plumbing Code," "Fire Code" or "Uniform Fire Code," shall mean Uniform



Mechanical Code, Uniform Plumbing Code and Uniform Fire Code of the International Conference of the Building Officials (ICBO). "Electric Code" or "National Electrical Code (NEC)" shall mean the National Electric Code of the National Fire Protection Association (NFPA). Unless otherwise indicated the latest edition of the codes as approved by the Municipal Code and used by the local agency as of the date that the work is advertised for bids, as adopted by the agency having jurisdiction, shall apply to the work herein, including all addenda, modifications, amendments, or other lawful changes thereto.

- C. In case of conflict between codes, reference standards, drawings, and the other Contract Documents, the most stringent requirements shall govern. All conflicts shall be brought to the attention of the City of Goleta for clarification and directions prior to ordering or providing any materials or furnishing labor. The Contractor shall bid for the most stringent requirements.
- D. References herein to "OSHA Regulations for Construction" shall mean Title 29, Part 1926, Construction Safety and Health Regulations, Code of Federal Regulations (OSHA), including all changes and amendments thereto.
- E. References herein to "OSHA Standards" shall mean Title 29, Part 1910, Occupational Safety and Health Standards, Code of Federal Regulations (OSHA), including all changes and amendments thereto.
- F. References herein to Caltrans Standards and Specifications Shall mean State of California Department of Transportation Standards and Specifications.
- G. **Applicable Safety Standards:** References herein to "Cal-OSHA" shall mean State of California, Department of Industrial Relations, Construction Safety Orders, as amended to date, and all changes and amendments thereto.
- H. References herein to ASTM shall mean American Society for Testing and Materials.
- I. References herein to "Greenbook" or "SSPWC" shall mean the Standard Specifications for Public Works Construction.
- J. References herein to County Standards and Specifications Shall mean County of Santa Barbara, Department of Public Works, Standards and Specifications.
- K. References herein to City of Goleta Standards and Specifications Shall mean City of Goleta, Department of Public Works, Standards and Specifications

1.03 REGULATIONS RELATED TO HAZARDOUS MATERIALS

- A. The Contractor shall be responsible that all work included in the Contract Documents, regardless if shown or not, shall comply with all EPA, OSHA, RCRA, NFPA, and any other Federal, State, and Local Regulations governing the storage and conveyance of hazardous materials, including petroleum products.



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PART 2 – PRODUCTS [NOT USED]

PART 3 – EXECUTION (NOT USED)

END OF SECTION – 01 4200



SECTION 01 42 13

ABBREVIATIONS, SYMBOLS AND ACRONYMS

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. List of abbreviations, symbols, and acronyms of societies, institutes, and associations generally appearing in the Contract Documents.

1.02 RELATED REQUIREMENTS

- A. Division 01 - General Requirements

PART 2 - PRODUCTS (Not applicable)

PART 3 - EXECUTION

3.01 ABBREVIATIONS

ac	Alternating current
AC	Asphaltic Concrete
ACC	Accessible
AFF	Above Finish Floor
ALUM	Aluminum
APN	Assessor Parcel Number
ALT	Alternate
amp	ampere
ASPH	Asphalt
ARCH	Architect
AUTO	Automatic
B/BOT	Bottom
BO	Blow Off
BC	Begin Curve
BCR	Begin Curve Return
BFV	Back Flow Valve



Department of Neighborhood Services and Public Safety
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BLDG	Building
BVCE	Begin Vertical Curve Elevation
BVCS	Begin Vertical Curve Station
C	Degrees Centigrade, Celsius
CA	California
Cat 6	Category 6, unshielded twisted pair cabling
CB	Catch Basin
CFC	Chlorofluorocarbon
cfh	Cubic feet per hour
cfm	Cubic feet per minute
CLF	Chain Link Fence
CLR	Clear
cm	Centimeter
CMU	Concrete Masonry Unit
Co.	Company
COD	Curb Outlet Drain
Corp.	Corporation
COMM	Communications
CONC	Concrete
COST	Construction
CONT	Continuous
COORD	Coordination
CW	Crosswalk
d	Penny
db.	Decibel
DB	Dry bulb
DBL	Double
dc	Direct current
DEMO	Demolition
DIM	Dimension
DET	Detail
DIA	Diameter
DN	Down
DS	Downspout
DWG	Drawing
EC	End Curve



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ECP	Electrical Control Panel
ECR	End Curve Return
EMT	Electrical Meter
EQ	Equivalent
EL	Elevation
EI	Electrical
EJ	Expansion Joint
EXT	Exterior
(E)/EXIST	Existing
EVCE	End Vertical Curve Elevation
EVCS	End Vertical Curve Station
ePTZ	Digital Pan Tilt Zoom
F	Degrees Fahrenheit
FC	Frontier Communications
fpm	Feet per minute
FIN	Finish
FF	Finish Floor
FH	Fire Hydrant
FLR	Floor
FOM	Face of Masonry
FPS	Frames per Second
Ft (')	Foot or feet
GA	Gage
GALV	Galvanized
gph	Gallons per hour
gpm	Gallons per minute
GB	Grade Break
GM	Gas Meter
GTD	Goleta Train Depot
GEN'L	General
GV	Gas Valve
GWD	Goleta Water District
HP	Horsepower
HR	Hour
HOA	Home Owner Association
HT	Height



HMA	Hot Mix Asphalt
Hz	Hertz
ICV	Irrigation Control Valve
ID	Inside Diameter
IN (“)	Inch
Inc.	Incorporated
INT	Intersection
IP	Internet Protocols
IR light	Infrared light
Kbps	Kilobits per Second
KHz	Kilohertz
Kip	thousand pounds
Ksf	Thousand pounds per square foot
Ksi	Thousand pounds per square inch
Kv	Kilovolt
KVA	Kilovolt amperes
KW	Kilowatt
KWH	Kilowatt hour
LED	Light Emitting Diode
LF	Linear foot
Lb(s)	Pound(s)
LCD	Liquid Crystal Display
LOL	Layout Line
LOC	Location
Lt	Light
Lux	A standard unit of illumination measurement
MAT	Material
Max	Maximum
MBH	1000 BTUs per hour
MECH	Mechanical
MFR	Manufacturer
MHz	Mega hertz
mil	Thousandth of an inch
Min	Minimum
mm	Millimeter
mph	Miles per hour



Department of Neighborhood Services and Public Safety
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MISC	Miscellaneous
MTL	Metal
MBX	Mailbox
(N)	New
NA	Not Applicable
NIC	Not in Contract
NO	Number
NTS	Not to Scale
OC	On Center
OD	Outside Dimension
OFCI	Owner Furnished / Contractor Installed
OFOI	Owner Furnished / Owner Installed
OG	Original Ground
OPP	Opposite
oz.	Ounce
PCF	Pounds per cubic foot
pH	Acidity-alkalinity balance
PL	Property Line
PLAS	Plaster
PLYWD	Plywood
PoE	Power Over Ethernet – A standard for providing power over network cable
PP	Power Pole
psf	Pounds per square foot
psi	Pounds per square inch
psig	Pounds per square inch, gage
PTS	Pan-Tilt-Zoom
PVIE	Point of Vertical Intersection Elevation
PVIS	Point of Vertical Intersection Station
PVC	Polyvinylchloride
QoS	Quality of Service
R, RAD	Radius
RD	Road
REF	Reference
Rel	Relocate
RF	Radio frequency
Rmv	Remove
REINF	Reinforcement



RET	Return
Rplc	Replace
Rt	Right
REQ'D	Required
RSP	Revised Standard Plan
R/W	Right of Way
rpm	Revolutions per minute
SDK	Software Development Kit
SF	Square foot
SIM	Similar
SIP	Session Initiation Protocol
SMA	Software Maintenance Agreement
SPEC	Specification
SQ	Square
SS	Stainless Steel
STL	Steel
SCE	Southern California Edison
SCG	Southern California Gas Company
SL	Street Light
SPPWC	Standard Plans for Public Works Construction (Greenbook by APWA)
SR	State Route
SS	Sanitary Sewer
SSP	State Standard Plan
STD	Standard
STRUCT	Structural
SUSP	Suspended
SW	Switch or Sidewalk
SC	Sawcut
SSL	Secure Sockets Layer
SSM	Server Software Module
SY	Square yard
TCP	Transmission Control Protocol
T	Top
TCE	Temporary Construction Easement
TC	Top of Curb
TF	Top of Foundation
TOS	Top of Slab
TSB	Traffic Signal Box



TSPB	Traffic Signal Pull Box
TW	Top of Wall
THRESH	Threshold
TLS	Transport Layer Security
TYP	Typical
UI	User Interface
Unicast	Communication between a single sender and single receiver on network
UNO	Unless (Otherwise)
UON	Noted Otherwise
UP	Utility Pole
UPnP	Universal Plug and Play
V	Volts
Var	Variable
VERT	Vertical
VBR	Variable Bit Rate
VIF	Verify in Field
VMS	Video Management System
W	Watts
WB	Wet bulb
WD	Wood
WDR	Wide dynamic range
WO	Where Occurs
WP	Water Proof
WPJt	Weakened Plan Joint
WT	Weight
WWF	Welded Wire Fabric

3.02

SYMBOLS

#	Number or pound
'	Foot or feet
"	Inch(es)
%	Percent
°	Degree (Angle or Temperature)

3.03

ACRONYMS

AA	The Aluminum Association, Inc
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AABC	Associated Air Balance Council
AAMA	American Architectural Manufacturers Association
AASHTO	American Association of State Highway and Transportation Officials
AATCC	American Association of Textile Chemists and Colorists
ABMA	American Boiler Manufacturers Association
ACI	American Concrete Institute
ACS	Access Control System
AEC	Automatic Echo Cancellation
ADA	Americans with Disabilities Act
ADAAG	Americans with Disabilities Act Accessibility Guidelines
AFF	Above Finish Floor
AGC	Automatic Gain Control
ALPR	License Plate Recognition
AGA	American Gas Association
AGC	Automatic Gain Control
AGCIH	American Conference of Governmental Industrial Hygienists
AI	Asphalt Institute
AIA	American Institute of Architects
AISC	American Institute of Steel Construction
AISI	American Iron and Steel Institute
AITC	American Institute of Timber Construction
AMCA	Air Movement and Control Association, Inc.
ANI	Automatic Number Identification
ANSI	American National Standards Institute
APA	APA – The Engineered Wood Association
API	Application Programming Interface
ARI	Air-Conditioning and Refrigeration Institute
ARS	Automated Route Selection
ARP	Address Resolution Protocol
ATSC	Advanced Television Systems Committee
ASHRAE	American Society of Heating, Refrigeration and Air Conditioning Engineers
ASME	American Society of Mechanical Engineers
ASTM	American Society for Testing and Materials
ATBCB	Architectural & Transportation Barriers Compliance Board
AWI	Architectural Woodwork Institute
AWPA	American Wood Preservers Association
AWPI	American Wood Preservers Institute



AWS	American Welding Society
AWWA	American Water Works Association
BBS	Backbone Switch
BGP	Border Gateway Protocol
BHMA	Builders Hardware Manufacturers Association
BIA	Brick Institute of America
BICSI	Building Industry Consulting Services, International
BRI	Basic Rate Interface
BOOTP	Bootstrap Protocol
BTU	British thermal unit
CAL/OSHA	California Occupational Safety and Health Administration
CAC	Call Admission Control
CAS	Channel Associated Signaling
CAT 5e	Category 5e
CBC	California Building Code
CCR	California Code of Regulations
CCK	Complementary Code Keying
CDR	Call Detail Record
CEC	California Electrical Code
CESM	Compact Edge Switch-Managed
CFR	Code of Federal Regulations
CIF	Common Intermediate Format
CISPI	Cast Iron Soil Pipe Institute
CLFMI	Chain Link Fence Manufacturers Institute
CLI	Command Line Interface
CLID	Calling Line Identification
CMAS	California Multiple Award Schedule
CMC	California Mechanical Code
CNG	Comfort Noise Generation
CNID	Calling Party Name Identification
CQC	California Quality Control (CMA Standards)
Codec	Coder/Decoder
COP	Coefficient of performance
COS	Class of Service
CPC	California Plumbing Code
CRA	California Redwood Association
CSA	Client Software Application



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CRI	Carpet and Rug Institute
CRSI	Concrete Reinforcing Steel Institute
CS	Commercial Standards, U.S. Department of Commerce
CS	Communications Server
CSFM	California State Fire Marshal
CSI	Construction Specifications Institute
CTIOA	Ceramic Tile Institute of America
CTI	Cooling Tower Institute
DHCP	Dynamic Host Configuration Protocol
DHI	Door and Hardware Institute
DHCP	Dynamic Host Configuration Protocol
DGM	Dynamic Graphical Map
DNS	Domain Name System
DTV	Digital Television
DSS	Direct Station Selection
DTMF	Dual Tone Multiple Frequency
DVD	Digital Video Disc
EER	Energy efficiency ratio
EIA	Electronic Industries Alliance
EIS	Electronic Image Stabilization
ESM	Edge Switch-Managed
E&M	Ear and Mouth
FAT	Field Acceptance Testing
FEP	Front End Processor
FEP	Fluorinated Ethylene Propylene
FPS	Frames per Second
FTP	File Transfer Protocol
FXS	Foreign Exchange Station
EPA	Environmental Protection Agency
ETL	ETL Testing Laboratories
FCC	Federal Communication Commission
FDA	Food and Drug Administration
FECC	Far End Camera Control
FPS	Frames per Second
FM	Factory Mutual
FPS	Frames per Second
FS	Federal Specifications



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FTP	File Transfer Protocol
FXO	Foreign Exchange Office
FXS	Foreign Exchange Station
GA	Gypsum Association
GANA	Glass Association of North America
GBIC	Gigabit Interface Converter
GUI	Graphical User Interface
GigE	Gigabit Ethernet
HMMA	Hollow Metal Manufacturer's Association
HPVA	Hardwood Plywood & Veneer Association
HTTP	Hypertext Transfer Protocol
HTTPS	Hypertext Transfer Protocol over SSL
HVAC	Heating, Ventilation, and Air Conditioning
IACS	International Annealed Copper Standards
IAMPO	International Association of Plumbing and Mechanical Officials
IC	Intercom
ICBO	International Conference of Building Officials
ICEA	Insulated Cable Engineers Association
ICMP	Internet Control and Message Protocol
ID	Identifier
IDF	Intermediate Distribution Frame
IEEE	Institute of Electrical & Electronic Engineers, Inc.
IDS	Intrusion Detection System
IEC	International Electro technical Commission
IES	Illuminating Engineering Society
IMI	International Masonry Institute
IOR	Inspector of Record
IP	Internet Protocol
IP Router	Internet Protocol Router
IPVC	Internet Protocol Video Conferencing
IPX	Internetwork Packet Exchange
IRI	Industrial Risk Insurers
ISDN	Integrated Services Digital Network
ISO	International Organization for Standardization
ISA	Industry Standard Architecture
ISDN	Integrated Services Digital Network
ISM	Intermediate Switch-Managed (Fiber Switch)



ISMS	Integrated Security Monitoring and Management System
ISP	Internet Service Provider
ITD	OWNER, Information Technology Division
ITU	International Telecommunication Union
IVR	Interactive Voice Response
JPEG	Joint Photographic Experts Group (image format)
Kbps	Kilobits per Second
LAN	Local Area Network
LCD	Liquid Crystal Display
LDC	Local Distribution - Cabinet
LDF	Local Distribution Frame
LED	Light Emitting Diode
LIU	Light Interconnection Unit
MAC	Media Access Control
MAN	Metropolitan Area Network
MBR	Maximum Bit Rate
MCU	Multipoint Conference Unit
MDF	Main Distribution Frame
MDF-BBS	Main Distribution Frame Backbone Switch
MIB	Management Information Base
MIC	Message Integrity Check
MLD	Multicast Listener Discovery
MLSFA	Metal Lath/Steel Framing Association
MPOE	Main Point of Entry
MPEG	Moving Picture Experts Group
MP-BGP	Multi-Protocol Border Gateway Protocol
MOS	Mean Opinion Scale
MSS	Manufacturers Standardization Society of the Valve & Fittings Industry.
NAAMM	National Association of Architectural Metal Manufacturers
NAT	Network Address Translation
NAT-PT	NAT Protocol Translation
NAS	Network Attached Storage
NBFU	National Board of Fire Underwriters
NBS	National Bureau of Standards
NCMA	National Concrete Masonry Association
NEBB	National Environmental Balancing Bureau



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NEBS	Network Equipment Building System
NEC	National Electrical Code
NEMA	National Electrical Manufacturers Association
NEC	National Electrical Code
NFPA	National Fire Protection Association
NFPA	National Forest Products Association
NIC	Network Interface Card
NIOSH	National Institute for Occupational Safety and Health
NIST	National Institute of Standards and Technology
NMP	Simple Network Management Protocol
NOFMA	National Oak Flooring Manufacturers Association
NPCA	National Paint and Coatings Association
NPDES	National Pollutant Discharge Elimination System
NRCA	National Roofing Contractors Association
NSF	National Sanitation Foundation
NTP	Network Time Protocol
NTSC	National Television System Committee
NTMA	National Terrazzo & Mosaic Association
NTSC	National Television System Committee
NUSIG	National Uniform Seismic Installation Guidelines
NWMA	National Woodwork Manufacturers Association
OAR	OWNER Authorized Representative
OC-3	Optical Carrier Level-3 (~155 Mbps)
OEHS	Office of Environmental Health and Safety
OFNR	Optical Fiber Non-Conductive Riser
OFNP	Optical Fiber Non-Conductive Plenum
OID	Object Identifier
OPX	Off Premise Extension
OSHA	Occupational Safety & Health Administrations
OSI	Open Systems Interconnection
OSPF	Open Shortest Path First
OTDR	Optical Time Domain Reflectometer.
ONVIF	Open Video Interface Forum
OWAN	OWNER's Wide Area Network
OWNER	City of Goleta



Department of Neighborhood Services and Public Safety
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PA	Public Address
PABX	Private Auxiliary Branch Exchange
PA/IC	Public Address/Intercommunications
PAL	Phase Alternating Line
PAT	Port Address Translation
PBX	Private Branch Exchange
PCA	Portland Cement Association
PCI	Precast/Prestressed Concrete Institute
PCM	Pulse Code Modulation
PDI	Plumbing and Drainage Institute
PEI	Porcelain Enamel Institute
PHB	Per Hop Behavior (DiffServ)
PIC	PBX Integration Card
PIM	Protocol-Independent Multicast
PING	Packet Internet Groper
PINX	Private Integrated Services Network Exchange
PIP	Picture in Picture
PMO	Project Management Office
PoE	Power-over-Ethernet
POP	Point of Presence
POTS	Plain Old Telephone System
PRI	Primary Rate Interface
PS	Product Standard, U.S. Department of Commerce
PSIP	Program and System Information Protocol
PSTN	Public Switched Telephone Network
PZM	Pressure Zone Microphone
QCIF	Quarter CIF – See CIF
QoS	Quality of Service
QSIG	Q-Signaling
RADIUS	Remote Access Dial-In User Service
RIP	Routing Information Protocol
RIPng	Routing Information Protocol Next Generation
RIS	Redwood Inspection Service
RMON	Remote Network Monitoring
RMON2	Remote Network Monitoring Version 2



SAN	Storage Area Network
SCAQMD	South Coast Air Quality Management District
SCSI	Small Computer System Interface
SDEI	Steel Deck Institute
SDI	Steel Door Institute
SFM	State Fire Marshal
SFP	Small Form-factor Pluggable transceiver
SFP+	Enhanced Small Form-factor Pluggable transceiver
SFPA	Southern Forest Products Association
SIF	Source input format (NTSC)
SIP	Session Initiation Protocol
SIGMA	Sealed Insulating Glass Manufacturers Association
SJI	Steel Joist Institute
SLC	Small Learning Community
SMACNA	Sheet Metal and Air Conditioning Contractors National Association
SMDI	Simple Message Desk Interface
SMI	Structure of Management Information
SMTP	Simple Mail Transfer Protocol
SMPTE	Society of Motion Picture and Television Engineers
SNA	Systems Network Architecture
SNMP	Simple Network Management Protocol
SSH	Secure Shell
SSID	Service Set Identifier
SSL	Secure Socket Layer
SSPC	Steel Structures Painting Council
S/P DIF	Sony/Philips Digital InterFace
SWI	Steel Window Institute
TEHO	Tail End Hop Off
TCA	Tile Council of America
TCP	Transmission Control Protocol
TFTP	Trivial File Transfer Protocol
TIA	Telecommunications Industry Association
TKIP	Temporal Key Integrity Protocol
TLS	Transport Layer Security
TOS	Type of Service



UBPPA	Uni-Bell PVC Pipe Association
UCI	Uniform Construction Index
UFAS	Uniform Federal Accessibility Standards
UL	Underwriters' Laboratories, Inc.
UM	Unified Messaging
UPS	Uninterruptible Power Supply
UPnP	Universal Plug and Play
URL	Uniform Resource Locator
USDA	United State Department of Agriculture
UTC	Coordinated Universal Time
UTP	Unshielded Twisted Pair
UPS	Uninterruptible Power Supply
USP	Unified Security Platform
USW	Unified Web Client
VAD	Voice Activity Detection
VBR	Variable Bit Rate
VLAN	Virtual Local Area Network
VM	Voice Mail
VSS	Video Surveillance System
VoD	Video on Demand
VFD	Vacuum Fluorescent Display
VTC	Video Teleconference
WAN	Wide Area Network
WDR	Wide dynamic range
WLAN	Wireless Local Area Network
WCLIB	West Coast Lumber Inspection Bureau
WDMA	Window and Door Manufacturers Association
WWPA	Western Wood Products Association

END OF SECTION – 01 4213



SECTION 01 45 16

CONTRACTOR CONSTRUCTION QUALITY CONTROL

PART 1 – GENERAL

1.01 SUMMARY

- A. The intent of this specification is to delineate a plan and procedure to be used by CONTRACTOR, working in partnership with OWNER and its agents, to assure the quality control necessary to provide for a complete, fully functional, high-quality facility in accordance with the intent and meaning of the Contract Documents.
- B. CONTRACTOR shall be totally responsible for Contractor Construction Quality Control (CQC) – which is verification by CONTRACTOR that work performed by CONTRACTOR forces is in compliance with the Contract Documents.
- C. OWNER shall be responsible for Construction Quality Assurance (CQA) – which is the verification by Owner Authorized Representative (OAR), Architect Of Record (AOR), Project Inspector (PI), and Deputy Inspectors that CONTRACTOR has taken the actions and steps defined in the Construction Documents and Contractor Construction Quality Control Plan accepted by OWNER. Verification shall consist of the Inspection of the Work in place by the OAR, AOR, PI, and Deputy Inspectors using established inspection, sampling, testing, and observational techniques.
- D. Section Includes:
 - 1. CONTRACTOR requirements for establishing, administering and maintaining Quality Control (QC) over the Work and ancillary functions through Contract Closeout.
 - 2. Required elements of a Construction Quality Control program.
- E. Related Requirements:
 - 1. Section 00 70 00 - General Conditions.
 - 2. Section 00 73 00 - Supplementary Conditions.
 - 3. Section 01 11 00 - Summary of Work.
 - 4. Section 01 31 29 - Partnering.
 - 5. Section 01 12 16 - Phasing of the Work.
 - 6. Section 01 31 13 - Project Coordination.
 - 7. Section 01 31 19 - Project Meetings.
 - 8. Section 01 33 00 - Submittal Procedures.



9. Section 01 74 16 - Storm Water Pollution Prevention.
10. Section 01 74 19 - Construction & Demolition Waste Management.
11. Section 01 32 13 - Construction Schedule.
12. Section 01 35 46 - Indoor Air Quality Procedures.
13. Section 01 45 23 - Testing and Inspection.
14. Section 01 45 24 - Environmental Import/Export Materials Testing.
15. Section 01 45 25- Testing, Adjusting, and Balancing for HVAC.
16. Section 01 25 13 - Product Substitution Procedures.
17. Section 01 77 00 - Contract Closeout.
18. Section 01 78 36 - Warranties.
19. Section 01 91 13 - General Commissioning Requirements.

1.02 OBJECTIVES

- A. Require CONTRACTOR to establish and maintain a CQC program as described in this section.
- B. Require CONTRACTOR to provide a qualified, full-time Construction Quality Control Manager to direct, manage, control and document a CQC Program for the Project that includes a:
 1. CQC Manager reporting directly to the person authorized to sign the Contract or an Officer of CONTRACTOR's firm and not be subordinate to CONTRACTOR's Project Superintendent or Project Manager.
 2. CQC plan for the project (keyed to the work sequence) addressing site logistics, planning, submittals, design (architectural/engineering) issue and interpretation coordination, and on-site and off-site Work.
 3. Procedure:
 - a. To ensure no construction work or testing is performed unless CQC Manager is on the work site unless otherwise approved by OWNER.
 - b. By which the CQC Manager certifies that submittals, i.e., RFCs, shop drawings, etcetera for project materials, equipment, fabrication, construction and construction operations provided by CONTRACTOR comply with the requirements of the CONTRACT.



- c. By which the CQC Manager certifies that project materials, equipment, fabrication, construction and construction operations provided by CONTRACTOR comply with the requirements of this CONTRACT.
 - d. To ensure coordination drawings have been prepared and reviewed by impacted subcontractors and trades.
 - e. To ensure an activity hazard analysis is conducted for operations specifically identified as having special.
 - f. Safety considerations.
 - g. For quality control during project commissioning (if applicable).
 - h. For expediting project closeout.
4. Schedule and format/agenda for CQC review meetings.
 5. Site specific Safety Plan/Injury and Illness Prevention Plan (IIPP) reviewed and accepted by OWNER.
 6. System to report on the CONTRACTOR's Quality Control activities.
- C. Ensure that Work is performed in accordance with the approved Construction Documents at the specified construction quality level.

1.03

SUBMITTALS

- A. For the purposes of the CQC Plan, the term "Submittals" shall include, but not be limited to, required engineering, administrative and material submittals, inspection requests, Requests for Clarification (RFCs), Change Order Proposals (COPs), Requests for Proposals (RFPs) and other project documents. The CQC Manager is responsible for the timelines of each submittal, and shall certify in writing the quality, accuracy and completeness of submittals. CONTRACTOR shall submit the resume' of the proposed CQC Manager to OWNER upon receiving Notice of Award. The proposed CQC Manager shall be approved in writing by OWNER. The CQC Manager shall be assigned to work on the project full-time through the completion of the Contract Administrative Closeout period and be available at the project site location whenever construction work occurs.
- B. CONTRACTOR's CQC Manager shall have significant, relevant documentable training and field experience on building construction projects of a similar scale and be one of the following:
1. Engineer or Architect currently licensed in the State of California with a minimum of ten years of relevant, documentable training and field experience on building construction projects of a similar scale.
 2. Inspector with a current California State Certification.
 3. Construction CONTRACTOR or superintendent (or similar position/function) with a minimum of ten years of relevant, documentable training and field experience on building construction projects.



- C. CQC Assistant Manager. CONTRACTOR shall submit the resume' of a proposed CQC Assistant Manager to OWNER prior to receiving Notice to Proceed 1. The proposed CONTRACTOR's CQC Manager shall have significant, relevant documentable training and field experience on building construction projects of a similar scale and be one of the following:
1. Engineer or Architect currently licensed in the State of California with a minimum of five years of relevant, documentable training and field experience on building construction projects.
 2. Construction CONTRACTOR or superintendent (or similar position/function) with a minimum of five years of relevant, documentable training and field experience on building construction projects.
- D. CONTRACTOR shall submit a draft Construction Quality Control (CQC) Plan to OWNER within fifteen days after issuance of Notice to Proceed 1. The CQC plan shall include, but not be limited to:
1. A letter from the person authorized to sign the Contract or an Officer of CONTRACTOR's firm clearly identifying:
 - a. CONTRACTOR's CQC Manager.
 - b. CQC Manager as having responsibility and authority to implement and manage CONTRACTOR's CQC Program.
 - c. Lines of authority and reporting for the CQC Manager. (Note: The CQC Manager shall report directly to the person authorized to sign the Contract or an Officer of the CONTRACTOR's firm. The person signing the letter shall not be the Project Manager or the Superintendent for the project nor report to the Project Manager, Superintendent or persons other than those defined heretofore.)
 - d. CQC Manager's authority to direct stoppage, removal and/or replacement of non-conforming Work.
 - e. CQC Manager or CQC Assistant Manager as the direct and only line of contact with OWNER's Project Inspector (PI) with sole responsibility for submitting and documenting Inspection Requests (IRs) to the Project Inspector.
 2. Proposed formats for meeting agendas, minutes and required reports.
 3. Procedures for managing the submittal process, as described in Section 01 3300 - Submittal Procedures, including:
 - a. Reviews and approvals.
 - b. List of required submittals and certifications cross-referenced to the construction drawings and specifications.
 - c. Scheduled date of submittals.



- d. Certification that submittals will have been reviewed prior to submission and found ready, as described in Section 01 3300, for ARCHITECT/ENGINEER review.
4. Procedure for ensuring that Construction Coordination Drawings are coordinated with and reflect the Contract's Construction Drawings and Specifications.
5. Procedure for preparing an Activity Hazard Analysis (AHA) Plan identifying operations requiring special safety considerations and defining the policy, procedure and administrative steps to be taken to ensure the preparation and submittal of an AHA during each of the three phases of Construction Quality Control.
6. Testing Plan and Log that identifies tests required (referencing the specification section and/or drawing requiring the test), subcontractor responsible for each test, scheduled date of test and actual date performed and approved.
7. A plan for coordinating with OWNER's designated commissioning agent, if applicable, to ensure that documentation, measurements and calibration of systems necessary to complete the Commissioning Plan defined in Section 01 91 13 are performed prior to requesting OWNER's designated commissioning agent to verify and observe CONTRACTOR and subcontractor demonstration of operations and testing. Owner or Architect of Record may act as Commissioning Agent for this project as allowed in Section 01 91 13.
8. Procedure and documentation required to ensure CONTRACTOR compliance with sustainable building practices during construction per Section 01 35 46 Indoor Air Quality Procedures.
9. Contract Closeout Plan compliant with requirements of Section 01 77 00, Contract Closeout.
10. Procedures and requirements for above-ceiling coordination and installation.
11. Procedures to identify, record and track completion and clearing of rework items (including deviations and corrections to deviations).
12. List of outside firms CONTRACTOR may employ in executing CONTRACTOR responsibilities identified in the CQC Plan and a description of their respective services to be provided.
- E. CONTRACTOR shall submit the final Construction Quality Control (CQC) Plan to OWNER within forty-five days following issuance of Notice to Proceed 1 for review and acceptance.
- F. CQC Manager Responsibilities shall be clearly defined in the CQC Plan which shall commit that:
 1. CQC Manager shall be designated as person responsible for directing, managing, coordinating, documenting and reporting CONTRACTOR quality



control activities in accordance with CONTRACTOR's CQC Plan including, if applicable, required CONTRACTOR materials testing and certifications.

2. The approved CQC Manager and CQC Assistant Manager shall be assigned to work on the project and at the project site full-time through completion of the Contract Administrative Closeout period and be available at the project site location whenever construction work occurs. OWNER shall assess scheduled payment amounts for the CQC Manager and/or CQC Assistant Manager position for any period when the position is not staffed for more than two (2) days consecutively when Work is performed at the site against the invoiced Contract amount for the corresponding month.

1.04 APPROVALS

- A. OWNER shall approve in writing the proposed CONTRACTOR CQC Manager prior to start of any Work requiring quality control.
- B. OWNER shall review and respond to CONTRACTOR's draft and final CQC Plan within fifteen days of receipt.
 1. Response shall be in writing.
 2. Approval shall be in writing.
 3. OWNER reserves the right to require changes in the approved CQC Plan and operations as necessary to ensure quality of the Work.
 4. CONTRACTOR shall submit a written request to OAR for approval of any proposed change in the CQC Manager, CQC staff or CQC Plan or Procedures a minimum of seven days prior to the proposed change. CONTRACTOR shall receive OAR's written approval of any proposed changes to the CQC Plan prior to implementing any changes.
 5. CONTRACTOR shall be assessed OWNER's actual incurred costs to provide quality control services by OWNER should CONTRACTOR fail to have an accepted CQC Plan within ninety days of Notice to Proceed 1.
- C. OWNER shall have the right to require the removal and replacement of the CQC Manager or CQC Assistant Manager after providing a minimum of seven (7) days written notice.

PART 2 – PRODUCTS (Not used)

PART 3 – EXECUTION

3.01 QUALITY CONTROL RESPONSIBILITY

- A. The CONTRACTOR's CQC Manager, Project Superintendent and Project Manager and City OAR and PROJECT INSPECTOR must work together effectively. While the



CQC Manager shall be the primary individual responsible for quality control, CONTRACTOR personnel, subcontractor personnel and material suppliers shall be responsible for the quality of their work and products used on the project.

- B. No Work of the CONTRACT shall commence prior to OWNER approval of CQC Manager and acceptance of CQC Plan unless otherwise specifically authorized in writing by OAR.

3.02 MEETINGS

- A. Weekly CQC Meetings: The CQC Manager shall conduct weekly CQC meetings at the Project Site with the Project Superintendent, Safety Officer and pertinent subcontractors starting with the Preconstruction Phase and continuing through completion of the construction. The OAR, PI, and AOR may attend these meetings.

1. The CQC Manager shall prepare minutes of the meeting and provide a copy to OAR and PI within two working days after the meeting.
2. As a minimum, the meetings will address the following:
 - a. Minutes of the previous meeting.
 - b. Status of submittals.
 - c. Work scheduled during the next fourteen days and status of related documentation, namely: submittals, RFCs, Change Orders, etcetera.
 - d. Status of inspection requests and identification of pre-inspection requirements.
 - e. Current and upcoming activities requiring special safety training, resources and Activity Hazard Analyses including:
 - i. Preparation and submittal of Activity Hazard Analyses.
 - ii. Fourteen day safety look-ahead schedule.
 - f. Safety audit findings.
 - g. Safety deficiency/corrective action log.
 - h. Resolving CQC and construction Work problems including open deviations and rework items.
 - i. Items that may require revisions in the CQC Plan.

- B. Preconstruction Submittal Phase

1. OAR shall schedule a Pre-submittal Meeting within twenty-one days following Notice of Award. The Pre-submittal Meeting will include key representatives of OWNER (OAR, Project Inspector, key specialty inspectors, Material Testing Lab and other key testing agency representatives), CQC Manager, CONTRACTOR (and its key subcontractors), and ARCHITECT/ENGINEER (and its key sub consultants).
2. Purpose of this meeting is to:



- a. Develop a mutual understanding of the Contract and the City's CQC Plan requirements prior to Plan development and submittal.
- b. Establish the Project Quality approach.
- c. Define the scope, content and documentation required for submittals.
- d. Establish the quality requirements for submittals, with a goal of no "Revise and Resubmit" responses to submittals.
- e. Define review criteria for each of the submittals.
- f. Set timeframes for the preparation, transmittal and review of the submittals.
- g. Establish the framework for a Project Quality Assurance/Quality Control Team and the associated quality culture for the life of the project.
- h. Foster teamwork between OAR, CONTRACTOR (including CQC Manager and subcontractors), INSPECTOR (and subordinate specialty inspectors and Material Testing Labs), and ARCHITECT/ENGINEER (and its sub consultants) and function as an initial teambuilding intervention.
- i. Schedule follow-on meetings between each of the subcontractors and their respective counterpart sub consultants for the purpose of defining in detail the scope, content and documentation required for submittals.
- j. The results of this meeting shall be incorporated into the CONTRACTOR's Construction Quality Control Plan.

3.03 Partnering Meetings:

- A. CQC Manager shall schedule, coordinate attendance of required CONTRACTOR and subcontractor personnel, and participate in "Partnering" sessions as required by Section 01 31 29 or by OAR.

3.04 THREE-PHASE CONSTRUCTION QUALITY CONTROL PROCESS

- A. For each project component or activity and each trade associated with executing or performing that component or activity, CONTRACTOR shall apply a three phase construction quality control process to that activity to ensure each trade's Work complies with CONTRACT requirements and is coordinated with other trades. The three phase quality control process shall address both on-site and off-site Work and include:
 - B. Preparatory Phase: CONTRACTOR or CQC Manager shall conduct a Preparatory Phase meeting with the Project Superintendent, CONTRACTOR's Safety Officer, subcontractor(s) and foremen responsible for that portion of Work.



1. A Preparatory Phase meeting shall be conducted a minimum of five working days and maximum of ten working days prior to the scheduled start of the Work.
 2. OAR and PI shall be notified at least two working days prior to each Preparatory Phase meeting.
 3. The CQC Manager shall prepare and distribute an agenda to attendees at least two working days prior to each Preparatory Phase meeting.
 4. At each Preparatory Phase meeting, the following tasks shall be performed:
 - a. Review the applicable Contract Document specification sections.
 - b. Review the applicable Contract Document and trade coordination drawings.
 - c. Review codes, jurisdictional requirements and City specifications relative to execution of the applicable portion of the Work.
 - d. Verify that appropriate shop drawings and submittals for materials and equipment have been submitted, reviewed and returned with no outstanding revisions required.
 - e. Verify, when required, the receipt of approved factory test results
 - f. Review the testing plan and testing schedule to ensure that provisions have been made to provide the required QC testing.
 - g. Review the safety plan and appropriate Activity Hazard Analysis to ensure applicable safety requirements are met.
 - h. Examine the work areas to ensure the required preliminary Work has been completed.
 - i. Discuss, as necessary, construction methods.
 - j. Confirm coordination with other trades.
 - k. Confirm completion of above-ceiling coordination.
 - l. Confirm service accessibility for installed systems.
 - m. Confirm inspection requirements of the Work and Inspection Request timing and submittal requirements.
 5. The CQC Manager shall prepare and distribute minutes of Preparatory Phase meetings to attendees of the meeting within two working days after each meeting.
 6. Results of the most recent preparatory phase meeting and actions shall be documented in the bi-weekly CONTRACTOR Quality Control Report.
- C. Initial Phase: When construction crews are ready to start work, the CQC Manager shall coordinate with the Project Superintendent, CONTRACTOR's Safety Officer and foreman responsible for the Work and:



1. Notify OAR and PI at least two working days in advance of starting the Work.
 2. Observe the initial Work activities to ensure compliance with Contract requirements including Safety.
 3. Perform the following:
 - a. Confirm that the quality of materials, fabrication, and execution provided meets requirements.
 - b. Resolve potential conflicts.
 - c. Review the Safety Plan and appropriate Activity Hazard Analysis and verify that applicable safety requirements are met and followed.
 - d. Ensure that testing is performed by the approved laboratory.
 4. Repeat the Initial Phase for each new crew assigned to work on the activity on-site or when compliance falls below acceptable levels when so notified by OAR.
 5. Document observations and results of Initial Phase coordination and most recent activities in the bi-weekly CONTRACTOR Quality Control Report.
- D. Follow-Up Phase: After the work has begun, perform the following:
1. Document the results and observations in the biweekly CONTRACTOR Quality Control Report.
 2. Daily, or more frequently as necessary, until completion of Work:
 - a. Ensure the Work is in compliance with Contract requirements.
 - b. Identify and document CONTRACTOR and subcontractor Work requiring rework or correction.
 - c. Ensure documented rework items are corrected.
 - d. Ensure that the quality materials, fabrication, and execution provided complies with the requirements of the Contract Documents.
 - e. Review and sign off on Inspection Requests prior to issuance to PI.
 - f. Ensure testing is performed by the approved laboratory.
 - g. Ensure safety requirements and practices are observed.
- E. Notify OAR, Project Inspector and involved local regulatory agencies or utilities at least fourteen days prior to the start of Preparatory and Start-Up Phases for Off-Site Work.

3.05 ACTIVITY HAZARD ANALYSIS – CONTRACTOR SAFETY PROGRAM

- A. Before beginning each Work component or activity, CQC Manager shall ensure CONTRACTOR prepares and utilizes an Activity Hazard Analysis (AHA)/Job Safety Analysis (JSA) for each task identified. The AHA/JSA shall be reviewed by each



work crew prior to starting the activity and re-addressed any time there are changes in that activity.

1. Activity Hazard Analyses will define the activities being performed and identify the sequences of work, specific hazards anticipated, site conditions, materials and control measures to be implemented to eliminate or reduce each hazard.
 2. Work shall not begin until the AHA for the work activity has been accepted by OWNER and discussed with parties engaged in the work activity (CONTRACTOR, subcontractors, OWNER representatives) at the preparatory and initial phase meetings required by the Construction Quality Control process.
 3. The names of the competent/qualified person(s) required to be present during particular activities (for example: excavations, fall protection, other activities required by OSHA or similar jurisdictions) shall be identified and included in the AHA. Proof of their competency shall be submitted to the OWNER for acceptance prior to start of that work activity.
 - a. If more than one competent/qualified person will be used on the AHA activity, a list of names and proof of their competency shall be submitted as an attachment to the AHA form. Those listed shall be competent and qualified for the type of work addressed in the AHA and familiar with current site safety policies, procedures and issues.
 - b. If a new competent and qualified person is added to the staff, the original list attached to the AHA form shall be updated and include proof of the new person's competency. The new person shall acknowledge in writing that they have reviewed the AHA and is familiar with the current site safety issues.
 4. The AHA shall be reviewed and modified as necessary to address changing site conditions, operations, or changes of competent/qualified person(s).
- B. An AHA shall be prepared and documented for each project work activity as warranted by the hazards associated with the activity. Generally, an AHA shall be prepared for field work activities.

3.06 MOCKUPS

- A. Purpose: It is the intent of OWNER that achievement of Project Quality Assurance/Quality Control goals and objectives be supported by use of mockup assemblies and spaces prior to installation and/or the Substantial Completion Inspection.
- B. CQC Manager shall ensure that CONTRACTOR prepares, as required by the technical specifications (Divisions 02-49), mockups of construction assemblies and systems using specified materials for review and approval of OWNER before proceeding with installation.



- C. The scope of Work and schedule for preparing the required mockups, including associated submittals, shall be included in the CONTRACTOR CQC Plan and construction schedule. Written approval of the Mockup element of the CQC Plan is required prior to CONTRACTOR commencing with preparation of required mockups.
- D. In addition to the material and systems mockups required under the technical specifications, CONTRACTOR shall prepare, at a minimum, mockups of the following typical rooms and/or other areas identified in writing by OWNER. CONTRACTOR shall install approved construction assemblies and systems at the level of quality and completion CONTRACTOR considers typical of, and in compliance with, the approved plans and technical specifications a minimum of 60 days prior to Substantial Completion:
 - 1. Depot
 - 2. Restroom.
 - 3. Site Improvements.
- E. OWNER shall inspect the completed mockups of the typical rooms and/or other areas and provide CONTRACTOR's CQC Manager with a listing of typical deficiencies and/or non-compliant Work observed in the mockups no more than 14 days following notification by CONTRACTOR the mockup has been completed.
- F. CONTRACTOR's CQC Manager shall have Work inspected and any occurrence of the deficiencies and non-compliant Work, observed and listed by OWNER in the mockups of the typical rooms and/or other areas that are found in other areas and aspects of the Work, corrected prior to requesting Substantial Completion.

3.07 PROJECT CLOSEOUT

- A. The CQC Manager shall be responsible for ensuring the quality and completeness of CONTRACTOR closeout activities as they relate to the Work of the Contract including, but not limited to, remedial work, final submittals, as-built drawings, maintenance and operations manuals and training, spare parts and materials, etcetera.
- B. Prior to CONTRACTOR submission of the Request for Certificate of Substantial Completion, CQC Manager shall:
 - 1. Inspect Work and have any occurrence of deficiencies and/or non-compliant Work that were found and listed by OWNER in the mockups of typical rooms and/or other areas and have any similar deficiencies and/or non-compliant Work found in the remaining portions of the Work corrected.
 - 2. Ensure completion of Work except those minor items identified on CONTRACTOR's Punch List.
 - 3. Conduct a CONTRACTOR Pre-Substantial Completion Inspection of the entire Work to:
 - a. Identify any additional items of construction requiring correction to comply with the project documents.



- b. Cause trades to promptly correct identified defects in their respective Work.
 - c. Re-inspect any identified defects in the Work to ensure their compliance with project documents.
- 4. Certify that items, except those minor Work items identified on CONTRACTOR's Punch List, have been completed in accordance with the contract plans and specifications.
- 5. Ensure required closeout documents, as outlined in Section 01700, have been submitted to OWNER.
- C. CQC Manager shall have the Punch List prepared by CONTRACTOR attached to the CONTRACTOR's Request for Certificate of Substantial Completion and certify that items known to require correction are listed.
- D. CONTRACTOR's Request for Certificate of Substantial Completion shall have attached certification by the CQC Manager that items listed on the "Rework Items List", the Inspector's List and with a Deviation/Corrective Notice as needing rework or correction have been corrected in accordance with the plans and specifications
- E. Upon determination by OAR that the Work is Substantially Complete and ready for inspection, the Project Inspector shall conduct a Substantial Completion Inspection, that shall be attended by the CQC Manager and other CONTRACTOR and subcontractor representatives identified by CQC Manager, and prepare an Inspector List (Working Copy) incorporating input from the AOR, its subconsultants and other OWNER representatives.
- F. OAR will provide the CQC Manager with a copy of the Certificate of Substantial Completion with Inspector List (Working Copy) attached upon completion of the Substantial Completion Inspection and a copy of the Inspector Punch List (Master Copy) within five days of OWNER's issuing of the Certificate of Substantial Completion.
- G. CQC Manager shall ensure that, within the time allowed for Administrative Closeout of the contract, CONTRACTOR and subcontractors correct the deficient Work indicated on the Inspector Punch List (Master Copy). Upon completion of corrections, the CQC Manager shall certify that the Work of the Inspector Punch List (Master Copy) has been completed and ask for a Final Inspection of the Work. OWNER will re-inspect the Work and identify to the CQC Manager any items still requiring correction.

3.08 DOCUMENTATION

- A. CQC Manager shall maintain current and complete records of on-site and off-site construction and CQC program operations and activities including, but not limited to:
- B. CONTRACTOR Daily Construction Report



1. The CONTRACTOR Daily Construction Report shall be generated as required in Section 01 5000, Construction Facilities and Temporary Controls, and shall include the following information:
 - a. Date of report, name of CONTRACTOR, and superintendent present.
 - b. Weather conditions in the morning and in the afternoon including maximum and minimum temperatures.
 - c. List of CONTRACTOR and subcontractor personnel on the Project site, their trades, employer, Work location, description of Work performed and materials used and hours worked.
 - d. List of job safety actions taken and safety inspections conducted. Indicate identified safety deficiencies that have been corrected, that remain uncorrected, and provide related documentation of the following:
 - 1) Job safety meetings held (including sign-in sheets).
 - 2) Lost time accidents/incidents (including witness statements and photographs).
 - 3) Daily written safety inspections conducted including as a minimum when applicable:
 - a) Fire extinguishers.
 - b) Crane certification/equipment operator licenses.
 - c) Trenching/shoring/scaffold/high voltage electrical/elevated work.
 - d) Personal Fall Arrest System (PFAS) equipment/harnesses, spider boxes.
 - 4) Hazardous material/waste released into the environment.
 - 5) Meetings held, including CQC preparatory and initial phase meetings.
 - e. List of equipment/material received and incorporated into the project that day.
 - f. List of construction and plant equipment on the Project site including number of hours used, idle and/or down for repair. Identify whether equipment is rented or CONTRACTOR-owned.
 - g. Include a “remarks” section in this report for directions received and identify from whom received, problems and delays, drawing coordination and conflicts, field changes, record of visitors, and any other relevant issues.
 - h. List of items, generated by CQC staff, observed as requiring correction or having been corrected.



2. Terminology used for reporting of Work in the CONTRACTOR Daily Construction Report shall be consistent with terminology in the construction schedule and Contract Documents.
3. Reports shall be prepared, signed and dated by CONTRACTOR's project superintendent. CQC Manager shall review, initial and date CONTRACTOR Daily Construction Reports, add comments as necessary and submit to OAR within two days of the Daily Construction Report reporting date.

C. CONTRACTOR QUALITY CONTROL REPORT

1. Bi-weekly CONTRACTOR Quality Control Reports shall be prepared, certified and submitted to OAR and PI on the first Monday following the reporting period end date.
2. Terminology used for reporting of Work shall be consistent with terminology in the construction schedule or contract documents.
3. Reports shall be prepared, signed and dated by the CQC Manager and include the following information:
 - a. Identification of the Work performed and its associated Construction Quality Control phase (Preparatory, Initial, Follow-up) including:
 - 1) Results of Preparatory Phase meetings held during the reporting period, including location of the Work and list of personnel present at the meeting and verifying that tasks listed in 3.03.A.4 were addressed and performed.
 - 2) Results from Initial Phase meetings held since submittal of the last CONTRACTOR Quality Control Report, including location of the Work, list of trades involved, and personnel present at the meeting. Verify in the report that:
 - a) Preliminary Work was done correctly.
 - b) Work is in compliance with CONTRACT and jurisdictional agency requirements.
 - c) Materials, fabrication, and execution are satisfactory.
 - d) Safety requirements were met.
 - e) Samples have been prepared and approved. Required testing to be performed, by whom and verify that the results are in compliance with requirements.
 - f) Required tests were performed by the approved testing laboratory.
 - 3) Results of Follow-Up Phase observations and inspections conducted during the week including verifying:
 - a) Location of the Work.



- b) Work was done correctly.
 - c) Work complies with CONTRACT requirements.
 - d) Materials, fabrication, and execution are satisfactory.
 - e) Required testing has been performed, by whom and verify that the results are in compliance with requirements.
 - f) Required tests were performed by the approved testing laboratory and identifying individual(s) responsible for performing the tests.
- b. Safety-related activities including operations, incidents, analyses, and “lessons learned”.
 - c. Status of submittals, namely: RFCs, materials, project schedules, Activity Hazard Analyses, etcetera.
 - d. Status of Change Order Proposals – pending and submitted.
 - e. “Lessons learned” from the identification and resolution of issues during the reporting week.
 - f. Results of the three phases of construction quality control meetings for off-site Work (if applicable) including actions taken.
 - g. An updated “Rework Items List”:
 - 1) Identifying items/Work observed by the CQC Manager and/or CQC Assistant Manager that do not comply with CONTRACT requirements and still require correction (or completion) or that were corrected (or completed) during the last 30 days.
 - 2) Incorporating those items identified by the OAR, AOR or Field Engineer that do not comply with CONTRACT requirements and still require correction (or completion) or that were corrected (or completed) during the last 30 days.
 - 3) Incorporating items on the PI’s List or having a Deviation/Corrective Notice and still require correction (or completion) or that were corrected (or completed) during the last 30 days. Clearly identify on the “Rework Items List” which are items from the Inspector List or have been issued a Deviation/Corrective Notice.
 - 4) With corrected items sorted by date completed first and with uncorrected items sorted by date the items were initially identified and/or listed. Items corrected more than 30 days prior to the Bi-weekly CONTRACTOR Quality Control Report issuance date need not be listed.



- 5) Including, for each item on the “Rework Items List”:
 - a) Date the item was originally identified.
 - b) Name of party observing and/or reporting the item.
 - c) Date the item was corrected and corrective action taken.
 - d) Date the PI was notified the when an item on the Inspector List or Deviation/Corrective Notice was corrected.
 4. Include a “remarks” section for listing any directions received and identifying from whom received, problem areas, any deviation from the CQC Plan, other meetings, As-Built drawing update reports, corrective direction and action, and other relevant information.
- D. Testing Plan and Log
- 1 As tests are performed, the CQC Manager shall record in the “Testing Plan and Log”:
 - a. Date the test was conducted and recorded results.
 - b. Date the test results were received by CONTRACTOR.
 - c. Date the test results were received by the Project Inspector.
 - d. Verification and identification of the approved testing laboratory that was used.
 2. Attach a current, updated copy of the “Testing Plan and Log” to the bi-weekly CONTRACTOR Quality Control Report.
- E. Storm Water Pollution Prevention Plan (SWPPP): CQC Manager is required to:
1. Review the SWPPP for compliance in accordance with Section 01 7416 prior to submission.
 2. Prepare and submit to OAR in accordance with the date established in the Notice to Proceed 1 (as outlined in Section 01 12 16).
 3. Review and ensure timely submission of required monitoring and final reports and payments as required in Section 01 74 16.
- F. Construction and Demolition (C&D) Waste Management: The CQC Manager is required to:
1. Review the C&D Waste Management plan for compliance with Section 01 7419 prior to submission.
 2. Within fifteen days after Notice to Proceed 1, and prior to any waste removal, submit the plan to the OAR for review and approval.
 3. Review and ensure timely submission of required monitoring and final reports as required in Section 01 74 19.
- H. Environmental Import/Export Materials: The CQC Manager is required to:



1. Review the import/export Sampling Strategy Plan (SSP) prepared by the CONTRACTOR's licensed environmental professional as outlined in Section 01 4524.
 2. Review the Draft Certification Report prepared by the CONTRACTOR's licensed environmental professional as outlined in Section 01 45 24.
 3. Provide OWNER with required certifications and manifests as required in Section 01 45 24.
- I. Test and Balance: The CQC Manager is required to:
1. Review the qualifications of the Test and Balance agency directly subcontracted by CONTRACTOR to ensure compliance with requirements of Section 01 45 25.
 2. Review the Work of the Test and Balance agency as part of the CQC program.
 3. Review and ensure timely submission of Test and Balance Reports as required by Section 01 45 25.
- J. "Trade" Coordination Drawings: The CQC Manager shall:
1. Facilitate the preparation and utilization of trade coordination drawings as required under Section 01 31 13.3.02.A.
 2. Ensure and certify that the trade coordination drawings are complete and continuously updated to reflect changes in the Work.
 3. Ensure that the trade coordination drawings are used during the Preparatory Phase for each scheduled construction operation such that the Work of trades is properly coordinated and free from interference and conflict.
 4. Ensure field changes arising from coordination of the respective trades will be reflected in revised trade coordination drawings.
 5. Certify monthly as to the accuracy and completeness of trade coordination drawings prior to review by OWNER.
- K. As-Built Drawings: CQC Manager shall review the as-built drawings required by Section 01 77 00, CONTRACTOR's AS-BUILT DOCUMENTS, to ensure as-built drawings are:
1. Kept current on a daily basis.
 2. Marked to show precisely dimensioned and referenced locations of any deviations made from the Contract Document drawings or specifications.
 3. Attest to the accuracy of the current As-Built drawings when submitting any Application for Payment.
 4. Submit the As-Built drawings to the OAR, along with a certificate attesting to the accuracy of the As-Built drawings, with the Request for Substantial Completion.



3.09 REQUIRED CONTRACTOR QUALITY CONTROL CERTIFICATIONS

- A. Submittal Certification: The CQC Manager shall certify in writing as to the adequacy and completeness of any and submittals with each submittal.
- B. CONTRACTOR Quality Control Report Certification: Furnish bi-weekly CONTRACTOR Quality Control Reports, signed by the CQC Manager, containing the following statement: “On behalf of CONTRACTOR, I certify that this report is complete, correct and equipment and material used and work performed during this reporting period is in compliance with the Contract Documents to the best of my knowledge, except as noted in this report.”
- C. Invoice Certification: Include a certificate with each payment request, signed by CQC Manager, attesting that record drawings are current and the Work for which payment is requested, including stored material, is in compliance with Contract requirements.
- D. Completion Certification: Upon completion of designated portion of the Work, furnish a certificate to Owner, signed by the CQC Manager, attesting that “...the Work has been completed, inspected, tested and is in compliance with the Contract requirements.”
- E. Commissioning Certification. If applicable, coordinate with OWNER’s designated Commissioning Agent by furnishing a certification to OWNER, signed by the CQC Manager, attesting that the Work of CONTRACTOR, in support of the project commissioning activities, “...has been completed in compliance with the approved Project Commissioning Plan and Contract requirements.”
- F. Submittals: CQC Manager shall attest in writing as to the adequacy and completeness of submittals.
- G. Drawing Certification: The CQC Manager shall certify, in writing, as to the accuracy and completeness of CONTRACTOR “As-Built” and trade coordination drawings – whether submitted or in use on-site for construction or installation.
- H. Punch List Certification: The CQC Manager shall attest, in writing, as to the accuracy and completeness of rework and punch list corrective activities reported.

END OF SECTION – 01 4516



SECTION 01 45 23

TESTING AND INSPECTION

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Testing and inspection services to meet requirements of the California Building Code (CBC).
- B. Related Requirements:
 - 1. Section 03 20 00 – Concrete Reinforcing.
 - 2. Section 03 30 00 – Cast-in-Place Concrete.
 - 3. Section 04 22 00 – Concrete Unit Masonry.
 - 4. Section 05 12 00 – Structural Steel Framing.
 - 5. Section 06 10 00 – Rough Carpentry.
 - 6. Section 06 17 33 – Wood I Joist.
 - 7. Section 31 - Excavation Fill for Structures.

1.02 REFERENCES

- A. American Concrete Institute (ACI):
 - 1. ACI 318 – Building Code Requirements for Structural Concrete and Commentary.
- B. American Institute of Steel Construction (AISC):
 - 1. AISC 360 – Specification for Structural Steel Buildings.
 - 2. AISC 341 – Seismic Provisions for Structural Steel Buildings.
- C. ASTM International (ASTM):
 - 1. ASTM A108 – Standard Specification for Steel Bar, Carbon and Alloy, Cold-Finished.



2. ASTM A370 – Standard Test Methods and Definitions for Mechanical Testing of Steel Products.
 3. ASTM A706 – Standard Specification for Deformed and Plain Low-Alloy Steel Bars for Concrete Reinforcement.
 4. ASTM C31 - Standard Practice for Making and Curing Concrete Test Specimens in the Field.
 5. ASTM C172 - Standard Practice for Sampling Freshly Mixed Concrete.
 6. ASTM C780 - Standard Test Method for Preconstruction and Construction Evaluation of Mortars for Plain and Reinforced Unit Masonry.
 7. ASTM C1314 - Standard Test Method for Compressive Strength of Masonry Prisms.
 8. ASTM E164 - Standard Practice for Contact Ultrasonic Testing of Weldments.
 9. ASTM E488 - Standard Test Methods for Strength of Anchors in Concrete Elements.
 10. ASTM E543 - Standard Specification for Agencies Performing Nondestructive Testing.
 11. ASTM E605 - Standard Test Methods for Thickness and Density of Sprayed Fire-Resistive Material (SFRM) Applied to Structural Members.
 12. ASTM E1444 - Standard Practice for Magnetic Particle Testing.
 13. ASTM F606 - Standard Test Methods for Determining the Mechanical Properties of Externally and Internally Threaded Fasteners, Washers, Direct Tension Indicators, and Rivets.
- D. Association of the Wall and Ceiling Industry (AWCI):
1. AWCI Technical Manual 12-B - Standard Practice for the Testing and Inspection of Field Applied Thin Film Intumescent Fire-Resistive Materials; an Annotated Guide.
- E. American Welding Society (AWS):
1. AWS D1.1 – Structural Welding Code.
 2. AWS D1.4 – Structural Welding Code – Reinforcing Steel.
 3. AWS D1.8 – Structural Welding Code – Seismic Supplement.



1.03 REGULATORY REQUIREMENTS

- A. Laboratories performing testing shall have City’s Laboratory Evaluation and Acceptance Program approval prior to providing material testing or special inspection services.
- B. Tests of materials and inspections shall be in accordance to Section 4-213 through 4-219 of the California Building Standards Commission’s, California Administrative Code.

1.04 TESTS

- A. OWNER will contract with a City approved testing laboratory to perform the testing indicated on the Contract Documents, including the Tests and Special Inspections (T&I) list.
- B. Selection of material to be tested shall be by the Testing Laboratory and not by CONTRACTOR.
- C. Any material shipped from the source of supply prior to having satisfactorily passed such testing and inspection, or prior to the receipt of notice from Project Inspector such testing and inspection is not required, shall not be incorporated into the Work.
- D. The Testing Laboratory is not authorized to release, revoke, alter, or enlarge requirements of the Contract Documents or approve or accept any portion of the Work.
- E. The Testing Laboratory shall not perform any duties of CONTRACTOR.
- F. CONTRACTOR shall provide an insulated curing box with the capacity for twenty concrete cylinders and will relocate said box and cylinders as rapidly as required in order to provide for progress of the Work.

1.05 TEST REPORTS

- A. Test reports shall include all tests performed, regardless of whether such tests indicate the material is satisfactory or unsatisfactory. Samples taken but not tested shall also be reported. Records of special sampling operations, when and as required, shall also be reported. Reports shall indicate the material (or materials) was sampled and tested in accordance with requirements of CBC, Title 24, Parts 1 and 2, as indicated on the Contract Documents. Test reports shall indicate specified design strength and specifically state whether or not the material (or materials) tested comply with the specified requirements.

1.06 VERIFICATION OF TEST REPORTS



- A. Each Testing Laboratory shall submit to the City, in duplicate, a verified report covering all tests required to be performed by that agency during the progress of the Work. Such report, covering all required tests, shall be furnished prior to Substantial Completion and/or, when construction on the Work is suspended, covering all tests up to the time of Work suspension.

1.07 INSPECTION BY OWNER

- A. OWNER, and its representatives, shall have access, for purposes of inspection, at all times to all parts of the Work and to all shops wherein the Work is in preparation. CONTRACTOR shall, at all times, maintain proper facilities and provide safe access for such inspection.
- B. OAR shall have the right to reject materials and/or workmanship deemed defective Work and to require correction. Defective workmanship shall be corrected in a satisfactory manner and defective materials shall be removed from the premises and legally disposed of without charge to OWNER. If CONTRACTOR does not correct such defective Work within a reasonable time, fixed by written notice and in accordance with the terms and conditions of the Contract Documents, OWNER may correct such defective Work and proceed in accordance with related Articles of the Contract Documents.
- C. CONTRACTOR is responsible for compliance to all applicable local, state, and federal regulations regarding codes, regulations, ordinances, restrictions, and requirements.

1.08 PROJECT INSPECTOR

- A. A Project Inspector will be employed by OWNER in accordance with requirements of Title 24 of the California Code of Regulations with their duties specifically defined therein.
- B. Inspection of Work shall not relieve CONTRACTOR from any obligation to fulfill all terms and conditions of the Contract Documents.
- C. CONTRACTOR shall be responsible for scheduling times of inspection, tests, sample taking, and similar activities of the Work.

1.09 STRUCTURAL TESTS AND SPECIAL INSPECTIONS

- A. Soils:
 - 1. General: Periodic inspection by Geotechnical Engineer for verification of the following construction activities in conformance to CBC Table 1705A.6:



- a. Site has been prepared properly prior to placement of controlled fill and/or excavations for foundations.
 - b. Foundation excavations are extended to proper depth and have reached proper material.
 - c. Materials below footings are adequate to achieve the design bearing capacity.
2. Compacted Fills: Testing and inspections shall be in conformance to Table 1705A.6:
- a. Geotechnical Engineer will continuously verify the use of proper materials and inspect lift thicknesses, placement, and compaction during placement of fill.
 - b. Testing Laboratory under the supervision of the Geotechnical Engineer will:
 - 1) Perform qualification testing of fill materials.
 - 2) Test the compaction of fill.
3. Retaining Walls:
- a. Continuous inspections by Geotechnical Engineer:
 - 1) Placement, compaction and inspection of soil per CBC Section 1705A.6.1 for fills supporting foundations.
 - 2) Segmental retaining walls; inspect placement of units, dowels, connectors, etc.
 - b. Concrete Retaining Walls: Provide tests and inspections as indicated on paragraphs below for concrete.
 - c. Masonry Retaining Walls: Provide tests and inspections as indicated on paragraphs below for masonry.
- B. Concrete:
1. Cast in Place Concrete: Inspection and testing in conformance to CBC Table 1705A.3:
 - a. Inspection of reinforcement, including prestressing tendons and verification of placement, per ACI 318, sections 25.2, 25.2, 25.5.1 through 26.5.3.



- b. Reinforcing bar welding: Inspect per AWS D1.4, ACI 318 26.5.4.
 - 1) Verification of weldability of reinforcing bars other than ASTM A706.
 - 2) Inspect single-pass fillet welds, maximum 5/16”.
 - 3) Inspect all other welds.
- c. Inspect anchors cast in concrete per ACI 318, section 17.8.2.
- d. Inspect anchors post-installed in hardened concrete members:
 - 1) Continuous inspection of adhesive anchors installed in horizontally or upwardly inclined orientations to resist sustained tension loads, per ACI 318, section 17.8.2.4.
 - 2) Mechanical anchors and adhesive anchors, not defined in previous paragraph, per ACI 318, section 17.8.2.
- e. Design Mix:
 - 1) Verify use of required mix, per ACI 318, chapter 19 and sections 26.4.3 and 26.4.4.
 - 2) Batch Plant Inspection: The quality and quantity of materials used in transit-mixed concrete and in batched aggregates shall be continuously inspected as required by CBC section 1705A.3.2. If approved by City, batch plant inspection may be reduced to periodic if plant complies with CBC section 1705A3.3.1, item 1, and requires first batch inspection, weightmaster, and batch tickets.
- f. Prior to concrete placement, fabricate specimens for strength tests, perform slump and air content tests, and determine the temperature of the concrete, per ASTM C172, ASTM C31, ACI 318, sections 26.4.5 and 26.12.
- g. Inspect concrete placement for proper application techniques, per ACI 318, section 26.4.5.
- h. Verify maintenance of specified curing temperature and techniques per ACI 318 sections 26.4.7 through 26.4.9 and CBC section 1908.9.
- i. Inspect prestressed concrete for:
 - 1) Application of prestressing forces, per ACI 318 section 26.9.2.1



- 2) Grouting of bonded prestressing tendons per ACI 318 section 26.9.2.3.
 - j. Inspection of erection of precast concrete members per ACI 318 chapter 26.8.
 - k. Verify in-situ concrete strength, prior to stressing of tendons in post-tensioned concrete and prior to removal of shores and forms from beams and structural slabs per ACI 318 section 26.10.1.b.
 - l. Sampling and testing of reinforcing steel per ASTM A370, CBC section 1910A.2. CONTRACTOR shall submit mill certificate indicating compliance with requirements for reinforcement, anchors, ties, and metal accessories.
2. Prestressed Concrete: In addition to the tests and inspections required for concrete listed above, the following tests and inspections will performed:
- a. Testing Laboratory will test prestressing tendons and anchorages per CBC section 1910A.3 and ASTM A370.
 - b. Special Inspector will check the materials, equipment, tensioning procedure and inspect placement of prestressing tendons and construction, per CBC section 1705A.3.4.
 - c. Special Inspector will verify in-situ adequate concrete strength prior to stressing tendons.
 - d. Continuous inspection by Special Inspector of application of prestressing forces and grouting of bonded prestressing tendons, per CBC section 1705A.3.4.
3. Precast Concrete: In addition to the tests and inspections required for concrete listed above, the following tests and inspections will performed:
- a. Continuous inspection by Special Inspector of fabrication of precast concrete members.
 - b. Inspection of erection of precast concrete members per ACI 318, chapter 26.8.
4. Post-installed Anchors:
- a. Special Inspector will inspect installation of post-installed anchors in hardened concrete members as required by CBC table 1705A.3, item 4.



- 1) Adhesive anchors installed in horizontally or upwardly inclined orientations to resist sustained tension loads, per ACI 318, section 17.8.2.4.
 - 2) Mechanical anchors and adhesive anchors not defined above, per ACI 318, section 17.8.2.
- b. Testing Laboratory will test post-installed anchors in conformance to CBC section 1905A and ASTM E488.
- C. Structural Masonry:
1. Material Verification and Testing:
 - a. Sampling and testing of reinforcing steel per ASTM A370, CBC section 1910A.2. CONTRACTOR shall submit mill certificate indicating compliance with requirements for reinforcement, anchors, ties, and metal accessories.
 - b. Submit manufacturer's certificate of compliance for masonry units, mortar and grout materials. Test masonry units, mortar and grout (unit strength method).
 - c. Testing Laboratory will test masonry prisms in conformance with ASTM C1314.
 - d. Special Inspector will verify proportions of site-prepared, premixed or preblended mortar and grout, per ASTM C780.
 - e. Testing Laboratory will test core-drilled samples in conformance with CBC 2114.6.2.
 2. Inspection:
 - a. Special Inspector will continuously inspect preparation of prisms per ASTM C1314.
 - b. Special inspector will verify size, location and condition of dowels and construction supporting masonry.
 - c. Special inspector will verify size specified size, grade and type of reinforcement.
 - d. Special inspector will verify weldability of reinforcing bars other than ASTM A706. Special inspector to inspect reinforcing bar welding: Inspection to be in conformance with AWS D1.4, ACI 318 26.5.4.



- e. Special inspector will inspect placement of reinforcement, connectors, masonry units and construction of mortar joints.
 - f. Special inspector will verify protection of masonry during cold weather temperature (temperature below 40° F) or hot weather (temperature above 90° F).
 - g. Special inspector will inspect type, size and location of anchors and all other items to be embedded in masonry, including other details of anchorage of masonry to structural members, frames and other construction.
 - h. Special inspector will inspect grout space prior to grouting and placement of grout.
3. Post-installed Anchors in Masonry:
- a. Special inspector will inspect anchors cast in concrete per ACI 318, section 17.8.2.
 - b. Special inspector will inspect anchors post-installed in hardened concrete members:
 - 1) Continuous inspection of adhesive anchors installed in horizontally or upwardly inclined orientations to resist sustained tension loads, per ACI 318, section 17.8.2.4.
 - 2) Mechanical anchors and adhesive anchors, not defined in previous paragraph, per ACI 318, section 17.8.2.
 - c. Testing Laboratory will test post-installed anchors in conformance to CBC section 1905A and ASTM E488.

D. Structural Steel:

- 1. Special inspector will verify that all materials are properly marked in conformance with AISC 360, Section 3.3 and applicable ASTM standards.
 - a. Mill certificates indicating material properties that comply with requirements.
 - b. Materials, sizes, types and grades complying with requirements.
- 2. Testing Laboratory will test unidentified materials in conformance with ASTM A370.



3. Special inspector will examine seam welds of HSS shapes in conformance with ASTM.
 4. Special inspections and non-destructive testing of structural steel elements shall be in conformance to CBC section 1705A.2.1.
- E. High Strength Bolts:
1. Special inspector will verify identification markings and manufacturer's certificates of compliance conform to ASTM standards specified in the Contract Documents, per ASTM.
 2. Testing Laboratory will test high-strength bolts, nuts and washers in conformance with ASTM F606, ASTM A370.
 3. Special inspector will inspect bearing-type ("snug tight") bolt connections in conformance with AISC 360, section M2.5.
 4. Special inspector will inspect slip-critical bolt connections in conformance with AISC 360, section M2.5.
- F. Welding:
1. Verification of Materials, Equipment and Welders:
 - a. Special inspector will verify weld filler material identification markings per AWS designation listed on the Contract Documents and the WPS.
 - b. Special inspector will verify material manufacturer's certificate of compliance.
 - c. Special inspector will verify WPS, welder qualifications and equipment in conformance to CBC.
 2. Shop Welding: Special inspector will inspect the following, per CBC 1705A.2.1, AISC 360 (and AISC 341, as applicable).
 - a. Groove, multi-pass fillet welds larger than 5/16", plug and slot welds.
 - b. Single-pass fillet welds equal or less than 5/16".
 - c. Inspect welding of stairs and railing systems.
 - d. Verification of reinforcing steel weldability.
 - e. Welding of reinforcing steel, per AWS D1.4.



3. Field Welding: Special inspector will inspect the following, per CBC 1705A.2.1, AISC 360 (and AISC 341, as applicable):
 - a. Groove, multi-pass fillet welds larger than 5/16", plug and slot welds.
 - b. Single-pass fillet welds equal or less than 5/16".
 - c. End welded studs (ASTM A108) installation, including bend test.
 - d. Floor and roof deck welds.
 - e. Welding of structural cold-formed steel.
 - f. Welding of stairs and railing systems.
 - g. Verification of reinforcing steel weldability.
 - h. Inspect welding of reinforcing steel.
 4. Non-Destructive Testing: Testing Laboratory will test perform ultrasonic and magnetic particle testing in conformance to AISC 360 section N5.5, AISC 341 appendix Q5.2, AWS D1.1, AWS D1.8, ASTM E543, ASTM E1444, ASTM E164.
- G. Steel Joists and Trusses: Continuous inspection, special inspector will verify size, type and grade for all chord and web members as well as connectors and weld filler material, verify joist profile, dimensions and chamber (if applicable); verify all weld locations, lengths and profiles; mark or tag each joist, in conformance with CBC section 2207.1.
- H. Fire-Proofing:
1. Spray Applied:
 - a. Project inspector will examine structural steel surface conditions, inspect application, take samples, measure thickness, and verify compliance of all aspects of application with Construction Documents, in conformance with CBC sections and ASTM E.605.
 - b. Testing Laboratory will test bond strength in conformance with ASTM E605, per CBC section 1705A.14.6.
 - c. Testing Laboratory will test density in accordance with ASTM E605, per CBC section 1705A.14.5.
 2. Intumescent Fire-Resistant Coatings: Special inspector will inspect and test in accordance with AWCI 12-B, per CBC section 1705A.15.



- I. Anchor Bolts, Anchor Rods and Other Steel:
 - 1. Testing Laboratory will sample and test not readily identifiable anchor bolts and anchor rods in accordance with CBC.
 - 2. Testing Laboratory will sample and test not readily identifiable threaded rod not used for foundation anchorage per procedures noted in CBC.

- J. Prefabricated Wood Structural Elements:
 - 1. Special inspector will continuously inspect fabrication of glued-laminated timber in accordance with CBC section 1704A2.5.
 - 2. Special inspector will continuously inspect fabrication of manufactured open-web trusses in accordance with CBC 1704A2.5.
 - 3. Special inspector will continuously inspect fabrication of manufactured metal plate connected trusses in accordance with CBC 1704A2.5.

PART 2 – PRODUCTS (Not used).

PART 3 – EXECUTION (Not used).

END OF SECTION – 01 4523



SECTION 01 45 25

TESTING, ADJUSTING, AND BALANCING FOR HVAC

PART 1 – GENERAL

1.01 SUMMARY

A. SECTION INCLUDES

1. This Section specifies the requirements for test and balance of HVAC and related systems.

B. RELATED REQUIREMENTS

1. Section 01 11 00: Summary of Work.
2. Section 01 31 13: Project Coordination.
3. Section 01 32 13: Construction Schedule.
4. Section 01 33 00: Submittal Procedures.
5. Section 01 77 00: Contract Closeout.
6. Section 23 05 00: Common Work Results for HVAC.
7. Section 23 07 00: HVAC Insulation.
8. Section 23 08 00: HVAC Systems Commissioning.
9. Section 23 09 00: HVAC Controls.
12. Section 23 30 00: Air Distribution.
21. Section 23 80 00: Heating, Ventilating and Air Conditioning Equipment.
22. Section 28 31 49: Carbon Monoxide Detection and Alarm Systems.

PART 2 – PRODUCTS (Not used)

PART 3 – EXECUTION

3.01 DEFINITIONS AND APPLICABLE PUBLICATIONS



- A. For the purposes of this Section definitions are as indicated in applicable publications of AABC, NEBB, TABB, ASHRAE, ANSI and SMACNA.
1. TAB: Testing, Adjusting and Balancing.
 2. TABB: Testing, Adjusting and Balancing Bureau.
 3. AABC: Associated Air Balance Council.
 4. NEBB: National Environmental Balancing Bureau.
 5. ASHRAE: American Society of Heating, Refrigerating and Air-Conditioning Engineers.
 6. ANSI: American National Standards Institute.
 7. SMACNA: Sheet Metal and Air Conditioning Contractors' National Association.
 8. OAR: OWNER'S Authorized Representative

3.02 QUALITY ASSURANCE

- A. The General Contractor shall contract directly with the test and balance agency. Tests performed by testing agencies contracted with the system's subcontractor will not be accepted. The qualifications of the agency shall comply with Article 3.02, Quality Assurance. The agency shall be responsible for furnishing labor, instruments, and tools required to test, adjust, and balance the heating, ventilating, and air conditioning (HVAC) systems and related plumbing systems, as described and/or as indicated in the Contract Documents.
- B. CONTRACTOR shall obtain services of an independent, qualified testing agency acceptable to Architect to perform testing and balancing Work as specified and as follows:
1. Agency shall be currently certified by either the Associated Air Balance Council (AABC), the National Environmental Balancing Bureau (NEBB), or the Testing, Adjusting and Balancing Bureau (TABB). NEBB or TABB certification shall be for Air and Hydronic Testing, Adjusting and Balancing and Sound and Vibration Measurement.
 2. Work shall be in accordance with the latest edition of the AABC, NEBB, or TABB National Standards. Where the requirements of the two standards are different, the more stringent requirements shall prevail. Also, if the Contract Documents impose a more stringent standard, then the Contract Documents shall prevail.



- C. Performance Criteria: Work of this Section shall be performed in accordance with approved Testing, Adjusting, and Balancing agenda.
- D. Test Equipment Criteria: Basic instrumentation requirements and accuracy/calibration required by Section Two of the AABC, Section II of the NEBB, or TABB Procedural Standards for Testing, Adjusting and Balancing of Environmental Systems.
- E. Verification: The Test and Balance Agency shall recheck 10 percent (minimum 10) of the measurements listed in the report. The locations shall be selected by PROJECT INSPECTOR or OAR. The recheck will be witnessed by PROJECT INSPECTOR or OAR. If 20 percent of the measurements that are retested differ from the report and are also out of the specified range, an additional 10 percent will be tested. If 20 percent fall outside the specified range, the report will be considered invalid and all test and balance work shall be repeated.
- F. Due to more stringent acoustical requirements in the educational environment, the Test and Balance Agency shall recheck the air systems where the sound level is higher than the specified requirements and demonstrate compliance with the methodology specified in this document with emphasis on fan speed adjustment and balancing for optimum acoustical performance. The recheck will be witnessed by PROJECT INSPECTOR or OAR. When there are multiple air systems, a system selected by PROJECT INSPECTOR or OAR shall be rechecked. If this system is found to be not in compliance, a second system shall be checked. If the second system is also found to be not in compliance, the report will be considered invalid, and all test and balance work shall be repeated.

3.03 SUBMITTALS

- A. Submit name of agency to perform the Work. Include in the submittal the certified qualifications of all persons responsible for supervising and performing actual Work of this Section. Agency shall submit a minimum of five commercial or industrial HVAC system TAB projects of similar type, size, and degree of difficulty completed within the last two years. Agency shall provide name and telephone number of contact person for each listed project.
- B. Submit, for approval, 6 copies of the Agenda as indicated in Article 3.06 to test and balance all mechanical and relevant plumbing systems.
- C. Preliminary Report: Review the Contract Documents, examine Work installations and submit a written report to ARCHITECT, PROJECT INSPECTOR and OAR indicating deficiencies in Work precluding proper testing and balancing of the Work.
- D. Final TAB Report: Submit the final TAB report for review by ARCHITECT, PROJECT INSPECTOR, and OAR outlining the conditions and Work completed on each HVAC system. All outlets, devices, HVAC equipment, etc. shall be identified, along with a numbering system corresponding to report unit identification.



- E. Submit an AABC “National Project Performance Guaranty” or “NEBB Quality Assurance Certification”, assuring the Project systems were tested, adjusted, and balanced in accordance with the Specifications and AABC, NEBB, or TABB National Standards.
- F. CAD drawings: Submit single line, multi-color CAD drawings indicating outside return and supply air, volume control boxes, each outlet and inlet, room numbers, duct sizes at traverse locations, temperatures and pressures, systems balanced, components changed, and CONTRACTOR installed access points. In addition, drawings shall identify controls, equipment settings, including manual damper quadrant positions, manual valve indicators, fan speed control levers, and similar controls, and devices shall be marked on the drawings to show final settings. CAD files shall be submitted on CD-ROM upon final submittal of TAB report. Reports shall identify discrepancies between completed Work and the Contract Documents affecting the performance and longevity of the system.

3.04 GENERAL SCOPE OF WORK

- A. The general scope of Work shall include but not be limited to the following:
 - 1. Measure airflow rates of HVAC systems and make adjustments to achieve design airflow rates, tabulate results, and submit reports.
 - 2. Measure water-flow rates of HVAC systems and make adjustments to achieve design water flow rates, tabulate results, and submit reports.
 - 3. Measure flow velocities, temperatures, static pressures or head, rotational speed, and electrical power demand of fans, pumps, and other related HVAC system components, tabulate results, and submit reports.
 - 4. Measure sound levels in each conditioned space, tabulate results, and submit reports.
 - 5. Measure ambient sound levels of outdoor HVAC units and system components such as chillers and cooling towers, tabulate results, and submit reports.
 - 6. Reports shall contain sufficient data for the system designer to evaluate system performance and solve installation problems such as system pressure profiles and pressure drops across system components

3.05 SPECIFIC SCOPE OF WORK

- A. The specific scope of Work shall include the following HVAC system components as indicated on the Drawings:
 - 1. Air Conditioning Units.



2. Heating and Ventilating Units.
3. Supply, Return, Relief and Exhaust Fans.
4. Outside Air and Return Air Plenums.
5. Outside Air Intakes.
6. All Supply and Return Ductwork.
7. All associated Air Terminal Devices, i.e. Supply Diffusers, Return Registers, etc.
8. Exhaust Duct Systems.
9. Fire and Fire/Smoke Dampers.

3.06 TESTING, ADJUSTING, AND BALANCING AGENDA

- A. Provide proposed materials, methods, procedures, forms, diagrams, and reports for test and balance Work.
- B. Agenda to be completed by the test and balance agency and submitted to ARCHITECT, PROJECT INSPECTOR, and OAR for review and approval.
- C. Agenda shall include one complete set of AABC, NEBB, or TABB publications listed in Sub-paragraph 3.02.B.2, applicable publications, or, in case of other test and balance agencies and or organizations, comparable publications to establish an approved, systematic, and uniform set of procedures.
- D. Agenda shall also include the following detailed narrative procedures, system diagrams, and forms for test results:
 1. Specific standard procedures required and proposed for each system of the Work.
 2. Specified test forms for recording each procedure and for recording sound and vibration measurements.
 3. Systems diagrams for each air, water, and steam system. Diagrams may be single line.
- E. In addition to information recorded for standard AABC, NEBB, or TABB procedures, the following information is required:
 1. Fan data.



2. System number, location, manufacturer, model, and serial number.
 3. Fan wheel type and size.
 4. Motor horse power, type, and rpm.
 5. Sheave size, type, number of grooves, and open turns on Variable Pitch Sheave.
 6. Number and size of belts, motor and fan shaft sizes, center-to-center of shafts in inches, and adjustment available motor data, including nameplate data, actual amps, rated, and actual motor rpm, volts, phase, hp, kW, starter heater size, and capacity.
 7. Fan design airflow and service (supply, return, outdoor air or exhaust).
 8. Fan static pressure, suction/discharge, static profile, and static control point.
- F. The following traverse data is required:
1. Traverse location, size of duct (inside dimensions), and area of duct in square feet.
 2. Column for each hole traversed/lines for each reading.
 3. Barometric pressure.
 4. Temperature/Static pressure in the duct.
 5. Actual CFM corrected to SCFM.
 6. Notes.
- G. The following air distribution data is required:
1. Room identification.
 2. Outlet or intake balance sequence number.
 3. Size of outlet or inlet.
 4. AK Factor.
 5. Design and Actual FPM and CFM.
 6. Notes.
- H. The following hydronic coil data is required:



1. Air flow through the coil in CFM.
 2. Dry bulb and wet bulb temperatures entering/leaving coil.
 3. Enthalpy or total heat differences in BTU/pound.
 4. Capacity in BTU/hour at time of test.
 5. Water temperature and pressure entering/leaving coil.
 6. Flow (in GPM) through coil.
 7. Air pressure drop across coil.
 8. Water head drop across coil.
 9. Notes.
- I. The following DX coil data is required:
1. Air flow through the coil in CFM.
 2. Dry and wet bulb temperatures entering/leaving coil.
 3. Enthalpy or total heat difference across coil in BTU/ pound.
 4. Capacity in BTU/hour at time of test.
 5. Air pressure drop across coil.
 6. Notes.
- J. The following electric heating coil data is required:
1. Heating coil identification number.
 2. Nameplate data; manufacturer, model and serial number.
 3. Amperage/Voltage on each phase.
 4. Phase, kW, and Stages.
 5. Safety device installed.
 6. Air pressure drop across coil.
 7. Notes.



- K. The following boiler and domestic water heater data is required:
1. Performance test results for rated capacity.
 2. Boiler identification number.
 3. Nameplate data; manufacturer, model, and serial number.
 4. Water temperature entering/leaving the boiler.
 5. Outside conditions: temperature, humidity, general cloud cover.
 6. Barometric pressure.
- L. The following sound test data is required:
1. Area or location.
 2. Sound level in dB(A) as specified in Article 3.19.
 3. Sound level at the center band frequencies of eight non-weighted octaves with equipment on and off for 5 rooms selected by the OAR/PROJECT INSPECTOR.
 4. Plot of corrected sound-level reading on Noise Criteria (NC) curve for the measurements in Q 3 above.
- M. The following vibration test data is required:
1. Equipment identification number.
 2. Vibration levels at all accessible bearings, motors, fans, pumps, casings, and isolators.
 3. Measurements in mils deflection and velocity in inches per second.
 4. Each measurement taken in horizontal, vertical, and axial planes as accessible.
- N. The following mixing damper leakage test data is required:
1. Equipment identification number (unit, box, zone, etc.).
 2. Dry bulb temperature in the cold/hot (or bypass) deck.
 3. Dry bulb temperature in the mixed air stream.
 4. Calculated percent leakage.



5. Data above taken in the full cool and full heat (or bypass) mode.
 6. Notes.
- O. The following airflow station data is required:
1. Station identification number.
 2. Nameplate data including effective area.
 3. Differential test pressure or velocity.
 4. Calculated CFM.
 5. Actual CFM (from Pitot-tube traverse form).
 6. Read out CFM.
 7. Notes
- P. The following unit heater data is required:
1. Equipment identification number.
 2. Nameplate data; manufacturer, model, and serial number.
 3. Test CFM (use manufacturer rated CFM if not ducted).
 4. Heat test data per applicable procedure (hot water, electric, etc.).
 5. Notes.
- Q. The following fan coil and unit ventilator data is required:
1. Equipment identification number.
 2. Nameplate data; manufacturer, model, and serial number.
 3. Tested supply CFM or manufacturer rated CFM if not ducted.
 4. Tested outside air in CFM.
 5. Motor data and actual amps and volts.
 6. Cooling/Heating test data.
 7. Static pressure.



8. Notes.

U. The following terminal box data is required:

1. Box identification number.
2. Node, address, or designation on system.
3. Box size.
4. Cooling CFM.
5. Minimum CFM (if applicable).
6. Heating CFM (if applicable).
7. Box fan amps and volts (if applicable).
8. For DDC controlled boxes, record computer readout maximum, minimum, and heat, along with box correction factor for calibrating to true CFM.
9. Notes.

3.07 PROCEDURES

- A. Schedule the Work of this Section in order for test and balance activities to be completed prior to the date of Substantial Completion. CONTRACTOR shall place all heating, ventilating, and air conditioning equipment into operation during each day and until all HVAC adjusting, balancing, testing, demonstrations, and instructions on systems are completed. Agency shall prepare and submit reports within ten (10) days from completion of the Work of this Section to allow sufficient time for corrective measures to be completed before Substantial Completion of the Work. When an individual building or portion thereof is ready for occupancy, all equipment relative to such portion of Work shall be put into service, tested, and balanced.
- B. Prior to the date of Substantial Completion, and upon completion of test and balance Work, place all exhaust fans in operation, force all air handling units, and air conditioning units into a 100 percent outdoor air economizer mode with heating and cooling locked out and flush the building continuously for a period of fourteen (14) days.
- C. Coordinate test and balance procedures with any phased Project requirements so test and balance procedures on each phased portion of the Work will be completed prior to completion of said designated phase.

3.08 FIELD EXAMINATION



- A. Before the commencement of test and balance Work, CONTRACTOR shall ascertain that following conditions are fulfilled:
1. Ensure that all water heating and water cooling systems have been flushed, cleaned, and filled and high points vented.
 2. Refrigerant systems are fully charged with specified refrigerant.
 3. Over-voltage and current protection have been provided for motors.
 4. Equipment has been labeled as required.
 5. Curves and descriptive data on each piece of equipment to be tested and adjusted are available as required.
 6. Operations and maintenance manuals have been supplied.
 7. Controls manufacturer and boiler-burner representatives shall be available for consultation and supervision of adjustments during tests.
 8. Verify that heating and cooling coil fins are cleaned, combed and air filters clean, and installed.
 9. Verify that duct systems are clean of debris and leakage is minimized, access doors are closed and duct end caps are in place, and fire and volume dampers are in place and open.
 10. Automatic control systems are completed and operating.
 11. Start up and initial commissioning of all HVAC equipment except fans shall be by the manufacturer.
- B. In addition to the above, CONTRACTOR shall establish a specific, coordinated plan which details how each area of existing building will be balanced during the various phases of the Work. The evaluation shall address, at a minimum, the following concerns:
1. OWNER operations.
 2. Building safety and security policies. Prior to any fire safety or security systems shutdown at any time during the Work, CONTRACTOR shall first advise and coordinate with OWNER to ensure all concerned parties are notified.
 3. Protecting furniture, computers, photocopiers, and other office equipment.
 4. Concerns specific and unique to building related issues.



5. Downtime required for each Air Handling Unit including projected time to return each portion of the building back to its normal occupancy temperature and humidity.
6. Shutdown and reactivation of the fire alarm system to avoid accidental alarms during test and balance and related Work.

3.09 TEST AND BALANCE

A. For each heating, ventilating, or air conditioning system the following shall be performed, recorded, and submitted in an approved format for review. Make, type, and model of unit, and location of each piece of equipment shall be included in the report. Readings shall include but not be limited to following:

1. Air Systems:
 - a. General
 - 1) Verify all ductwork, dampers, grilles, registers, and diffusers have been installed per design and set in the full open position. Agency shall perform the following TAB procedures in accordance with AABC or NEBB National Standards. Where the requirements of the two standards are different, the more stringent requirements shall prevail. Also, if the Contract Documents impose a more stringent standard then the Contract Documents shall prevail.
 - b. Zone, Branch, and Main Ducts:
 - 1) Adjust ducts to within design CFM requirements by means of Pitot-tube duct traverse.
 - c. Supply Fans:
 - 1) Fan Speeds: Test and adjust fan RPM to achieve maximum or design CFM. CONTRACTOR shall provide new belt pulleys when required.
 - 2) Current and Voltage: Test and record motor voltage and amperage, and compare data with the nameplate limits. Ensure fan motor is not in or above the service factor as published by the motor manufacturer.
 - 3) Pitot-Tube Traverse: Perform a Pitot-tube traverse of main supply and return ducts, record total CFM.



- 4) Outside Air: Test and adjust the outside air using Pitot-tube traverse.
 - 5) Static Pressure: Test and record system static profile of each supply fan.
 - 6) Current and Voltage: Test and record motor voltage and amperage, and compare data with the nameplate limits. Ensure fan motor is not in or above the service factor as published by the motor manufacturer.
- d. Return, Relief, and Exhaust Fans:
- 1) Fan Speeds: Test and adjust fan RPM to achieve maximum or design CFM. CONTRACTOR shall provide new belt pulleys where required.
 - 2) Pitot-Tube Traverse: Perform a Pitot-tube traverse of the main return ducts to obtain total CFM.
 3. Static Pressure: Test and record system static profile of each fan.
- e. VAV Systems:
- 1) Set volume regulators on all terminal boxes to meet design maximum and minimum CFM requirements.
 - 2) Identification: Identify the type, location, and size of each terminal box. This information shall be recorded on terminal box data sheets.
- f. Diffusers, Registers and Grilles:
- 1) Tolerances: Test and balance each diffuser, grille, and register to within 5 percent of design requirements.
 - 2) Identification: Identify the type, location, and size of each grille, diffuser, and register. This information shall be recorded on air outlet data sheets.
- g. Coils: Air Temperature: Once airflow is set to acceptable limits, agency shall take wet bulb and dry bulb air temperatures on the entering and leaving side of each cooling coil. Dry-bulb temperature shall be taken on the entering and leaving side of each heating coil.
- h. Duct Leakage Testing:



- 1) On existing ductwork, agency shall calculate duct leakage by traversing the unit and reading associated diffusers.
 - 2) On new installations each and every section of the entire air distribution system (all supply, return, exhaust, and relief ductwork) shall be tested at 1.5 times design static pressure. All ducts shall demonstrate 5 percent leakage maximum (per CBC).
- i. Air Handling Units:
- 1) Prepare pressure profile and show design and actual CFM (outside air, return air, and supply air).
 - 2) Measure and record each mode (minimum OA and 100 percent OA) where economizer cycle is specified.
 - 3) Record pressure drops of all components (coils, filters, sound attenuators, louvers, dampers, and fans) and compare with design values.
 - 4) Pressure profile and component pressure drops are performance indicators and are not to be used for flow measurements.
- j. System Pressure Profiles:
- 1) Prepare pressure profiles from fan (supply, return, and exhaust) or air handling unit to extremities of system.
 - 2) As a minimum, show pressure at each floor, main branch, and airflow measuring device.
 - 3) Make pitot-tube traverses of all trunk lines and major branch lines where required for analysis of distribution system. Airflow measuring devices installed in ductwork, if available, may be utilized.
 - 4) Record residual pressures at inlets of volume controlled terminals at ends of system.
 - 5) Show actual pressures at all static pressure control points utilized for constant or variable flow systems.
- k. Fan speed adjustments and balancing for optimum acoustical performance:
- 1) As the very first step, the speed of all fans (supply, return, and exhaust inside packaged equipment or air handling units) shall



be adjusted to deliver the required fan total air quantity with all volume dampers and other flow rate control devices fully open. Adjustments shall be made with the outdoor air intake dampers, return air dampers, and relief air dampers in the minimum outdoor air position. The adjustments shall be made again in the 100 percent outdoor air position in systems with 100 percent outdoor air economizers.

- 2) The above adjustment shall be done with wet cooling coils, where cooling coils are provided.
- 3) The airflow rates at each branch duct shall be adjusted as the second step with air with all volume dampers and other flow rate control devices fully open.
- 4) The airflow rates at each air inlet and outlet shall be adjusted as the final step. The volume damper in the branch duct shall be used for balancing. Opposed blade dampers at air inlets and outlets where provided shall only be used for fine adjustments and shall not be closed beyond 60 percent open or when the dampers start to generate audible noise.
- 5) CONTRACTOR shall provide the labor and materials for all dampers, pulleys, and belt changes required for balancing. The design documents indicate the worst-case scenario with safety factors in fan static pressures for contingency. Properly coordinated and installed air systems may require a lower static pressure and a reduction in fan speed.

B. Pumps:

1. Test and adjust chilled water, hot water, and condenser water pumps to achieve maximum or design GPM.
2. Measure and record suction and discharge pressures.
3. Check pumps for proper operation. Pumps shall be free of vibration and cavitation.
4. Current and Voltage: Agency shall test and record motor voltage and amperage and compare data with the nameplate limits. Ensure pump motor is not in or above the service factor as published by the motor manufacturer.
5. Adjust pump flow by adjusting and setting balancing valves to obtain amperage reading on a clamp-on ammeter that corresponds to amperage indicated on pump's curves for required flow.



6. Verify that the motor is not drawing more current than indicated on motor plate rating. When actual flows of primary pumps are found by test to vary more than 5 percent from specified amount, system shall be re-balanced to regulate flow within this tolerance. When a flow indicating device(s) is in circuit, it shall be used to verify pump flows.
7. When testing is completed, a pump capacity chart with pump number and location indicated shall be marked indicating operating point of pump on the curve. Chart shall then be included in the report.

3.10 VERIFICATION OF HVAC CONTROLS

- A. Agency shall verify in conjunction with CONTRACTOR all control components are installed in accordance with the intent of the Contract Documents and are functioning according to the design intent, including all electrical interlocks, damper sequences, air and water resets, fire stats, and other safety devices.
- B. CONTRACTOR shall verify all control components are calibrated and set for design operating conditions and intent.

3.11 TEMPERATURE TESTING

- A. To verify system control and operation, agency shall perform a series of three temperature tests taken at approximately two hour intervals in each separately controlled zone. The resulting temperatures shall not vary more than two degrees Fahrenheit from the thermostat or control set point during the tests. Outside temperature and humidity shall also be recorded during the testing periods.

3.14 BUILDING/ZONE PRESSURIZATION

- A. Agency shall test and adjust building/zone pressurization by setting the design flows to meet the required flow direction and pressure differentials. Positive/Negative area(s) supply air shall be set to design flow and exhaust air rates adjusted to obtain the required pressure differential(s).

3.15 FIRE AND SMOKE DAMPER TESTING

- A. This work is to be performed by OWNER and State Fire Marshall. Do not include in agency scope of work.

3.16 LIFE SAFETY CONTROLS TESTING

- A. This work is to be performed by OWNER and State Fire Marshall. Do not include in agency scope of Work.

3.17 FINAL TABULATION



- A. After heating, ventilating, and air conditioning components are satisfactorily tested and balanced, entire system shall be put into operation and all pressures, temperatures, gpm, cfm, velocities, etc., shall be recorded and checked against design schedules. Design requirements shall be listed on reports and final tabulation shall be within a tolerance of plus or minus five percent of design requirements.
- B. Readings at various locations as described herein will be made every hour for four (4) hours, during normal working hours for three (3) days. Boilers, forced air furnaces, and chillers shall be started up far enough in advance to meet design conditions during period of testing.

3.18 VIBRATION TESTING

- A. Furnish instruments and perform vibration measurements if specified in Division 23. Provide measurements for all rotating HVAC equipment half horsepower and larger, including reciprocating/centrifugal/screw/scroll compressors, pumps, fans, and motors.
- B. Record initial and final measurements for each unit of equipment on test forms. Where vibration readings exceed allowable tolerance and efforts to make corrections have proved unsuccessful, forward a separate report to ARCHITECT.

3.19 SOUND TESTING

- A. Perform and record sound measurements as specified in this Section and in Section 23 0548: HVAC Sound, Vibration and Seismic Control. Take additional readings if required by ARCHITECT.
- B. Measuring equipment and methods shall comply with the current requirements of the AABC, NEBB, TABB and ANSI S12.60. Take measurements with a calibrated Type 1 sound level meter and octave band analyzer.
- C. Sound reference levels, formulae, and coefficients shall be according to ASHRAE Handbook: HVAC Applications, Chapter on Sound and Vibration Control.
- D. Where sound pressure levels are specified as noise criteria or room criteria in Section 23 0548: HVAC Sound, Vibration and Seismic Control determine compliance with the Contract Documents as follows:
 - 1. Reduce background noise as much as possible by shutting off unrelated audible equipment.
 - 2. Measure octave band sound pressure levels with specified equipment "off".
 - 3. Measure octave band sound pressure levels with specified equipment "on".



4. Use difference in corresponding readings to determine sound pressure due to equipment. Sound pressure level, due to equipment equals sound pressure level with equipment "on" minus factor.

DIFF.:	0	1	2	3	4	5	9-10 or More
FACTOR:	10	7	4	3	2	1	0

5. Plot octave bands of sound pressure level due to equipment for typical rooms, on a graph, which also shows, noise criteria (NC) curves.
- E. Where sound levels are required in dbA, measure sound levels using the A-frequency-weighting of meter. Single value readings will be used instead of octave band analysis.
- F. Measure sound levels at each octave band as NC or RC (room criteria) if indicated in the Drawings or other Spec Sections. Where measured sound levels exceed specified level, CONTRACTOR shall take all remedial action and necessary sound tests shall be repeated. Sound tests after remedial action shall be in octave band in NC or RC for the room and also at each diffuser, grille, or register in occupied areas. Sound levels shall be measured approximately five feet above floor on a line approximately 45 degrees to center of opening, on the A- and C-frequency-weighting of the measuring instrument.
- G. Measure and record sound levels in decibels for each room per current ANSI S12.60.
- H. Report shall include ambient sound levels, taken without air-handling equipment operating, of rooms in which above openings are located. A report shall also be made of any noise caused by mechanical vibration.

END OF SECTION – 01 4525



SECTION 01 50 00

CONSTRUCTION FACILITIES AND TEMPORARY CONTROLS

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Temporary utilities, construction facilities and temporary controls to be provided, maintained, relocated, and removed by CONTRACTOR.
- B. Temporary office furnishings and office equipment.
- C. Project signage.

1.02 QUALITY ASSURANCE

- A. CONTRACTOR shall comply with applicable laws and regulations of authorities having jurisdiction including, but not limited to, the following:
 - 1. Building Code requirements.
 - 2. Health and safety regulations.
 - 3. Utility company regulations.
 - 4. Police, fire department and rescue squad requirements.
 - 5. Environmental protection regulations.
- B. CONTRACTOR shall arrange for the inspection and testing of each temporary utility prior to use. Obtain required certifications and permits and transmit to OAR.
- C. CONTRACTOR provided facilities are to be in place and available for OWNER use and occupancy within (Insert Number of Days) calendar days following the date of issue of the Notice to Proceed and shall remain in place and available for OWNER use and occupancy throughout the full term of the Contract.

1.03 SUBMITTALS

- A. Temporary Utilities: Submit to OAR reports of tests, inspections, meter readings, certifications, permits and similar procedures performed on temporary utilities.
- B. Project Signage / Banner: Submit to OAR for review and approval.



1. Shop Drawings: Elevation showing the text, OWNER sign and color of project signage, jointing, fittings and location of grommets.
2. Certification: Submit certification attesting fabric is certified as flame retardant, in accordance to NFPA 701, Standard Methods of Fire Tests for Flame Propagation of Textiles and Films.

1.04 PROJECT IDENTIFICATION SIGNAGE AND BANNERS

A. Provide the following project identification information:

1. “Construction Anticipated to Start in XXXX”.
2. \$XXX Million Investment.
3. “Creates an Estimated XXX Jobs.
4. City of Goleta
5. Name of the Architect/Engineer.
 - i. Architect: Anil Verma Associates, Inc.
 - ii. Mechanical / Electrical Engineer: Anil Verma Associates, Inc.
 - iii. Civil Engineer: RailPros, Inc. & MNS Engineers, Inc.
 - iv. Structural Engineer: SE Solutions, Inc.
 - v. Geotechnical Engineer: ENGEO, Inc.
6. Name of CONTRACTOR.

B. Project Sign:

1. CONTRACTOR shall furnish and install 1 Project Signs on the Project site at a location established by OAR. For graphical layout refer to Appendix A. OAR will provide the information to be posted on the sign. A draft of the proposed sign shall be submitted to OAR for review and approval before fabrication.
2. Sign shall be direct printed on an aluminum sheet 0.08 thick, adhered to a 3/4 inch thick exterior grade plywood. Electronic file of graphic shall have a minimum resolution of 150 dpi at two feet by four feet. Provide posts, bracing and perimeter framing with intermediate backing not to exceed two feet on center. Size: eight feet wide by four feet high. Size of building rendering shall be approximately six feet wide by three feet high.



C. Banners:

1. CONTRACTOR shall furnish and install Two (2) Banners on the Project site at a location established by OAR. For graphical layout refer to Appendix A. OAR will provide the information to be posted on the sign. A draft of the proposed sign shall be submitted to OAR for review and approval before fabrication.
2. Products of the following manufacturers form the basis for design and quality intended: 3M, MACtac North America, or equal, and shall meet the following requirements:
 - a. Flame retardant, heavy duty durable vinyl material, super smooth, minimum 16 ounces per layer.
 - b. Banners shall be cut with accurate angles and straight edges. Edges of banner shall be heat welded on four sides without causing fabric separation or otherwise damaging the work.
 - c. Banners shall have on both sides a clear, permanent, anti-graffiti coating that shall be durable and last a minimum of two years. Cleaning or removal of graffiti shall not cause damage to the anti-graffiti coating or image, or cause it to flake, yellow, bubble, peel or fade.
 - d. Ink used in the printing process shall be of the highest quality OEM inks and have integral UV protective components.
 - e. Banners shall be provided with ½ inch diameter grommets along the top and the bottom edges, spaced not more than 30 inches on center. Grommets shall be 4 inches, minimum, from the edges of the banner. Tie wire to fence / barricade.

D. No other signs shall be displayed without approval of OAR. At CONTRACTOR'S expense and without limitation remove and/or relocate Project signage and related facilities as rapidly as required in order to provide for progress of the Work.

E. CONTRACTOR shall remove Project Identification Signage at Substantial Completion of the Work.

1.05 TEMPORARY UTILITIES

A. CONTRACTOR shall coordinate with the appropriate utility company to install temporary services. Where the utility company provides only partial service, CONTRACTOR shall provide and install the remainder with matching compatible materials and equipment.

B. CONTRACTOR shall furnish, install and pay for all necessary permits, inspections, move ins/out, temporary lines, connections and fees, extensions and distribution, metering



devices and use charges, deliveries/pickups, rentals, storage, transportation, taxes, labor, insurance, bonds, material, equipment and all other miscellaneous items for the temporary utility systems. CONTRACTOR shall pay to utility companies for the consumption of the following temporary utility services:

1. Temporary Water service.
 2. Temporary Electrical service.
 3. Temporary Gas service.
 4. Temporary Telephone and Data.
- C. Maintain, extend and/or relocate temporary utility systems as rapidly as required in order to provide for progress of the Work.
1. Water distribution piping and outlet devices shall be of the size and required flow rates in order to provide service to all areas of the Project site.
 2. Furnish, install, maintain, extend and distribute temporary electric area distribution boxes, so located that individual trades can obtain adequate power and artificial lighting, at all points required for the Work, for inspection and for safety.
 3. Provide temporary phone, data service and distribution to Project site temporary offices.
- D. Upon Substantial Completion of the Work, remove temporary systems, devices and appurtenances.

1.06 TEMPORARY OFFICES

- A. CONTRACTOR shall provide Project Site temporary office facilities for his own use, and in addition shall provide and maintain a minimum of one construction trailer on the Project site for use by OWNER for the duration of the Work. Construction trailer shall be accessible by OWNER and/or INSPECTOR on a 7 day a week 24-hour basis. CONTRACTOR shall provide the necessary materials and labor to provide the trailer with access for disabled persons on request by the OAR. Trailer shall include, at a minimum, the following:
1. Conference room with a table and adequate seating for twelve.
 2. One bathroom.
 3. An open work area with devising partitions as required by OWNER.
 4. Two enclosed, separate offices with windows and lockable doors.



- B. Trailer shall be furnished with two exterior entrance doors with one located in a separate office. Each door shall be furnished with ‘Smart Key’ technology on both the dead bolt and cylinder lock. Provide six keys for each locking device. Exterior doors and windows shall be provided with exterior mounted burglar bars. Windows shall be provided with operable window shades. Security of trailer and contents is a continuous obligation of CONTRACTOR and shall be equipped with local sounding security system.
- C. Trailer shall have ample headroom, 8-foot minimum, and shall be lighted, heated, ventilated, and air-conditioned. Provide an electrically chilled bottled water fountain of 5-gallon capacity. Purified water shall be supplied in 5-gallon containers, delivered weekly, with four spares on hand after each re-supply visit. As an option, CONTRACTOR may maintain a minimum of two 24 500ml bottles cases of purified water in owner trailer throughout the duration of the project.
- D. The separate offices shall each be approximately 120 square feet in size and shall be furnished with a minimum of four 120 volt single phase convenience outlets with one 4’ long multi-outlet power strip (such as Legrand Model #PM48C) at each outlet location as well as one telephone jack and one data/LAN outlet. The conference room shall be approximately 200 square feet in size and shall be furnished with a minimum of eight 120 Volt single phase convenience outlets with one telephone jack and one data/LAN outlet.
- E. CONTRACTOR shall coordinate floor plan and location of electrical, telephone, data outlets with OAR prior to ordering and delivering the trailer.
- F. At CONTRACTOR’S expense and without limitation remove and/or relocate temporary office(s) and related facilities as rapidly as required in order to provide for progress of the Work.
- G. CONTRACTOR shall remove waste bin trash from OAR’S trailer, vacuum OAR’S trailer floors and/or mop OAR’S trailer floors once per week. Provide trailer with bathroom paper goods, soap, broom, mop and doormats.
- H. Trailer shall remain property of CONTRACTOR. CONTRACTOR shall remove such property upon Substantial Completion of Work or as otherwise determined in writing by OAR.

1.07 FURNISHINGS

- A. CONTRACTOR shall provide furnishings in the following quantities, shall set in rooms and shall position as directed by OAR upon delivery:
 - 1. **Two (2)** rolling mid-back task chairs, with arms, Allseating Inertia Mesh Back Basic Synchro Tilt 77089-T2-FM-NSBL-LH-BKN-OG17 Gray Mesh, Gray Matters Enviroleather, warranty 24/7 lifetime, or equal, shall be provided new and shall remain as OWNER’S property.



2. **Ten (10)** padded meeting chairs, Allseating 77054-NA-GM-FM-NGRY-FV-ARIVR, Gray Matters Enviroleather, warranty 24/7 lifetime, or equal shall be provided new and shall remain as OWNER's property.
 3. **Two (2)** desks, 30 by 66 by 30 inches: Haworth Adaptables WURA-3066-LJSC H-AE Graphite worksurface, Haworth Reside Adjustable Hoop Leg ZKH2-3000-PNFD TR-J Graphite (2 per desk), Haworth X Series Pedestal JPMH-24-SJ B/B/F TR-J Graphite (2 per desk), lifetime warranty, or equal, shall be provided new and shall remain as OWNER's property.
 4. **Two (2)** metal bookcases, three shelf, 41 by 34 by 12 inches; HON Brigade or equal (Similar to Staples Cat.# 793638; Item: 1598509/ Model: HS42ABCL).
 5. **Two (2)** resin folding tables, 29 by 30 by 72 National Public Seating BT3072, 10 year warranty, or equal, shall be provided new and shall remain as OWNER's property.
 6. **Two (2)** four drawer, legal size lateral filing cabinet. HON 500 series or equal. (Similar to Staples Item: 342892/Model: HON584L).
 7. **Two (2)** four drawer, legal size lateral filing cabinet. HON 320 series or equal. (Similar to Staples Item: 904583/Model: HH324CPP).
 8. **Two (2)** five (5) shelf storage/supply cabinet of approximately 78-inch high by 36-inch wide by 24-inch deep, furnished with locking doors, Sandusky or equal. (Similar to Staples Cat. # 880049/Model: SA4R362478-07).
 9. Provide and install one **(1)** "Plan-Hold" wall-mounted 42-inch wide plan racks with 36 individual plan holders each.
 10. Provide and install **one (1)** large white board in one conference room, 48 by 72 inches, Quartet melamine dry-erase board or equal. (Similar to Staples Cat. # 789834/Model: S538).
 11. Provide and install **one (1)** combination tack/white boards, 36 by 48 inches, one in each office, Quartet or equal. (Similar to Staples Cat. # 518886/Model: S554).
- B. Unless otherwise noted in this Section, temporary furniture shall remain property of CONTRACTOR. CONTRACTOR shall remove such property upon Substantial Completion of Work or as otherwise determined in writing by OAR.

1.08 TELEPHONE & DATA AND TRANSMISSION LINES

- A. Provide LAN and phone connectivity to all equipment specified below from the point of connection (POC) to equipment, including, but not limited to all cabling, jacks, patch



panel, and patch cables as required to connect all of the equipment listed in this section to the LAN. Cabling shall be CAT 6 or better.

- B. Provide **two (2)** separate phone lines, one dedicated fax line and **three (3)** phone instruments each with speakerphone, intercom, conference call, flash, redial, call hold and voice mail. Each phone instruments shall have a 4-line or more capacity/selectivity. Provide supporting terminal blocks and any required switch, router, power supplies, and amplifiers.
- C. Provide business class Broadband data service. Broadband data service is defined as a minimum of 200 Mbps download.
- D. Provide, install, and maintain the following specified equipment:
 - 1. Cisco ISR 4331 capable of providing wireless Internet access. Smartnet will be provided for the entirety of the project to cover the networking equipment.
 - 2. Cisco Small Business unmanaged switch with enough capacity to provide a wired Ethernet connection to each device in the office capable of using one.
- E. Provide, install, configure and maintain **five (5)** laptop docking station.
- F. Printer/Copier/Scanner/Fax: Provide, install, configure and maintain for network connectivity one HP LaserJet MFP M880z+ (or latest HP equivalent model at time of bid) with the following features and accessories:
 - 1. B/W and Color.
 - 2. Speed:
 - a. Copy: 46 ppm.
 - b. Scan: 70 ppm.
 - c. Print: 46 ppm.
 - 3. Network capable.
 - 4. Finisher with collation and one position stapling (minimum A2W80A HP LaserJet Stapler/Stacker).
 - 5. Three paper trays integral with the equipment including 8 ½ by 11, 8 ½ by 14 and 11 by 17.
 - 6. Additional 3500 sheet paper feed pedestal or drawer.
 - 7. 600 by 600 dpi.



8. Zoom, Reduction and enlargement from 25 percent to 400 percent.
 9. Embedded Print Controller with minimum 166 Mhz processor and 10/100 BaseT Network Interface Card.
 10. 1Fax specifications: See standard for MFP model.
 11. Maintenance: CONTRACTOR shall repair and service machine as necessary. Repair calls shall be responded to within 24 hours of placement.
 12. Supplies: CONTRACTOR shall provide THE FOLLOWING:
 - a. All toner supplies and consumables, including enough supplies to maintain two spares of each color toner.
 - b. All staples and other printer-related consumables, including enough supplies to maintain one spare staple cartridge.
- G. CONTRACTOR shall be responsible for maintaining all transmission lines, equipment and related devices. If equipment and/or transmission equipment becomes inoperable and downtime exceeds two days, CONTRACTOR shall replace and/or provide equivalent interim equipment.
- H. CONTRACTOR shall employ an experienced and qualified MCSE certified Network Administrator, who shall be responsible to set up and service the LAN equipment and appurtenances provided in OWNER trailer, so as to maintain the equipment in continuous operation. Service response shall be within one day of incident.
- I. Electronic/office equipment shall be new at the commencement of the project.

1.09 TEMPORARY STORAGE UNITS

- A. CONTRACTOR shall provide secure and waterproof storage units for the temporary storage of furniture, equipment and other items requiring protection.
- B. Walls, roof and doors shall be a minimum of 16-gauge steel with floors of 1 inch tongue and groove hardwood or $\frac{3}{4}$ inch minimum exterior type plywood. The undercarriage shall be designed to accommodate forklift blades 42-inch to 60-inch long. There shall be doublewide swing out lockable doors at one end equipped with waterproof gaskets.
- C. CONTRACTOR shall be responsible for delivery charges and will install the storage unit in an appropriate area.
- D. CONTRACTOR shall remove the storage unit from the Project site when the storage unit is no longer required for the Work or upon Substantial Completion of the Work.



- E. CONTRACTOR shall at their expense and without limitation remove and/ or relocate storage units as rapidly as required in order to provide for progress of the Work.

1.10 TEMPORARY SANITARY FACILITIES

- A. CONTRACTOR shall provide portable chemical toilet facilities. Quantity of portable chemical toilet facilities shall be based on total number of workers and shall be in accordance with CAL/OSHA standards.
- B. Portable chemical toilet facilities shall be maintained with adequate supplies and in a clean and sanitary condition and shall be removed from the Project site upon Substantial Completion of the Work. CONTRACTOR shall keep both OWNER chemical toilet facilities and OWNER trailer restroom clean and operational at all times.
- C. At CONTRACTOR'S expense and without limitation remove and/or relocate portable chemical toilet facilities as rapidly as required in order to provide for progress of the Work.
- D. CONTRACTOR will contain their breaks and lunch periods to the areas designated by OAR or any public area outside the Project site. CONTRACTOR shall provide a suitable container within the break/lunch area for the placement of trash. Areas used for break/lunch must be maintained clean and orderly. Once finish flooring has been installed in a particular area, no food or beverages will be permitted in that area.

1.11 TEMPORARY SECURITY FENCE / BARRICADE

- A. CONTRACTOR shall install temporary Project site security barricade(s) indicated on Drawings or as required for safety and as specified herein. New or used material may be furnished. Security of Project site and contents is a continuous obligation of CONTRACTOR.
- B. Unless otherwise indicated or specified, security fence shall be constructed of 8-foot high chain link fencing with an 8-foot high windscreen. Space posts not to exceed ten feet on centers. Posts shall be of following nominal pipe dimensions: terminal, corner, and gatepost 2 ½-inch, line posts 2-inch. Chain link fence shall be not less than #13 gauge, 2-inch mesh, and in one width. Posts, fence and accessories shall be galvanized and as follows:
 - 1. Shall be set in the earth a depth of 24-inch with soil firmly compacted around post, unless required otherwise in writing by OAR.
 - 2. Fence fabric shall be attached to posts with #14 gauge tie wire at 16 inches on center. A #6 gauge steel tension wire with turnbuckles shall be installed at top and bottom of barricade fencing. Wire tie fabric to tension wires at 18" centers.



3. Windscreen shall be attached to fence fabric and steel tension wires at 18-inch centers with a minimum of #14 gauge tie wire. Windscreen shall be maintained and all rips, tears, missing sections shall be corrected upon notification by OAR.
4. Chain link fencing shall be free from barbs, icicles or other projections resulting from galvanizing process. Fence having such defects will be replaced even if it has been installed.
5. Gates shall be fabricated of steel pipe with welded corners and bracing as required. Fence and fabric to be attached to frame at 12-inch centers. Provide all gate hardware of a strength and quality to perform satisfactorily until barricade is removed upon Substantial Completion of the Work. Each gate shall have a chain and padlock. Provide two gate keys to OAR. At Substantial Completion of the Work, remove barricade from Project site, backfill and compact fence footing holes. Existing surface paving that is cut into or removed shall be patched and sealed to match surrounding areas.
6. At CONTRACTOR'S expense and without limitation remove or relocate fencing, fabric and barricades or other security and protection facilities as rapidly as required in order to provide for progress of the Work.

1.12 OTHER TEMPORARY ENCLOSURES AND BARRICADES

- A. Provide lockable, temporary weather-tight enclosures at openings in exterior walls to create acceptable working conditions, to allow for temporary heating and for security.
- B. Provide protective barriers around trees, plants and other improvements designated to remain.
- C. Since the Work of this Project may be immediately adjacent to existing occupied structures, an Amtrak platform, and vehicular and pedestrian right of ways, CONTRACTOR shall, in his sole judgment and in accordance with applicable safety standards, provide temporary facilities, additional barricades, protection and care to protect existing structures, occupants, property, pedestrians and vehicular traffic. CONTRACTOR is responsible for any damage, which may occur to the property and occupants of the property of OWNER or adjacent private or public properties which in any way results from the acts or neglect of CONTRACTOR.
- D. CONTRACTOR shall be responsible for cleaning up all areas adjacent to the construction site which have been affected by the construction; and for restoring them to at least their original condition- including landscaping; planting of trees, and shrubs damaged by construction; and raking and disposal of debris such as roofing shingles, paper, nails, glass sheet metal, bricks, and waste concrete. Construction debris shall be removed and properly disposed of. Culverts and drainage ditches with sediment from the construction area shall be cleared routinely to maintain proper drainage and re-cleaned prior to completion of the contract.



- E. CONTRACTOR shall ensure sediment does not block storm drains. CONTRACTOR shall be responsible for cleaning storm drains blocked due to erosion or sediment from the work area.

1.13 TEMPORARY STORAGE YARDS

- A. CONTRACTOR shall fence and maintain storage yards in an orderly manner.
- B. Provide storage units for materials that cannot be stored outside.
- C. At CONTRACTOR'S expense and without limitation remove and/or relocate storage yards and units as rapidly as required in order to provide for progress of the Work.

1.14 TEMPORARY DE-WATERING FACILITIES AND DRAINAGE

- A. For temporary drainage and de-watering facilities and operations not directly associated with construction activities included under individual sections, comply with de-watering requirements of applicable Division 01 sections. CONTRACTOR shall maintain the Work, Project site and related areas free of water.
- B. For temporary drainage and de-watering facilities and operations directly associated with new buildings, additions or other construction activities, comply with Divisions 01 and 33 Sections. CONTRACTOR shall be responsible for, but not limited to, de-watering of excavations, trenches and below grade areas of buildings, structures, the Project site and related areas.

1.15 TEMPORARY PROTECTION FACILITIES INSTALLATION

- A. CONTRACTOR shall not change over from using temporary facilities and controls to permanent facilities until Substantial Completion, except as permitted by OAR.
- B. Until permanent fire protection needs are supplied and approved by authorities having jurisdiction, CONTRACTOR shall provide, install and maintain temporary fire protection facilities of the types needed in order to adequately protect against fire loss. CONTRACTOR shall adequately supervise welding operations, combustion type temporary heating and similar sources of fire ignition.
- C. CONTRACTOR shall provide, install and maintain substantial temporary enclosures of partially completed areas of construction. Provide locking entrances to prevent unauthorized entrance, vandalism, theft and similar violations of security. Where materials, tools and equipment are stored within the Work area, CONTRACTOR shall provide secure lock up to protect against vandalism, theft and similar violations of security. OWNER accepts no financial responsibility for loss, damage, vandalism or theft.



- D. CONTRACTOR operations shall not block, hinder, impede or otherwise inhibit the use of required exits and/or emergency exits to the public way, except as approved by OAR. CONTRACTOR shall maintain unobstructed access to fire extinguishers, fire hydrants, temporary fire protection facilities, stairways and other access routes for firefighting equipment and/or personnel.
- E. With approval of OAR and at the earliest feasible date in each area of the Work, complete installation of the permanent fire protection facilities including connected services and place into operation and use. Instruct OWNER personnel in use of permanent fire protection facilities.
- F. In the event of an emergency drill or an actual emergency, designated by the sounding of the fire alarm and/or other sounding device, all construction activities must cease. CONTRACTOR shall evacuate the Work area and remain outside the Work area until permitted to return. No Work shall be conducted during the evacuation of a building or during an emergency.

1.16 TEMPORARY SECURITY AND SAFETY MEASURES

- A. CONTRACTOR shall employ and maintain sufficient security and safety measures to effectively prevent vandalism, vagrancy, theft, arson, and all other such negative impacts to the Work. Any impacts to the progress of the Work of CONTRACTOR, OWNER, or OWNER'S forces, due to loss from inadequate security, will be the responsibility of CONTRACTOR.
- B. Until Substantial Completion of the Work, CONTRACTOR shall employ appropriate means to remove all graffiti from buildings, equipment, fences and all other temporary and/or permanent improvements on the Project site within twenty-four (24) hours from the date of report or forty-eight (48) hours of each occurrence.

1.17 TEMPORARY ACCESS AND STAGING AREAS

- A. Due to the limited amount of on and off Project site space for the parking of visitor's vehicles there will be no parking of CONTRACTOR vehicles in areas designated for Amtrak Parking use only. CONTRACTOR shall provide legal access to and maintain CONTRACTOR designated areas for the legal parking, loading, off-loading and delivery of all vehicles associated with the Work. CONTRACTOR shall be solely responsible for providing and maintaining these requirements whether on or off the Project site. CONTRACTOR shall provide and maintain ample on-site parking spaces designated for the exclusive use of OWNER. CONTRACTOR shall erect signs as required by OWNER each of these spaces and prevent all unauthorized vehicles from parking in the OWNER-reserved spaces.
- B. Temporary access roads are to be installed and maintained by CONTRACTOR to all areas of the Project site.



- C. CONTRACTOR shall maintain roads and walkways in a clean condition including removal of debris and/or other deleterious material on a daily basis.

1.18 DIRECTIONAL SIGNAGE AND ADVERTISEMENT POSTING

- A. CONTRACTOR shall provide and install signage to provide directional, identification, and contact information to construction personnel and visitors as follows and as reviewed by OAR.

1. For construction traffic control/flow at entrances/exits, and as designated by OAR.
2. To direct visitors.
3. For construction parking.
4. To direct deliveries.
5. For Warning Signs as required.
6. In accordance with CAL/OSHA standards as necessary.
7. For trailer identification and Project site address.
8. For “No Smoking” safe work site at designated locations.
9. Emergency contact information and phone number of CONTRACTOR.
10. Emergency contact information and phone number of local police, fire, and emergency personnel.
11. For Labor Compliance Program (LCP) as required under the General Conditions (Prevailing wage rates and Notice of LCP)
12. Employee benefits payments paid to trust funds are required under the General Conditions.

- B. OWNER has established a program authorizing vendors to post advertisements and billboards along the perimeter of project site. CONTRACTOR shall provide access and shall allow advertising signage to be placed on top of temporary, perimeter, security barricade and/or fences.

1.19 TRENCHES

- A. Open trenches for installation of utility lines (water, gas, electrical and similar utilities) and open pits outside barricaded working areas shall be barricaded at all times in a legal manner determined by CONTRACTOR. Trenches shall be backfilled and patch-paved



within twenty-four (24) hours after approval of installation by authorities having jurisdiction or shall have "trench plates" installed. Required access to buildings shall be provided and maintained. CONTRACTOR shall comply with all applicable statutes, codes and regulations regarding trenching and trenching operations. Open trenches deeper than 3'-6", and not located within a public street access, shall be enclosed within an 8'-0" high chain-link fence.

1.20 DUST CONTROL

- A. CONTRACTOR is responsible for dust control on and off the Project site. When Work operations produce dust the Project site and/or streets shall be sprinkled with water to minimize the generation of dust. CONTRACTOR shall clean all soils and debris from construction vehicles and cover both earth and debris loads prior to leaving the Project site. CONTRACTOR shall, on a daily basis, clean all streets and/or public improvements within the right of way of any and all debris, dirt, mud and/or other materials attributable to operations of CONTRACTOR.

1.21 WASH OUT

- A. CONTRACTOR shall provide and maintain a minimum of four (4) wash out boxes of sufficient size and strength to provide for concrete mixer wash out. CONTRACTOR shall locate and relocate both the wash out boxes and wash out areas in order to accommodate the progression of the Work. The wash out area shall be located as to minimize the amount of potential run off onto adjacent private and/or public property. CONTRACTOR shall legally dispose of the contents of the wash out boxes and area on an as needed basis or as required by OAR.

1.22 WASTE DISPOSAL

- A. CONTRACTOR shall provide and maintain trash bins on the Project site. Trash bins shall be serviced on an as needed basis and CONTRACTOR is responsible for the transportation of and the legal disposal of all contents.

1.23 ADVERSE WEATHER CONDITIONS

- A. Should warnings of adverse weather conditions such as heavy rain and/or high winds be forecasted, CONTRACTOR shall provide every practical precaution to prevent damage to the Work, Project site and adjacent property. CONTRACTOR precautions shall include, but not be limited to, enclosing all openings, removing and/or securing loose materials, tools, equipment and scaffolding.
- B. CONTRACTOR shall provide and maintain drainage away from buildings and structures.
- C. CONTRACTOR shall implement all required storm water mitigation measures as required under related Division 01 Sections.



1.24 DAILY AND MONTHLY REPORTS

- A. CONTRACTOR shall provide and maintain in the Project site office of CONTRACTOR, a daily sign in sheet for use by all employees of CONTRACTOR and all Subcontractors at whatever tier. At the beginning of each workday, the foreman, project manager, superintendent of CONTRACTOR and/or Subcontractors shall visit the site office of CONTRACTOR and shall enter onto the daily sign in sheet: all employee names; trade classification; and represented company. The completed sign in sheet shall serve as the basis of and shall be submitted with the daily construction report as set forth in Paragraph B below.
- B. By the end of each workday, CONTRACTOR shall submit to OAR and INSPECTOR a daily construction report denoting the daily manpower counts and a brief description/location of the workday activities. Manpower shall be broken down by trade classification such as foreman, journeyman or apprentice. The report shall also note the date, day of the week, weather conditions, deliveries, equipment on the Project site whether active and/or idle, visitors, inspections, accidents and unusual events, meetings, stoppages, losses, delays, shortages, strikes, orders and requests of governing agencies, Construction Directive and/or Change Orders received and implemented, services disconnected and/or connected, equipment start up or tests and partial use and/or occupancies. CONTRACTOR shall also include on the daily construction report the above information for all Subcontractors at whatever tier.
- C. CONTRACTOR shall submit on a monthly basis the forms found in Sections 01 3229 and 01 7416 certifying CEQA Mitigations and Storm Water Pollution Prevention (SWPP) compliances.

1.25 FIELD OFFICE SUPPLIES

- A. CONTRACTOR shall provide the initial supply of field office supplies to OAR in the quantities listed as set forth below in Table A. If specified in Section 01 2100 – Allowances, CONTRACTOR shall provide additional supplies as required by OAR. CONTRACTOR shall not deduct the costs of the Initial Field Office Supplies (as shown in Table A) from the Allowance for the monthly replenishment of OWNER field office supplies listed in Section 01 2100 – Allowances. CONTRACTOR shall deliver all of the initial field office supplies to OWNER Field Offices within fourteen days from the date established in the Notice to Proceed.
- B. CONTRACTOR may utilize different suppliers as the specified information is only to establish the required quantities and minimum levels of quality.
- C. Replenishment of Field Office Supplies: If an Allowance is identified in Section 01 2100 – Allowances for the periodic replenishment of OWNER field office supplies. OWNER shall submit requests for replenishment of field office supplies to CONTRACTOR from those listed in Table ‘A’ below. CONTRACTOR shall provide a monthly accounting of



items being requested, cumulative cost of replenishment of Field Office supplies previously ordered, and balance of allowance remaining. Upon Substantial Completion of the Work, CONTRACTOR shall file a Change Order Proposal crediting OWNER for any remaining balance or unspent portion of the Allowance. This Allowance specifically excludes the initial supplies listed in Table ‘A’ below and is to be used exclusively for the monthly replenishment of OWNER field office supplies. Supplies are to be delivered to OWNER’S trailer within twenty-four hours of OWNER’S request.

- D. Postage and Delivery Costs: CONTRACTOR shall provide postage and delivery services for OWNER generated materials in quantities and/or frequencies as requested by OWNER. The cost for these services shall be deducted from the Allowance identified in Section 01 2100 – Allowances for the periodic replenishment of OWNER field office supplies. This allowance is for the OWNER’S use only. Postage and delivery costs for CONTRACTOR generated materials are the responsibility of the CONTRACTOR and shall not be charged to this allowance, regardless of whether the postage and/or delivery of CONTRACTOR generated materials resulted from a request and/or direction from OWNER.
- E. Other expendable field office support items specified elsewhere, including, but not limited to, furnishing toner cartridges, equipment maintenance, and bottled water, are to be supplied and paid for by CONTRACTOR. These costs are not to be deducted from the Allowance for the periodic replenishment of OWNER field office supplies identified in Section 01 2100.

Table A

ITEM	DESCRIPTION	UNIT	QUANTITY	SUPPLIER/ITEM NUMBER
Three Ring Binders – 3-inch	N/A	Each	{ SPECIFY }	Staples / 823526-54
Three Ring Binders – 2-inch	N/A	Each	{ SPECIFY }	Staples / 816199-54
Three Hole Punch	N/A	Each	{ SPECIFY }	Staples / 893844
Two Hole Punch	N/A	Each	{ SPECIFY }	Staples / 506261-54
File Organizer	N/A	Each	{ SPECIFY }	Staples / 120162-54
Calculator	Canon WS-1400H	Each	{ SPECIFY }	Staples / 342763
Flash Drive	2 GB	2	{ SPECIFY }	
Wastebasket	N/A	Each	{ SPECIFY }	Staples / 125039-54
Cordless Phone with Answering Machine	AT&T Dect 6.0	Each	1	Staples / 1148831
Surge Suppressors	N/A	Each	{ SPECIFY }	Staples / IM1RA1696
Flashlight	N/A	Each	{ SPECIFY }	Staples / 222397
Batteries	N/A	4/Lot	{ SPECIFY }	Staples / 318956-54
Clipboard	N/A	3/Lot	{ SPECIFY }	Staples / 450422-54
8-inch Cast Iron Shears	N/A	Each	{ SPECIFY }	Staples / 421040-54
First Aid Kit	N/A	Each	1	Staples / 503979-54
Journal	N/A	Each	{ SPECIFY }	Staples / 217695-54
Pens (blue, green and red)	N/A	12/Lot	{ SPECIFY }	Staples / 441884-64
Pencils	N/A	48/Lot	{ SPECIFY }	Staples / 711382-54
Pencil Sharpener	1900	1	{ SPECIFY }	Staples / 330250-54
Mouse Pad	N/A	Each	{ SPECIFY }	Staples / 382955-64
Date Received Stamp	N/A	Each	1	Staples / 920274-54
Colored Pencils	N/A	12/Lot	{ SPECIFY }	Staples / 317297-54



Markers	N/A	12/Lot	{ SPECIFY }	Staples / 932675
Telephone Message Book	N/A	Each	{ SPECIFY }	Staples / 194506
Wall Calendar	PM233-28	Each	{ SPECIFY }	Staples / 527861-54
Steno Pad	N/A	12/Lot	{ SPECIFY }	Staples / 163485-64
Legal Pad	N/A	12/Lot	{ SPECIFY }	Staples / 163865-64
Post Its	N/A	12/Lot	{ SPECIFY }	Staples / 130005-64
File Folders – 8-1/2 by 11	N/A	50/Lot	{ SPECIFY }	Staples / 831099-54
File Folders – 8-1/2 by 14	N/A	50/Lot	{ SPECIFY }	Staples / 831057-54
Tape / Dispenser	N/A	Each	{ SPECIFY }	Staples / 211540-54
Highlighters	N/A	12/Lot	{ SPECIFY }	Staples / 167031
Rubber Bands	N/A	Each	{ SPECIFY }	Staples / 808634
Push Pins	N/A	Each	{ SPECIFY }	Staples / 480118-54
Dry Erase Board	S537	Each	{ SPECIFY }	Staples / 518928-54
Binder Clip – Medium	N/A	24/Lot	{ SPECIFY }	Staples / 831602-54
Binder Clip - Large	N/A	12/Lot	{ SPECIFY }	Staples / 831610-54
Stapler	818	Each	{ SPECIFY }	Staples / 504308
3 Pocket Wall File	N/A	Each	{ SPECIFY }	Staples / 730523-54
Heavy Duty Stapler	415	Each	1	Staples / 386312-54
Heavy Duty Staples	SW1-35312	Each	1	Staples / 504191-54
Hanging File Folder	8-1/2 x 11	25/Lot	{ SPECIFY }	Staples / 116806-54
Hanging File Folder	8-1/2x14	25/Lot	{ SPECIFY }	Staples / 163352-54
File Folder Labels	5266	750/Lot	{ SPECIFY }	Staples / 287292-54
Fax Notes	N/A	12/Lot	{ SPECIFY }	Staples / 210625-64
Paper Clips	N/A	Each	{ SPECIFY }	Staples / 480108-54
Paper Clips	N/A	Each	{ SPECIFY }	Staples / 480109-54
Poster Kit - State	CA	Each	1	Staples / 1183148
Poster Kit - Federal	US	Each	1	Staples / 935983-54
Broom	N/A	Each	1	Staples / 256600
Fire Extinguisher	First Alert	Each	{ SPECIFY }	Staples / 238774-54
Copy Paper	8-1/2 x 11	5000/Case	{ SPECIFY }	Staples / 122374-69
Copy Paper	8-1/2 x 14	500/Ream	{ SPECIFY }	Staples / 122598-69
Copy Paper	11 x 17	500/Ream	{ SPECIFY }	Staples / 238105-69
Hardhats	White	Each	{ SPECIFY }	Fiber Metal Model E-2 Ratchet knob full range size adjustment
Safety Glasses	Clear and/or Tinted	Each	{ SPECIFY }	Crews Storm Series
Safety Vests, Zipper Front	Hi Vis Lime Yellow	Each	{ SPECIFY }	Aramak Wearguard Item DEF-1085

PART 2 – PRODUCTS – Not Used

PART 3 – EXECUTION – Not Used

END OF SECTION – 01 50 00



SECTION 01 55 26

TRAFFIC CONTROL AND ACCESS

PART 1 – GENERAL

1.01 GENERAL

- A. The Contractor shall provide traffic control and access in accordance with these Specifications, Caltrans Standard Specifications and Plans, and the standards contained in the “Work Area Traffic Control Handbook” (WATCH) published by Building News, Inc. The Contractor shall take all necessary precautions for the protection of the Work and the safety of the public. All barricades and obstructions shall be illuminated at night, and all lights shall be kept burning from sunset until sunrise. The Contractor shall prepare and submit Traffic Control plans and comply with special safety regulations relating to traffic control as may be required by the County of Santa Barbara or other public authorities within their respective jurisdiction.

PART 2 – PRODUCTS [NOT USED]

PART 3 – EXECUTION

3.01 EQUIPMENT TRAVEL ROUTE

- A. The Contractor shall make its own investigation of the condition of available access routes to and from the work site. If suitable access is not available, it shall be the Contractor’s responsibility to construct and maintain any access or haul roads required for its construction operations. The travel route for the Contractor’s equipment shall follow the safest route possible and minimize inconvenience to motorists and pedestrians.

3.02 TEMPORARY STREET USE

- A. Nothing herein shall be construed to entitle the Contractor to the exclusive use of any public street, alley, way, or parking area during the performance of the Work hereunder. The Contractor shall conduct its operations as not to interfere unnecessarily with the authorized work of the City, utility companies, or other agencies in such streets, alleys, ways, or parking areas.
- B. No street shall be closed to the public without first obtaining the permission of the County of Santa Barbara, the City of Goleta, and other proper governmental authority, where applicable. Where excavation is being performed in primary streets or highways, at least one lane of traffic shall be kept open in each direction at all times unless otherwise provided in the



Contract Documents or under the terms of the permits issued by the County of Santa Barbara, State, District or other public agencies, as required.

- C. Toe boards shall be provided to restrict movement of excavated material if required by the County, the City of Goleta, or other agency having jurisdiction over the affected street or highway. Temporary provisions shall be made by the Contractor to assure the use of sidewalks and the proper functioning of all gutters, drainage inlets, and other drainage facilities.

3.03 TRAFFIC CONTROL

- A. For the protection of traffic in public or private streets and ways, the Contractor shall provide, place, and maintain all necessary barricades, traffic cones, warning signs, lights, and other safety devices in accordance with the requirements of Caltrans "Manual of Traffic Controls - Warning Signs, Lights, and Devices for Use in Performance of Work Upon Highways."
- B. Provide, place and maintain all necessary barricades, traffic cones, warning signs, lights and other safety devices. Post and maintain adequate detour signs at all applicable approaches to forewarn and direct traffic. Use illuminated and/or reflective warning/construction signs at appropriate locations for the project. Use solar powered flashing arrow boards for each lane closure taper in addition to other delineation. Provide safe and effective work areas and warn, control, protect and expedite vehicular and pedestrian traffic through the construction project.
- C. Provide temporary traffic re-striping at the conclusion of any working day for any centerline or lane line which is obliterated by construction. Use temporary asphalt surfacing at the Contractor's own expense as required to maintain traffic in a safe and non-disruptive manner. Provide temporary delineation as required which includes sandblasting of conflicting markings, installation and removal of temporary centerlines or lane lines, detour signing, barricading, and replacement of traffic lines, and markings in their proper locations upon termination of the detour. Provide any temporary pavement marking. Provide for removal of existing markings and the later removal of temporary markings to restore the permanent markings.
- D. Through traffic shall be maintained in both directions during working hours. Reopen all traffic lanes for the traffic circulation at the end of each working day, and during non-working hours including holidays, Saturdays, and Sundays. Provide traffic re-striping and markings prior to opening street traffic.
- E. Where required, the Contractor shall furnish, install, and maintain in-place "No Parking – Tow Away" signs (even if streets have posted "No Parking" signs) which shall be posted at least two (2) working days prior to commencement of work. On the sign, Contractor shall print the hours, day(s) and date of closure in two-inch-high letters and numbers. The signs shall be spaced at a maximum of 50 feet from street intersection and/or from each adjacent sign.



- F. The Contractor shall be responsible for the project safety on a 24-hours basis each calendar day for the entire duration of the project.

3.04 ACCESS

- A. Wherever necessary or required for the convenience of the public or individual residents or business places at street or highway crossings, private driveways, or elsewhere, the Contractor shall provide suitable temporary bridges or steel plates over unfilled excavations, except in such cases as the Contractor shall secure the written consent of the individuals or authorities concerned to omit such temporary bridges or steel plates. Such written consent shall be delivered to the City of Goleta prior to beginning the excavation. All such bridges or steel plates shall be maintained in service until access is provided across the backfilled excavation.
- B. Temporary bridges or steel plates for street and highway crossings shall conform to the requirements of the County of Santa Barbara or authority having jurisdiction in each case. The Contractor shall adopt designs furnished by said authority for such bridges or steel plates, or shall submit designs to said authority for approval, as may be required.
- C. Maintain adjacent streets open for ingress and egress and for parking; Provide emergency access for fire trucks, police cars, and other emergency vehicles at all times. The Contractor shall notify each agency in writing at least three (3) working days prior to work, and submit a copy of notice to the City of Goleta. Fire hydrants on or adjacent to the work shall be kept accessible to fire-fighting equipment at all times.
- D. Construct temporary AC ramps to provide safe and drivable access to residents and businesses and safe pedestrian crossing paths at all times. Provide alternate crossing areas with appropriate signing and other devices where construction prohibits pedestrian and bicycle access. Provide safe and adequate pedestrian zones and public transportation stops, as well as reasonable pedestrian crossings of the work at frequent intervals. Notify local/regional transit agency of potential impact to bus routes and interference with bus stops. There may be a need for temporary bus stop relocations if required. Keep the areas through and adjacent to the construction site clear of any objects that may be hazardous to pedestrians.

3.05 WORKING HOURS

- A. Construction work operations shall be performed Monday through Friday except City observed holidays unless otherwise noted. The Contractor work hours shall be at City discretion Monday through Friday except that work within the street right-of-way that effects the flow of traffic shall only be allowed in accordance with the issued encroachment permit.

3.06 NOTIFICATION

- A. The Contractor shall provide notification in writing to affected residences, schools, churches, and businesses informing them of the pending project. A draft notification letter shall be submitted to the City of Goleta five working days in advance of required notification date for



verification and approval. The Contractor shall hand deliver copies of the approved notification letter to the affected residences, school, churches, and businesses at least 14 days prior to the scheduled construction on each block. The notification letter shall state the project name, scope of work, date and time of restricted travel on the affected streets, and the Contractor's and City's contact persons and phone numbers. Failure to meet the approved schedule requires that the Contractor immediately notify residents of the cancellation for that day's work and reschedule construction of the affected area at a later date. Notification of rescheduled work shall follow this same procedure.

3.07 TRAFFIC CONTROL PLANS

- A. Traffic control plans shall be provided by the Contractor and submitted to the County of Santa Barbara, Caltrans or other agencies having jurisdiction as may be required. Traffic control plans shall conform to the requirements of the County of Santa Barbara or Caltrans as applicable and shall include the location and wording of all signs, barricades, delineators, lights, warning devices, and temporary parking restrictions; separate plan for each stage of construction; and separate detour routing plan.

3.08 TEMPORARY STREET CLOSURE

- A. If closure of any street is required during construction, a formal application for a street closure shall be made to the County of Santa Barbara or other authority having jurisdiction at least 30 days prior to the required street closure to allow them to determine the necessary signing and detour requirements to be provided by the Contractor.

END OF SECTION – 01 55 26



SECTION 01 57 19 CEQA MITIGATIONS

PART 1 - GENERAL

- 1.01 SECTION INCLUDES
- A. Mitigation procedures to minimize environmental impact.
- 1.02 RELATED SECTIONS
- A. Section 01 81 19 – Indoor Air Quality Procedures.
 - B. Section 01 35 92 – Mitigation and Monitoring Procedures for Archaeological Findings.
 - C. Section 01 74 16 – Storm Water Pollution Prevention Plan.
 - D. Section 01 45 23 – Testing and Inspections
 - E. Section 01 50 00 - Construction Facilities and Temporary Controls.
 - F. Section 01 74 19 - Construction Demolition and Waste Management.
- 1.03 SUBMITTALS
- A. CONTRACTOR shall submit on a monthly basis the form “Certification of Compliance with CEQA Mitigations”, found in Section 01 3229, certifying compliance to CEQA mitigations.
- 1.04 CEQA MITIGATIONS
- A. Following installation of exterior lighting CONTRACTOR shall adjust light fixtures to reduce the lighting intensity from the new sources on adjacent residences to no more than two foot-candles, measured at the property line.
 - B. CONTRACTOR shall ensure that construction equipment is properly tuned and maintained in accordance with manufacturer’s specifications, to ensure that excessive emissions are not generated by unmaintained equipment.
 - C. CONTRACTOR shall comply with the following requirements:
 - 1. Maintain slow speeds with all vehicles.
 - 2. Load impacted soil directly into transportation trucks to minimize soil handling.
 - 3. Water/mist soil as it is being excavated and loaded onto the transportation trucks.
 - 4. Water/mist and/or apply surfactants to soil placed in transportation trucks prior to exiting the site.
 - 5. Minimize soil drop height into transportation trucks or stockpiles during dumping.



6. During transport, cover or enclose trucks transporting soils, increase freeboard requirements, and repair trucks exhibiting spillage due to leaks.
 7. Cover the bottom of the excavated area with polyethylene sheeting when work is not being performed.
 8. Place stockpiled soil on polyethylene sheeting and cover with similar material.
 9. Place stockpiled soil in areas shielded from prevailing winds.
- D. When using large, heavy or noisy construction equipment CONTRACTOR shall implement all feasible measures to reduce air emissions below the Air Quality Management District's regional and localized significance thresholds
1. Exhaust Emissions:
 - a. Schedule construction activities that affect traffic flow to off-peak hours (e.g. between 10:00 AM and 3:00 PM).
 - b. Consolidate truck deliveries and/or limit the number of haul trips per day.
 - c. Route construction trucks off congested streets.
 - d. Employ high pressure fuel injection systems or engine timing retardation.
 - e. Utilize ultra-low sulfur diesel fuel, containing 15 ppm sulfur or less (ULSD) in all diesel construction equipment.
 - f. Use construction equipment rated by the United States Environmental Protection Agency as having Tier 3 (model year 2006 or newer) or Tier 4 (model year 2008 or newer) emission limits for engines between 50 and 750 horsepower.
 - g. Restrict non-essential diesel engine idle time, to not more than five consecutive minutes.
 - h. Utilize electrical power rather than internal combustion engine power generators as soon as feasible during construction.
 - i. Utilize electric or alternatively fueled equipment, if feasible.
 - j. Utilize construction equipment with the minimum practical engine size.
 - k. Utilize low-emission on-road construction fleet vehicles.
 - l. Ensure construction equipment is properly serviced and maintained to the manufacturer's standards.
 2. Fugitive Dust:
 - a. Apply non-toxic soil stabilizers according to manufacturers' specification to all inactive construction areas (previously graded areas inactive for ten days or more).



- b. Replace ground cover in disturbed areas as quickly as possible.
 - c. Sweep streets at the end of the day if visible soil material is carried onto adjacent public paved roads (recommend water sweepers with reclaimed water).
 - d. Install wheel washers where vehicles enter and exit unpaved roads onto paved roads, or wash off trucks and any equipment leaving the site each trip.
 - e. Pave construction roads that have a traffic volume of more than 50 daily trips by construction equipment, and/or 150 daily trips for all vehicles.
 - f. Water the disturbed areas of the active construction site at least three times per day, except during periods of rainfall.
 - g. Enclose, cover, water twice daily, or apply non-toxic soil binders according to manufacturers' specifications to exposed piles (i.e., gravel, dirt, and sand) with a five percent or greater silt content.
 - h. Suspend all excavating and grading operations when wind speeds (as instantaneous gusts) exceed 25 miles per hour (mph).
 - i. Apply water at least three times daily, except during periods of rainfall, to all unpaved road surfaces.
 - j. Limit traffic speeds on unpaved road to 15 mph or less.
 - k. Prohibit high emission causing fugitive dust activities on days where violations of the ambient air quality standard have been forecast.
 - l. Tarp and/or maintain a minimum of 24 inches of freeboard on trucks hauling dirt, sand, soil, or other loose materials.
 - m. Limit the amount of daily soil and/or demolition debris loaded and hauled per day.
3. General Construction:
- a. Utilize ultra-low VOC or zero-VOC surface coatings.
 - b. Phase construction activities to minimize maximum daily emissions.
 - c. Configure construction parking to minimize traffic interference.
 - d. Provide temporary traffic control during construction activities to improve traffic flow (e.g., flag person).
 - e. Develop a trip reduction plan for construction employees.
 - f. Implement a shuttle service to and from retail services and food establishments during lunch hours.
 - g. Increase distance between emission sources to reduce near-field emission impacts.



- h. Require construction contractors to document compliance with the identified mitigation measures.
- E. CONTRACTOR shall consult and coordinate with the OAR prior to construction to schedule high noise or vibration producing activities to minimize disruption. Coordination shall continue on an as-needed basis throughout the construction phase of the project to reduce school and other noise sensitive land use disruptions.
- F. CONTRACTOR shall minimize blasting for all construction and demolition activities, where feasible. If demolition is necessary adjacent to residential uses or fragile structures, the OAR will require the CONTRACTOR to avoid using impact tools. Alternatives that shall be considered include mechanical methods using hydraulic crushers or deconstruction techniques.
- G. Specific noise reduction measures include, but are not limited to, those listed below.
 1. Source Controls:
 - a. Time Constraints: It is prohibited work during nighttime hours.
 - b. Scheduling: Perform noisy work during less sensitive time periods.
 - c. Equipment Restrictions: Restrict the type of equipment used.
 - d. Noise Restrictions: Specifying stringent noise limits.
 - e. Substitute Methods: Use quieter methods and/or equipment.
 - f. Exhaust Mufflers: Ensure equipment have quality mufflers installed.
 - g. Lubrication & Maintenance: Well-maintained equipment is quieter.
 - h. Reduced Power Operation: Use only necessary size and power.
 - i. Limit Equipment On-Site: Only have necessary equipment on-site.
 - j. Noise Compliance Monitoring: Technician on site shall ensure compliance.
 - k. Quieter Backup Alarms: Manually-adjustable or ambient sensitive types.
 2. Path Controls:
 - a. Noise Barriers: Semi-permanent or portable wooden or concrete barriers.
 - b. Noise Curtains: Flexible intervening curtain systems hung from supports.
 - c. Enclosures: Encase localized and stationary noise sources.
 - d. Increased Distance: Perform noisy activities farther away from receptors, including operation of portable equipment, storage and maintenance of equipment.
 3. Receptor Controls:
 - a. Community Participation – open dialog to involve affected residents



- b. Noise Complaint Process: CONTRACTOR shall log and respond to noise complaints. Advance notice of the start of construction shall be delivered to all noise sensitive receptors adjacent to the project area. The notice shall state specifically where and when construction activities will occur, and provide contact information for filing noise complaints with the CONTRACTOR and the OWNER. In the event of noise complaints, the OWNER will monitor noise from the construction activity to ensure that construction noise does not exceed limits specified in the noise ordinance.

- H. Construction Equipment for Use on Public Roadways: CONTRACTOR shall submit a construction worksite traffic control plan to City of Goleta Public Works for review prior to construction. The plan shall show the location of haul routes, hours of operation, protective devices, warning signs, and access to abutting properties OWNER encourages CONTRACTOR to limit construction-related trucks to off-peak commute periods. As required by Caltrans, applicable transportation related safety measures shall be implemented during construction.

PART 2 – PRODUCTS – Not Used

PART 3 – EXECUTION – Not Used

END OF SECTION – 01 5719



SECTION 01 60 00

PRODUCTS, MATERIALS, EQUIPMENT & SUBSTITUTIONS

PART 1 – GENERAL

1.01 DEFINITIONS

- A. The word "Products," as used in the Contract Documents, is defined to include purchased items for incorporation into the work, regardless of whether specifically purchased for the project or taken from Contractor's stock of previously purchased products. The word "Materials," is defined as products which must be substantially cut, shaped, worked, mixed, finished, refined, or otherwise fabricated, processed, installed, or applied to form work. The word "Equipment" is defined as products with operational parts, regardless of whether motorized or manually operated, and particularly including products with service connections (wiring, piping, and other like items). Definitions in this paragraph are not intended to negate the meaning of other terms used in the Contract Documents, including "specialties," "systems," "structure," "finishes," "accessories," "furnishings," "special construction," and similar terms, which are self-explanatory and have recognized meanings in the construction industry.
- B. Neither "Products" nor "Materials" nor "Equipment" includes machinery and equipment used for preparation, fabrication, conveying, and erection of the work.

1.02 QUALITY ASSURANCE

- A. **Source Limitations:** To the greatest extent possible for each unit of work, the Contractor shall provide products, materials, and equipment of a singular generic kind from a single source.
- B. **Compatibility of Options:** Where more than one choice is available as options for Contractor's selection of a product, material, or equipment, the Contractor shall select an option which is compatible with other products, materials, or equipment. Compatibility is a basic general requirement of product, material and equipment selections.

1.03 SUBSTITUTIONS

- A. The Contractor shall, to the greatest extent possible, provide the materials as specified in these Contract Documents. Where procurement of the material as specified is not possible or the Contractor would like to submit for consideration an alternative, the Contractor shall submit shop drawings in accordance with Section 013300 and shall clearly indicate the product being substituted.



1.04 PRODUCT DELIVERY AND STORAGE

- A. The Contractor shall deliver and store the products, materials and equipment in accordance with manufacturer's written recommendations and by methods and means which will prevent damage, deterioration, and loss including theft. Delivery schedules shall be controlled to minimize long-term storage of products at the Site and overcrowding of construction spaces. In particular, the Contractor shall ensure coordination to ensure minimum holding or storage times for flammable, hazardous, easily damaged, or sensitive materials to deterioration, theft, and other sources of loss.

1.05 TRANSPORTATION AND HANDLING

- A. Products shall be transported by methods to avoid damage and shall be delivered in undamaged condition in manufacturer's unopened containers and packaging.
- B. Products may be inspected prior to off-loading. Any materials found damaged shall be rejected and removed from the site.
- C. The Contractor shall provide equipment and personnel to handle products, materials, and equipment including those furnished by Goleta Water District, by methods to prevent soiling and damage.
- D. The Contractor shall provide additional protection during handling to prevent marring and otherwise damaging products, packaging, and surrounding surfaces.

1.06 STORAGE AND PROTECTION

- A. Products shall be stored in accordance with manufacturer's written instructions and with seals and labels intact and legible. Sensitive products shall be stored in weather-tight climate controlled enclosures and temperature.
- B. Loose granular materials shall be stored on solid flat surfaces in a well-drained area and shall be prevented from mixing with foreign matter.
- C. Storage shall be arranged in a manner to provide access for maintenance of stored items and for inspection.

1.07 MAINTENANCE OF PRODUCTS IN STORAGE

- A. The Contractor shall comply with manufacturer's product storage requirements and recommendations. The Contractor shall maintain a log of inspections and shall make the log available on request. The Contractor shall periodically inspect products to assure they are



undamaged and are maintained under required conditions. The Contractor shall maintain manufacturer-required environmental conditions continuously.

- B. The Contractor shall ensure that surfaces of products exposed to the elements are not adversely affected and that weathering of finishes does not occur.
- C. For mechanical and electrical equipment, the Contractor shall provide a copy of the manufacturer's service instructions with each item and the exterior of the package shall contain notice that instructions are included.
- D. Products shall be serviced on a regularly scheduled basis, and a log of services shall be maintained and submitted as a record document prior to final acceptance.

PART 2 – PRODUCTS [NOT USED]

PART 3 – EXECUTION [NOT USED]

END OF SECTION – 01 6000



SECTION 01 71 23

FIELD ENGINEERING

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

1. Layout of the work
2. Verification of work
 - a. OWNER reserves the right to verify any work that INSPECTOR deems necessary.
 - b. Other sections that require Surveyor to verify or measure installed work and related item. Surveyor shall perform such verifications or measurements at CONTRACTOR'S expense. CONTRACTOR shall furnish a certification, signed by both Surveyor and CONTRACTOR, to INSPECTOR.

B. Related Requirements:

1. Section 01 11 00 - Summary of Work.
2. Section 01 31 13 - Project Coordination.
3. Section 01 32 13 - Construction Schedule.
4. Section 01 33 00 - Submittal Procedures.
5. Section 01 77 00 - Contract Closeout.

1.02 SURVEY CONTROLS

- A. Vertical Control shall use same benchmark used in the preparation of topographic survey. When Work consists of both on-site and off-site and benchmarks differ, an equation shall be indicated on Drawings.
- B. Horizontal control for existing structures shall be the property line.

1.03 LAYOUT OF WORK



- A. All work related to staking shall be by a Land Surveyor, or Civil engineer, registered with the State of California to perform land surveying and employed by CONTRACTOR.
- B. Before commencement of Work, surveyor shall locate all reference points and benchmarks to be used for vertical and horizontal control.
- C. Surveyor shall lay out entire Work, set grades, lines, levels, control points, elevations, grids and positions.

1.04 RECORD DOCUMENTS

- A. Maintain complete and accurate log of all control and survey documentation as work progresses.
- B. Record, by coordinates, all utilities onsite with top of pipe elevations, at major grade and alignment changes, rim, grate or top of curb and flow line elevations of all drainage structures and sewer manholes.
- C. Indicate reference and control points on record drawings. The basis of elevation shall be one of the established benchmarks.
- D. Upon Substantial Completion, obtain and pay for reproducible plans. Deliver plans to OAR. Clearly indicate all differences between original drawings and completed work within specified tolerances.

1.05 SUBMITTALS

- A. Surveyor: Shall submit name, address and license number to OWNER, including any changes as they occur.
- B. Field notes: Upon request by OAR, submit copies of cut sheets, coordinate plots, data collector printouts, marked-up construction staking plans and other documentation as available to verify accuracy of field engineering work during and at completion of project. Submittals to OWNER must be signed and sealed by Surveyor and counter-signed by CONTRACTOR
- C. Statement of Compliance: CONTRACTOR shall submit a statement of certification signed and sealed by Surveyor, counter-signed by CONTRACTOR indicating compliance with grades and alignment of construction plans at rough grade, fine grade and top of rock stages. INSPECTOR shall approve survey submittals for each stage of construction prior to proceeding with work
- D. Upon Substantial Completion, CONTRACTOR shall obtain and pay for reproducible survey drawings (or “As Built”).



- E. Completed record drawings shall be signed and certified as correct and within specified tolerances by licensed surveyor. Originals and two sets of blueprints shall be submitted to OWNER.

PART 2-PRODUCTS – NOT USED

PART 3-EXECUTION

3.01 PREPARATION

- A. Pre-mark areas of excavation in accordance with the requirements of “Dig-Alert”. Request locators 2 days before commencing excavation.
- B. Before commencing Work, establish all horizontal and vertical reference points used in Contract Documents according to existing field conditions.
- C. Preserve established reference lines and benchmarks.
- D. Differentiate UPRR and city datum as applicable.
- E. Relocate bench marks that may interfere with Work.
- F. Reset and re-establish reference marks damaged or lost during construction.

3.02 SURVEY REQUIREMENTS GENERAL

- A. Establish a minimum of two permanent horizontal and vertical control points on Project site, remote from construction area, referenced to data established by control points.
- B. Indicate reference points, relative to benchmark elevation, on record drawings.
- C. Provide grade stakes and elevations to construct over excavation and re-compaction, rough and final grades, paved areas, curbs, gutters, sidewalks, building pads, landscaped areas, and other areas as required.
- D. Calculate and layout proposed finished elevations and intermediate controls as required to provide smooth transitions between spot elevations indicated on Drawings.
- E. Provide stakes and elevations for grading, fill, and topsoil placement.
- F. Provide adequate horizontal and vertical control to locate utility lines, including but not limited to, storm, sewers, water mains, gas, electric and signal and provide vertical control in proportion to the slope of the line as required for accurate construction. Dry utilities will be based upon adequate horizontal and vertical control layout. Prior to



trench closure, survey and record invert and flow line elevations. Survey and record top of curb and flow line elevations on finished concrete or asphaltic concrete (AC) surfaces at key locations such as beginning-of-curve (BC), end-of-curve (EC), grade breaks, corners or angle points in sufficient number to demonstrate the Work complies with the intent of the Contract Documents.

- G. Provide horizontal and vertical control for batter boards for drainage, utility, and other on-site structures as required.
- H. Furnish building corner offsets as required to adequately locate building pads. Provide cut and fill stakes within the building pad perimeter adequate to control both over excavation and re-compaction and the final sub-grade elevation of the building pad.
- I. Submit a certification signed by the surveyor confirming the elevations and locations of improvements are in conformance with the Contract Documents. The statement shall include survey notes for the finish floor and building pad, showing the actual measured elevations on the completed sub-grade, recorded to the nearest 0.01 of a foot. Building pad tolerance will be plus or minus 0.1 of a foot.
- J. Establish a minimum of two permanent horizontal and vertical control points on Project site, remote from building area, referenced to data established by survey control points.
- K. Mark boundaries for rights-of-way dedications and easements for utilities prior to making location of buildings and utilities.
- L. Layout all lines, elevations and measurements needed for construction or installation of buildings, grading, paving utilities according to the following:
 - 1. Identify site boundary, property lines.
 - 2. Provide working benchmarks.
 - 3. Set stakes for Bottom of Excavated Plane (B.E.P.).
 - 4. Set gridlines, radii, working points etcetera, for foundation.
 - 5. Set and verify building pad elevations.
 - 6. Set finish floor elevations.
 - 7. Stake location and elevations for exterior ramps and stairs.
 - 8. Set gridlines, radii, working points, etcetera, for all floors of multi-story buildings.



9. Set storm drain and sanitary sewer inverts and other utilities as needed at 5-foot off-set from building lines.
10. For new facilities, establish permanent onsite Benchmark with 2-inch diameter brass disk. Location of Benchmark to be determined by OWNER.

3.03 SURVEY REQUIREMENTS FOR GRADING

- A. Provide grade stakes and elevations as follows:
 1. Removal limits (cut lines).
 2. Rough grade staking: 60-foot maximum grid plus additional stakes at grade changes and pertinent locations. Flag all grade changes including ridges, flow lines and grade breaks.
 3. Fine grade for top of dirt: 30-foot maximum grid plus additional stakes at grade changes and pertinent locations. Flag all grade changes including ridges, flow lines and grade breaks.
 4. Verify fine grade for top of rock: 30-foot maximum grid plus additional stakes at grade changes and pertinent locations. Flag all grade changes including ridges, flow lines and grade breaks.
 5. Finish grade marks on all buildings, structures and at pertinent locations
 6. Finish grades and offsets for all concrete work, utilities, landscape areas, and structures.
 8. Offsite improvements: set grades and provide grade sheets as required by local authorities.
- B. Provide a minimum of two permanent horizontal and vertical control points onsite, remote from building area, referenced to data established by survey control points.

3.04 SURVEY REQUIREMENTS FOR UTILITIES

- A. Locate “wet” utility lines and provide vertical control proportionate to slope of line as required for accurate construction. “Dry” utilities shall have adequate horizontal and vertical control layout supplied by others.
- B. Prior to back-filling trench, survey and record invert and flow line elevations. Survey and record top of curb and flow line elevations on finished surfaces at key locations (such as Back of Curbs, grade breaks, corners or angle points) in sufficient number to demonstrate Work complies with intent of Contract Documents.



- C. Provide horizontal and vertical control for batter boards for drainage, utility, and other on-site structures as required.
 - 1. Set grades for vaults one inch higher than adjacent surrounding design grades, unless noted otherwise.
- D. Leave all trenches open until required inspection is completed.

3.05 SURVEY REQUIREMENTS FOR STRUCTURES

- A. Furnish building corner offsets as required to adequately locate building pads. Provide cut and fill stakes within building pad perimeter adequate to control both over excavation and re-compaction and final sub-grade elevation of building pad.
- B. Submit a certification signed by surveyor confirming elevations and locations of improvements are in conformance with Contract Documents. Statement shall include survey notes for finish floor and building pad, showing actual measured elevations on completed sub-grade, recorded to nearest 0.01 of a foot. Building pad tolerance will be plus or minus 0.1 of a foot.

END OF SECTION – 01 7123



SECTION 01 73 29

CUTTING AND PATCHING

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. This Section specifies procedural requirements for cutting and patching.

1.02 RELATED REQUIREMENTS

- A. Section 01 29 73 - Schedule of Values.
- B. Section 01 31 13 - Project Coordination.
- C. Section 01 31 19 - Project Meetings.
- D. Section 01 32 13 - Construction Schedule.
- E. Section 01 33 00 - Submittal Procedures.
- F. Section 01 71 23 - Field Engineering.
- G. Section 01 78 36 - Warranties.
- H. Section 01 45 25 - Testing, Adjusting, and Balancing of HVAC.

1.03 SUBMITTALS

- A. The word “cutting” as used in the Contract Documents includes, but is not limited to, cutting, drilling, chopping, and other similar operations and the word “patching” includes, but is not limited to, patching, rebuilding, reinforcing, repairing, refurbishing, restoring, replacing, or other similar operations.
- B. Cutting and Patching Proposal: CONTRACTOR shall submit a proposal describing procedures well in advance of the time cutting and patching will be performed if the Contract Documents requires approval of these procedures before proceeding. Include the following information, as applicable, in the proposal:
 - 1. Describe the extent of cutting and patching required. Denote how it will be performed and indicate why it cannot be avoided.



2. Describe anticipated results in terms of changes to existing construction. Include changes to structural elements and operating components as well as changes in the building's appearance or other significant visual elements.
3. List products to be used and firms or entities that will perform this Work.
4. Indicate dates when cutting and patching will be performed.
5. Utilities: List utilities that cutting and patching operations will disturb or affect. List utilities to be relocated and those that will be temporarily out-of-service. Indicate how long service will be disrupted.
6. Where cutting and patching involves adding reinforcement to structural elements, submit details and engineering calculations showing integration of reinforcement with the original structure.
7. Review by ARCHITECT prior to proceeding with cutting and patching does not waive ARCHITECT right to later require complete removal and replacement of defective Work.

1.04 QUALITY ASSURANCE

- A. Requirements for structural Work: Do not cut and patch structural elements in a manner that would change their load-carrying capacity or load-deflection ratio.
 1. Obtain approval from ARCHITECT of the cutting and patching proposal before cutting and patching the following structural elements:
 - a. Foundation construction.
 - b. Bearing and retaining walls.
 - c. Structural concrete.
 - d. Structural steel.
 - e. Structural decking.
 - f. Miscellaneous structural metals.
 - g. Equipment supports.
 - h. Piping, ductwork, vessels, and equipment.



- B. **Operational Limitations:** Do not cut and patch operating elements or related components in a manner that would result in reducing their capacity to perform as intended. Do not cut and patch operating elements or related components in a manner that would result in increased maintenance or decreased operational life or safety.
1. Obtain review of the cutting and patching proposal before cutting and patching the following operating elements or safety related systems:
 - a. Primary operational systems and equipment.
 - b. Air or smoke barriers.
 - c. Water, moisture, or vapor barriers.
 - d. Membranes and flashings.
 - e. Fire protection systems.
 - f. Control systems.
 - g. Communication and/or data systems.
 - h. Conveying systems.
 - i. Electrical wiring systems.
- C. **Visual Requirements:** Do not cut and patch construction exposed on the exterior or in occupied spaces in a manner that would, in the opinion of ARCHITECT, reduce the building's aesthetic qualities. Do not cut and patch construction in a manner that would result in visual evidence of cutting and patching. Remove and replace Work cut and patched in a visually unsatisfactory manner.
1. If possible, retain the original installer or fabricator to cut and patch the exposed Work listed below. If it is impossible to engage the original installer or fabricator, engage another recognized experienced and specialized firm.
 - a. Firestopping.
 - b. Acoustical ceilings.
 - c. Acoustical panels.
 - d. Finished wood flooring.
 - e. HVAC enclosures, cabinets, or covers.
 - f. Ceramic and quarry tile.



- g. Gypsum board.
- h. Masonry (exterior and interior where exposed).

1.05 WARRANTY

- A. Warranties: Replace, patch, and repair material and surfaces cut or damaged by methods and with materials in such a manner as not to void any warranties required or existing.

PART 2 - PRODUCTS (Not applicable)

PART 3 - EXECUTION

3.01 INSPECTION

- A. Examine surfaces to be cut and patched and conditions under which cutting and patching is to be performed before cutting. If unsafe or unsatisfactory conditions are encountered, take corrective action before proceeding.
 - 1. Before proceeding, meet at the Project site with parties involved in cutting and patching, including mechanical and electrical trades. Review areas of potential interference and conflict. Coordinate procedures and resolve potential conflicts before proceeding.

3.02 PREPARATION

- A. Protection: Protect existing improvements and Work during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of existing improvements or Work that might be exposed during cutting and patching operations.
- B. Avoid interference with use of adjoining areas or interruption of free passage to adjoining areas.
- C. Where the Work requires sandblasting of existing surfaces in order to receive new materials secured by cementitious, adhesive or chemical bond, completely remove existing finishes, stains, oil, grease, bitumen, mastic and adhesives or other substances deleterious to the new bonding or fastening of new Work. Utilize wet sand blasting for interior surfaces and for exterior surfaces where necessary to prevent objectionable production of dust.

3.03 PERFORMANCE



- A. General: Employ skilled workmen to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time and complete without delay. Carefully remove existing Work to be salvaged and/or reinstalled. Protect and store for reuse into the Work.
- B. Cutting: Cut existing construction using methods least likely to damage elements retained or adjoining Work. Where possible, review proposed procedures with the original installer; comply with the original installer's recommendations.
 - 1. In general, where cutting, use hand or small power tools designed for sawing or grinding, not hammering and chopping. Cut holes and slots as small as possible, neatly to size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
 - 2. To avoid marring existing finished surfaces, cut or drill from the exposed or finished side into concealed surfaces.
 - 3. Cut through concrete and masonry using a cutting machine, such as a carborundum saw or a diamond-core drill. Saw cut reinforcing bars and paint ends with bituminous paint except where bonded into new concrete or masonry.
 - 4. Comply with requirements of applicable Sections of Divisions 31, 32, and 33 where cutting and patching requires excavating, backfill, and recompaction.
 - 5. Sheet Metal: Remove back to joint, lap, or connection. Secure loose or unfastened ends or edges and seal watertight.
 - 6. Plaster: Cut back to sound plaster on straight lines, and back bevel edges of remaining plaster. Trim existing lath and prepare for new lath.
 - 7. Gypsum Wallboard: Cut back on straight lines to undamaged surfaces with at least two opposite cut edges centered on supports.
 - 8. Tile: Cut back to sound tile and backing on joint lines.
- C. Patching: Patch with durable seams that are as invisible as possible. Comply with required tolerances.
 - 1. Where feasible, inspect and test patched areas to demonstrate integrity of the installation. Verify conditions of existing substrates prior to executing Work.
 - 2. Restore exposed finishes of patched areas and extend finish restoration into retaining adjoining construction in a manner that will eliminate all evidence of patching and refinishing.



3. Concrete: Maintain cut edges in a moist condition for twenty four hours prior to the placement of new concrete. In lieu of this an epoxy adhesive may be provided. Finish placed concrete to match existing unless noted otherwise. Concrete shall have a compressive strength of 3,000 psi where installed to repair and match existing improvements, unless noted otherwise.
4. Metal Fabrications: Items to remain exposed shall have their edges cut and ground smooth and rounded.
5. Gypsum Wallboard: Fasten cut edges of wallboard. Install patches with at least two opposite edges centered on supports and secure at 6-inch centers. Tape and finish joints and fastener heads. Patching shall be non-apparent when painted or finished.
6. Acoustical Ceilings: Comply with the requirements for new Work specified in related sections of the Contract Documents.
7. Painting: Prepare areas to be patched, patch and paint as specified under related sections of the Contract Documents.

3.04 CLEANING

- A. Clean areas and spaces where cutting and patching are performed. Completely remove paint, mortar, oils, putty, and similar items. Thoroughly clean piping, conduit, and similar features before applying paint or other finishing materials. Restore damaged coverings to their original condition.

END OF SECTION – 01 7329



SECTION 01 74 16

STORM WATER POLLUTION PREVENTION PLAN

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

1. Storm water permitting and certification in compliance with state and local regulations, including payment of application and annual fees and electronic filing, through SMARTS website.
2. Preparation, implementation, upkeep and monitoring of Storm Water Pollution Prevention Plan (SWPPP).
3. Control runoff and pollutants from the site during construction activities.
4. Reference to SWPPP prepared for Train Depot Site by ENGEIO, Inc. on 10/26/2023.

B. Related Requirements:

1. Division 01 – General Requirements.
2. Section 32 13 43 – Pervious Concrete Pavement.
3. Section 32 14 15 – Permeable Interlocking Concrete Pavers.
4. Section 33 40 00 – Storm Drainage Utilities.

1.02 ACRONYMS AND DEFINITIONS

BMP	Best Management Practice.
CAN	Corrective Action Notice.
CASQA	California Stormwater Quality Association.
COI	Change of Information.
DWQ	Division of Water Quality.
CGP	NPDES General Permit for Storm Water Discharges Associated with Construction Activities.
ELAP	Environmental Laboratory Accreditation Program.
RWQCB	Regional Water Quality Control Board.
LRP	Legally Responsible Person (OWNER).
NOI	Notice of Intent.
NOT	Notice of Termination.



NPDES	National Pollutant Discharge Elimination System.
PRDs	Permit Registration Documents, including NOI, Risk Assessment, Site Map, SWPPP, Annual Fee, Signed Certification Statements.
RISK LEVEL	As defined by CGP.
QSD	Qualified SWPPP Developer.
QSP	Qualified SWPPP Practitioner.
QPE	Qualifying Precipitation Event, is any weather pattern that is forecast to have a 50% or greater Probability of Precipitation (PoP) and a Quantitative Precipitation Forecast (QPF) of 0.5-in or more within a 24-hr period.
SMARTS	Storm Water Multiple Application and Report Tracking System (smarts.waterboard.ca.gov).
SWPPP	Storm Water Pollution Prevention Plan.
SWRCB	State Water Resources Control Board.
TMDL	Total Maximum Daily Load, calculation of pollutant allowable for site specific water bodies.
WPCD	Water Pollution Control Drawings.
WDID	Waste Discharge Identification Number.

1.03

SWPPP REQUIREMENTS

- A. CONTRACTOR shall assign a QSD and QSP, who shall be in responsible charge of Work of this Section.
- B. Prior to start of Construction, CONTRACTOR shall:
 1. Submit QSD and QSP qualifications.
 2. Incorporate SWPPP activities into the Project Schedule.
 3. Update SWPPP provided by City to reflect CONTRACTOR's proposed construction staging, phasing, schedule and other construction activities. SWPPP shall be certified by QSD.
 4. Complete the following on the SMARTS website under project application started by OWNER LRP. CONTRACTOR shall provide SMARTS user name to OAR/LRP in order to be linked to the application.
 - a. NOI forms.
 - b. Upload SWPPP certified by QSD.
 - c. Risk Level Calculation.
 - d. Post Construction Water Balance Calculation provided by ARCHITECT (Attachment "B" Section 33 4000).



5. Inform OAR/LRP to review and certify the NOI application and PRDs on SMARTS at least 10 days prior to soils disturbance.
 6. Submit NOI fee statement along with payment to SWRCB at least 7 days prior to start of construction to obtain a WDID number.
 7. Secure and pay for deposits, permits and inspection fees to local jurisdiction, if required.
 8. Inform CONTRACTOR and Subcontractors personnel on the BMP procedures to prevent pollutants from entering the storm drain system, before they start construction activities.
- C. During Construction:
1. Implement, install and maintain BMPs. Ensure that BMPs are designed to protect all exposed portions of the site.
 2. Retain copy of the SWPPP, monitoring records, and PRD on site until Substantial Completion.
 3. Conduct and document storm water pollution prevention training of CONTRACTOR site personnel and provide records of training to OAR. See Attachment "D" for sample training log. Keep personnel informed of the SWPPP changes.
 4. Monitor the Project Site per the CGP requirements.
 - a. Conduct site inspection of pollution prevention controls and provide Site Monitoring Reports per the CGP and SWPPP. Prepare and maintain, at the Project site, a log of each inspection using Site Monitoring Report forms (Attachment "A", at the end of this Section. Inspections shall include, at a minimum:
 - 1) At least weekly.
 - 2) Within 72 to 120 hours prior to a QPE.
 - 3) Within 96 hours after the last 24 hour period with 0.25 inches or more precipitation.
 - 4) At least once each 24 hours during extended storm events.
 - 5) Conduct quarterly non-storm water inspections (Attachment "C").
 - b. Conduct sampling and reporting as directed by CGP and outlined in the SWPPP Construction Site Monitoring Plan.
 - c. Precipitation forecast information shall be obtained from the National Weather Service Forecast Office (<http://www.srh.noaa.gov/>).
 5. Participate in quarterly SWPPP inspections with representative from OWNER's representative. Correct CAN items.
 6. Non-compliance with the CGP and Unauthorized Discharges shall be reported to OAR immediately.



7. Provide verification annually that construction activities are in compliance with SWPPP. Submit Annual Report Compliance Certification (Attachment “B”) to OAR and complete Annual Report on SMARTS by July 15 of each year, for review and certification. Annual Report will be certified by OWNER’s LRP.
 8. Maintain, Report, and update SWPPP and PRDs on the SMARTS website, including items listed below.
 - a. Upload SWPPP amendments.
 - b. Complete Ad-Hoc Reports for all sampling events. Non-Visible, Effluent Monitoring, TMDL updates and Exceedance Results must be reported electronically by deadlines per CGP.
 - c. Provide COI in SMARTS to reflect changes to construction site area, schedule, and risk level. COI shall be submitted to OAR/LRP for certification.
 9. Pay annual fees related to the CGP up until the date of Substantial Completion.
 10. Pay fines and penalties from regulatory agencies against OWNER due to CONTRACTOR’S non-compliance with storm water regulations. OWNER shall recover costs of fines and penalties by appropriate OWNER assessment. Review of the SWPPP and inspection log by OAR shall not relieve CONTRACTOR from liabilities arising from non-compliance of storm water pollution regulations.
 11. Update Post Construction BMP Installation and Maintenance Log and complete Maintenance Plan, provided by ARCHITECT, to reflect ‘actual products installed (See Attachment "A" Section 33 4000 Storm Drainage Utilities). Markup Site Plan, Appendix 2 of Attachment “A” of Section 33 4000 to reflect ‘As-Built’ conditions.
- D. At Substantial Completion:
1. Provide SWPPP, Site Monitoring Reports, and record documents to OAR.
 2. Handover the maintenance log and maintenance plan to OAR. OWNER will maintain prevention controls left in place.
 3. Conduct Post-Construction BMP training of OWNER personnel.
 4. Notify OAR to schedule a meeting to confirm Substantial Completion of SWPPP.
 5. Submit to OAR Substantial Completion Certification that the Project has met all of the conditions of the CGP (Attachment “B”). Post-construction storm water operation and management plan as mentioned in the compliance certifications shall be in place at Substantial Completion.
 6. Prepare the final Annual Report and NOT to terminate permit coverage. Submit NOT electronically with required attachments through the SMARTS system. NOT will be certified by the OWNER’s LRP.
 7. OWNER Maintenance and Operations will maintain prevention controls left in place after CONTRACTOR receives Substantial Completion.
- E. Project Inspector will conduct inspection and examination of the SWPPP.



1.04 SUBMITTALS

- A. Submit the following:
1. Qualifications and experience of QSD and QSP for OWNER's review and acceptance.
 2. Electronic files of SWPPP updated and certified by QSD.
 3. NOI application to OAR/LRP for review and certification through SMARTS.
 4. NOI fee statement along with payment to SWRCB.
 5. Documentation in accordance with CGP requirements for SWPPP, including:
 - a. BMP material quality, grade, type as specified in the CASQA BMP Handbook.
 - b. Electronic Copies of weekly and quarterly inspections, annual reports, compliance certifications, and test results.
 - c. Proof of filing with the Water Board; copies of PRDs and all attachments.
 - d. Training records of CONTRACTOR site personnel.
 - e. BMP implementation schedule.
 - f. WPCD revisions.
- B. SWPPP Closeout Documents: At Substantial Completion provide one hard copy and electronic files of the documents listed below to OAR. OAR will forward records electronically to OWNER Supervising Civil Engineer for retention period of three years.
1. Copy of SWPPP and PRDs, including NOI, Monitoring Program, Inspection Records, Annual Reports, Compliance Certifications, and supporting documents.
 2. Updated and signed SWPPP amendments and amendment log.
 3. Storm and non-storm water sampling records and test results, including Noncompliance Reports, when limits are exceeded.
 4. Training Records for CONTRACTOR and OWNER personnel.
 5. Maintenance records for post construction BMP, per Appendix 4 of Attachment "A" of Section 33 4000.
 6. Updated Post-Construction Storm Water Management Plan to reflect 'As-Built' conditions.
 7. Notice of Termination.
 8. Signed Substantial Completion Certification that the Project has met all of the conditions of the CGP.

1.05 QUALITY ASSURANCE

- A. Comply with the following regulatory requirements:
1. National Pollutant Discharge Elimination System (NPDES) General Permit for Storm Water Discharges Associated with Construction and Lands Disturbance Activities;



ORDER NO. 2022-0057-DWQ; NPDES NO. CAS000002, adopted by the State Water Resources Control Board.

2. Regulations of the California Environmental Protection Agency, State Water Resources Control Board; Regional Water Control Board, and local ordinances.
 3. CASQA Stormwater Best Management Practice Handbook for Construction Activity (BMP Handbook), current adopted edition.
 4. Local jurisdiction stormwater management (SWPPP) and erosion control ordinances.
- B. Qualifications: CONTRACTOR's QSP/QSD shall meet the following qualifications:
1. Current certification as a CASQA Qualified SWPPP Practitioner/Developer.
 2. Two years minimum experience in erosion and sediment control and knowledgeable in the requirements of SWPPP, Best Management Practices and GCP.

1.06 STORAGE AND PROTECTION

- A. Provide proper storage of materials and equipment to prevent rain and storm water runoff to come in contact with pollutants, such as soil stabilizers, paint or fluids from vehicles.

1.07 TRAINING OF OWNER PERSONNEL

- A. Training of Owner's personnel shall include 8 hours of on-site overview and maintenance of the following Post Construction BMPs:
1. Bioretention Facilities, Planter Boxes and Proprietary Biotreatment Devices.
 2. Vegetated Swales, Vegetated Filter Strips and Green Roofs.
- B. Training of Owner's personnel on the Post Construction BMPs shall be per Section 33 4000, Storm Drainage Utilities.

1.08 FORMS

- A. Provide forms compliant with State and local requirements as follows:
1. Site Monitoring Report.
 2. Compliance Certification and Checklist.
 3. Quarterly Non-Storm Water Form.
- B. The following attachments are included at the end of Section 33 4000:
1. Attachment "A" - Post-Construction Storm Water Management Plan.
 2. Attachment "B" – Post-Construction Water Balance Calculator.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Provide quality, grade and type of materials as specified in the CASQA BMP Handbook.



- B. Provide and have available on-site during construction activities a non-stormwater sampling kit suitable for obtaining storm water and non-stormwater quality grab samples. Kit shall include containers and preservatives appropriate for the pollutants known or expected to be in the stormwater. Required sampling equipment shall be adequate to capture and transport samples to a local ELAP State certified water testing lab.
- C. Provide a rain gauge on site to record readings during site inspections.

PART 3 – EXECUTION

3.01 IMPLEMENTATION

- A. Install perimeter controls prior to starting work at the Project site.
- B. Implement BMPs as specified in the SWPPP to contain on-site storm water on the Project site. Provide storm drain inlet protection. Do not drain on-site water directly into the storm drain without proper BMPs in place. If an Active Treatment System (ATS) is used, comply with the design storm specified in the CGP (10-year, 24-hour event)
- C. Prevent pollutant discharges into the storm drain system. Prevent storm water from coming into contact with pollutants, such as material spills, or leakage from storage tanks, waste containers or transfer areas. In the event contamination is found CONTRACTOR shall immediately notify OAR.
- D. Protect exposed dirt, such as stockpiles, landscaping areas, and hillsides.
- E. Properly manage non-storm water discharges such as ground water, broken utility lines and fire hydrant testing per CGP requirements.
- F. Adjust BMP's locations and layouts in accordance to construction progress to assure compliance to regulations.
- G. Conduct inspections of pollution prevention controls and provide Site Monitoring Report to OAR immediately if pollutants are discharged into the site runoffs. CONTRACTOR shall sample and remediate contaminated water.
- H. Upon Substantial Completion: Maintain and leave post-construction storm water pollution prevention controls in place and remove those that are not needed as determined by the QSD and OAR.

3.02 SWPPP CLOSEOUT

- A. Verify the following prior to Substantial Completion of SWPPP:
 - 1. Elements of the SWPPP have been completed.
 - 2. Final stabilization of site, as defined by the GCP, has been demonstrated.
 - 3. There is no potential for construction related storm water pollutants to be discharged into site runoff.



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4. Construction related equipment and temporary BMPs have been removed from site.
5. Rubbish, debris, and waste materials have been removed and legally disposed of off the Project site.
6. CAN items have been closed and signed-off.
7. Post-Construction BMP Maintenance Plan has been established.

END OF SECTION - 01 7416



SECTION 01 74 19

CONSTRUCTION AND DEMOLITION WASTE MANAGEMENT

Part 1 - GENERAL

1.01 SUMMARY

- A. Section Includes: administrative and procedural requirements for the following:
 - 1. Salvaging nonhazardous construction and demolition waste.
 - 2. Recycling nonhazardous construction and demolition waste.
 - 3. Disposing of nonhazardous construction and demolition waste

1.02 DEFINITIONS

- A. Alternative daily cover: Cover material other than earthen material placed on the surface of the active face of a municipal solid waste landfill at the end of each operating day to control vectors, fires, odors, blowing litter, and scavenging.
- B. Construction Waste: Building and site improvement materials and other solid waste resulting from construction, remodeling, renovation, or repair operations. Construction waste includes packaging.
- C. Demolition Waste: Building and site improvement materials resulting from demolition or selective demolition operations
- D. Disposal: Removal off-site of demolition and construction waste and subsequent sale, recycling, reuse, or deposit in landfill or incinerator acceptable to authorities having jurisdiction.
- E. Extended Producer Responsibility: Closed-loop program, aka product take-back, are measures undertaken by a producer to accept its own and sometimes other manufacturers' products as post-consumer waste at the end of the product's useful life to recover and recycle the materials for use in new products of the same type.
- F. Material Stream: A material flow coming from a jobsite into markets for building materials including a specific material category that is diverted in a specific way or a mixture of several material categories that are diverted in a specific way.
- G. On site Waste Diversion: On site reuse including crushing asphalt, concrete, and masonry for infill or aggregate.



- H. Recycle: Recovery of demolition or construction waste for subsequent processing in preparation for reuse.
- I. Salvage: Recovery of demolition or construction waste and subsequent sale or reuse in another facility.
- J. Salvage and Reuse: Recovery of demolition or construction waste and subsequent incorporation into the Work.

1.03 PERFORMANCE REQUIREMENTS

- A. General: Develop waste management plan that results in end-of-Project rates for salvage/recycling of at least 50% by weight (minimum allowable) of total waste generated by the Work. Target end-of-Project rates for salvage/recycling of at least 75% by weight of total waste generated by the Work with a minimum of four separate diverted material streams. Practice efficient waste management in the use of materials in the course of the Work. Use all reasonable means to divert construction and demolition waste from landfills and incinerators. Facilitate recycling and salvage of materials.

1.04 SUBMITTALS

- A. Action Submittals: Construction and Demolition Waste Management Plan
 - 1. General: Develop a waste management plan according to ASTM E 1609 and requirements in this Section. The Plan must include the following information and directives:
 - a. Must be customized for each project.
 - b. Must include an overall project waste diversion goal and identify at least three kinds of materials that will be diverted from landfills or incineration.
 - c. Must account for all materials, including land-clearing debris, materials to be used for alternative daily cover (ADC), and other materials not contributing to diversion but not included in the diverted waste total.
 - d. Must include the strategy for the safe removal and disposal of hazardous materials. Hazardous materials must be tracked separately and not be included in the project's total waste.



2. **Waste Identification:** Indicate anticipated types and quantities of site-clearing, demolition and construction waste generated by the Work. Identify at least two kinds of materials that will be diverted from landfills or incineration. Include estimated quantities and assumptions for estimates. Specify the means and methods of diversion for each of the selected material streams.
3. **Waste Reduction Work Plan:** List each type of waste and whether it will be salvaged, recycled, or disposed of in landfill or incinerator. Include points of waste generation, total quantity of each type of waste, quantity for each means of recovery, and handling and transportation procedures.
 - a. **Salvaged Materials for Reuse:** For materials that will be salvaged and reused in this Project, describe methods for preparing salvaged materials before incorporation into the Work. Include on site reuse such as crushing asphalt, concrete, and masonry for infill or aggregate.
 - b. **Salvaged Materials for Sale:** For materials that will be sold to individuals and organizations, include list of their names, addresses, and telephone numbers.
 - c. **Salvaged Materials for Donation:** For materials that will be donated to individuals and organizations, include list of their names, addresses, and telephone numbers.
 - d. **Recycled Materials:** Include list of local receivers and processors and type of recycled materials each will accept. Include names, addresses, and telephone numbers.
 - 1) **Extended Producer Responsibility:** Include list of manufacturers that may accept materials as part of a take-back program.
 - 2) **Disposed Materials:** Indicate how and where materials will be disposed of. Include name, address, and telephone number of each landfill and incinerator facility.
 - 3) **Handling and Transportation Procedures:** Include method that will be used for separating recyclable waste including sizes of containers, container labeling, and designated location where materials separation will be performed.

B. Informational Submittals: Waste Reduction Progress Reports

1. **Concurrent with each Application for Payment, submit report. Include the following information, through the submission of waste hauling tickets, recycling receipts, or other forms of documentation:**
 - a. **Material category.**
 - b. **Total quantity of waste in tons.**



- c. Quantity of waste salvaged, in tons.
- d. Quantity of waste recycled, in tons.
- e. Quantity of waste diverted on site, in tons.
- f. Total quantity of waste diverted (salvaged, recycled, and on-site diversion) in tons.
- g. Total quantity of waste diverted salvaged, recycled, and on-site diversion) as a percentage of total waste.
- h. Location and name of facilities, organizations or landfills receiving waste.
- i. For commingled materials, provide the annual reporting rate for that facility. To count toward the corresponding credit (MR Credit Construction and Demolition Waste Management), commingled recycling facilities must be able to provide diversion rates either specific to the project, or an average diversion rate for the facility that is regulated by the local or state authority. The average recycling rate for the facility must exclude alternative daily cover (ADC).
- j. Records of Donations: Indicate receipt and acceptance of salvageable waste donated to individuals and organizations. Indicate whether organization is tax exempt.

1.02 QUALITY ASSURANCE

- A. Waste Management Coordinator Qualifications: Experienced firm, with a record of successful waste management coordination of projects with similar requirements, that employs a LEED-Accredited Professional, certified by the USGBC, as waste management coordinator. Waste management coordinator may also serve as LEED coordinator.
- B. Regulatory Requirements: Comply with hauling and disposal regulations of authorities having jurisdiction.
- C. Waste Management Conference: Conduct conference at Project site to comply with requirements in Section 01 31 00 "Project Management and Coordination." Review methods and procedures related to waste management including, but not limited to, the following:
 1. Review and discuss waste management plan including responsibilities of waste management coordinator.
 2. Review requirements for documenting quantities of each type of waste and its disposition.



3. Review and finalize procedures for materials separation and verify availability of containers and bins needed to avoid delays.
4. Review procedures for periodic waste collection and transportation to recycling and disposal facilities.
5. Review waste management requirements for each trade.

Part 2 - PRODUCTS (NOT USED)

Part 3 - EXECUTION

1.01 PLAN IMPLEMENTATION

- A. General: Implement approved waste management plan. Provide handling, containers, storage, signage, transportation, and other items as required to implement waste management plan during the entire duration of the Contract.
 1. Comply with operation, termination, and removal requirements in Section 01 50 00 "Temporary Facilities and Controls."
- B. Training: Train workers, subcontractors, and suppliers on proper waste management procedures, as appropriate for the Work.
 1. Distribute waste management plan to everyone concerned within three days of submittal return.
 2. Distribute waste management plan to entities when they first begin work on-site. Review plan procedures and locations established for salvage, recycling, and disposal.

1.02 RECYCLING CONSTRUCTION WASTE, GENERAL

- A. General: Recycle paper and beverage containers used by on-site workers.
- B. Recycling Incentives: Revenues, savings, rebates, tax credits, and other incentives received for recycling waste materials shall be shared equally by Owner and Contractor.
- C. Preparation of Waste: Prepare and maintain recyclable waste materials according to recycling or reuse facility requirements. Maintain materials free of dirt, adhesives, solvents, petroleum contamination, and other substances deleterious to the recycling process.



- D. Procedures: Separate recyclable waste from other waste materials, trash, and debris. Separate recyclable waste by type at Project site to the maximum extent practical according to approved construction waste management plan.
1. Provide appropriately marked containers or bins for controlling recyclable waste until removed from Project site. Include list of acceptable and unacceptable materials at each container and bin.
 - a. Inspect containers and bins for contamination and remove contaminated materials if found.
 2. Stockpile processed materials on-site without intermixing with other materials. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.
 3. Stockpile materials away from construction area. Do not store within drip line of remaining trees.
 4. Store components off the ground and protect from the weather.
 5. Remove recyclable waste from Owner's property and transport to recycling receiver or processor.

1.03 RECYCLING CONSTRUCTION WASTE, BEST PRACTICES

A. Packaging:

1. Cardboard and Boxes: Break down packaging into flat sheets. Bundle and store in a dry location.
2. Polystyrene Packaging: Separate and bag materials.
3. Pallets: As much as possible, require deliveries using pallets to remove pallets from Project site. For pallets that remain on-site, break down pallets into component wood pieces and comply with requirements for recycling wood.
4. Crates: Break down crates into component wood pieces and comply with requirements for recycling wood.

B. Commingled Waste Recycling:

1. If utilizing commingled waste strategy, the General Contractor shall select a facility that meets ONE of the following:
 - a. Facility has an average diversion rate and is regulated by the local or state authority and must exclude alternative daily cover (ADC). This



system must be a closed system; shipping waste to another municipality to manage, thus burdening another system, does not count as diverting the waste.

- b. The waste-sorting facility shall provide a waste diversion percentage specific to the project's waste based on measurement of each component waste material. Visual inspection is not an acceptable method of evaluation for documenting this percentage.

C. Source Separated Waste Recycling:

1. If utilizing a source separation waste strategy, the Construction Waste Management Plan shall include a list of anticipated types and quantities of waste materials generated from the Project site and proposed siting locations (including map) for waste/recycling containers. The plan shall identify materials to be recycled, re-used or salvaged. It shall include efforts at source reduction, material handling procedures and collection of weight and hauling destination information.
2. Source Reduction: List processes that minimize waste such as working with suppliers to take back or buy back substandard, rejected or unused items and to deliver supplies using returnable pallets and containers. Also include procedures to minimize breakage, mishandling, contamination, and other factors that reduce job site waste.
3. Material Handling Procedures: List means by which source separated waste materials will be protected from contamination, and the means for recycling them consistent with requirements for acceptance by designated facilities
4. Implement recycling program that includes separate collection of waste materials of following types as applicable to Project:
 - a. Asphalt.
 - b. Land clearing debris.
 - c. Soil.
 - d. Trees and shrubs.
 - e. Concrete and concrete blocks.
 - f. Brick and masonry materials.
 - g. Wood.
 - h. Cardboard and paper packaging materials.
 - i. Plastics.
 - j. Ferrous metal.



- k. Non-ferrous metals (e.g. copper, aluminum, etc.).
 - l. Glass.
 - m. Food and beverage containers.
 - n. Electrical fixtures and wires.
 - o. Other (where applicable)
- D. Gypsum Board: Stack large clean pieces on wood pallets or in container and store in a dry location.

1.04 DISPOSAL OF WASTE

- A. General: Except for items or materials to be salvaged, recycled, or otherwise reused, remove waste materials from Project site and legally dispose of them in a landfill or incinerator acceptable to authorities having jurisdiction.
- 1. Except as otherwise specified, do not allow waste materials that are to be disposed of accumulate on-site.
 - 2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
- B. Burning: Do not burn waste materials.
- C. Disposal: Remove waste materials from Owner's property and legally dispose of them.

END OF SECTION – 01 7419



SECTION 01 77 00

CONTRACT CLOSEOUT

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. This Section includes administrative and procedural requirements for Contract Closeout, including but not limited to, the following:
1. Inspection procedures.
 2. Project record documents submittal.
 3. Operation and maintenance manual submittal.
 4. OWNER orientation and instruction.
 5. Final cleaning.

1.02 RELATED REQUIREMENTS:

1. Section 01 29 76 - Progress Payment Procedures.
2. Section 01 32 13 - Construction Schedule.
3. Section 01 32 29 - Project Forms.
4. Section 01 33 00 - Submittal Procedures.
5. Section 01 45 25- Testing, Adjusting, and Balancing of HVAC.
6. Section 01 50 00 - Construction Facilities and Temporary Controls.
7. Section 01 78 36 - Warranties.

PART 2 – PRODUCTS (Not used)

PART 3 - EXECUTION

3.01 SUBSTANTIAL COMPLETION



- A. Inspection Procedures: On receipt of the Request For Certificate of Substantial Completion, OAR will authorize commencement of inspection. INSPECTOR, OAR, CONTRACTOR and ARCHITECT will inspect the Work.
1. If after inspection of the Work, OAR does not consider the Work substantially complete, OAR will notify CONTRACTOR.
 2. If after inspection, OAR considers the Work substantially complete, INSPECTOR shall prepare a comprehensive Punch List of items to be corrected.
 - a. INSPECTOR may repeat inspection to assure the Work is corrected.
 - b. Results of the completed inspection will form a partial basis of the requirements for Release of Retention.

3.02 ADMINISTRATIVE CLOSEOUT

- A. Re-inspection Procedures: INSPECTOR, OAR, CONTRACTOR and ARCHITECT may inspect the Work upon notice, including final inspection of Punch List items from earlier inspections, has been corrected, except for items whose completion is delayed under circumstances acceptable to OAR.
1. OWNER has the right to preclude CONTRACTOR from Punch List correction and documents submittals after the Contract Completion date; unless OWNER elects to authorize CONTRACTOR to extend Administrative Contract duration. CONTRACTOR will be assessed actual cost for the unsettled items. Withholds amounts exceeding actual costs to correct or to obtain deliverable will be released.
 2. If allowed by the OAR, re-inspection will be repeated, but may be assessed against CONTRACTOR if OWNER is subject to additional professional service and or additional costs of inspection.

3.03 PROJECT RECORD DOCUMENT SUBMITTAL

- A. General: Do not use project record documents for construction purposes. Protect record documents from deterioration and loss. Provide access to record documents for ARCHITECT, INSPECTOR and OAR reference during normal working hours. Project record document shall be updated on a weekly basis. Prior to submitting each application for payment, secure INSPECTOR and ARCHITECT approval of project record documents.
- B. Record Drawings: Maintain a clean, undamaged set of prints of Drawings and Shop Drawings. Mark the set to show the actual installation where the installation varies substantially from the Work as originally shown. Mark the Drawing that is most



capable of showing conditions fully and accurately. Where Shop Drawings are used, record a cross-reference at the corresponding location on the Drawings. Provide detailed and accurate field dimensions for concealed elements that would be difficult to measure and record at a later date.

1. Mark record sets with red erasable pencil. Use other colors to distinguish between variations in separate categories of the Work. Date and number entries in the same format as submitted. Call attention to entry by a “cloud” around the affected areas.
 2. Mark new information important to OWNER but was not shown on Drawings or Shop Drawings.
 3. Utility location and depth below finished grade and above ceilings and attic spaces shall be fully dimensioned and indicated on record drawings. Dimensions shall be measured from building lines or permanent landmarks and shall be triangulated to those features.
 4. Note related Change Order or Construction Directive numbers where applicable. RFC submissions shall be referenced on each affected sheet, Drawing and Shop Drawing.
 5. Organize record drawing sheets into manageable sets. Bind sets with durable-paper cover sheets; print suitable titles, dates, and other identification on the cover of each set.
 6. Prior to Contract Completion of the Work, review of the project record drawings by ARCHITECT; prepare a final set of project record drawings using reproducible vellum. Submit final set of transparencies to ARCHITECT.
- C. Record Specifications: Maintain two complete copies of the Specifications, including Addenda. Include with the Specifications two copies of other written Contract Documents, such as Change Orders or Construction Directives issued during construction.
1. Mark these record documents to show substantial variations in actual Work performed in comparison with the text of the Specifications and modifications.
 2. Give particular attention to substitutions and selection of options and information on concealed Work that cannot otherwise be readily discerned later by direct observation.
 3. Note related record document information with Product Data.
 4. Prior to Contract Completion of the Work, submit record Specifications to ARCHITECT for OWNER records.



- D. Record Product Data: Maintain two copies of each Product Data submittal. Note related Change Orders and Construction Directives and mark-up of record drawings and Specifications.
1. Mark these documents to illustrate significant variations in actual Work performed in comparison with information submitted. Include variations in products delivered to the Project site and from the manufacturer's installation instructions and recommendations.
 2. Provide detailed and accurate information regarding concealed products and portions of Work that cannot otherwise be readily discerned later by direct observation.
 3. Prior to Contract Completion, submit complete set of record Product Data to ARCHITECT for OWNER records.
- E. Record Samples: Immediately prior to Substantial Completion, CONTRACTOR shall meet with ARCHITECT and OAR at the Project site to determine which Samples are to be transmitted to OWNER for record purposes. Comply with OAR instructions regarding delivery to OWNER storage area.
- F. Miscellaneous Records: Refer to other Specification sections for requirements of miscellaneous record keeping and submittals in connection with actual performance of the Work. Prior to the date of Contract Completion, complete and compile miscellaneous records and place in good order. Identify miscellaneous records properly and bind or file, ready for continued use and reference. Submit to Architect for OWNER records.
- G. Maintenance Manuals: Prior to Substantial Completion, organize operation and maintenance data into suitable two sets of manageable size. Bind properly indexed data in individual, heavy-duty, two to three-inch 3-ring, vinyl-covered binders, with pocket folders for folded sheet information. Mark appropriate identification on front and spine of each binder. Submit to ARCHITECT for OWNER records. Include the following types of information.
1. Emergency instructions.
 2. Spare parts list.
 3. Copies of warranties.
 4. Wiring diagrams.
 5. Recommended "turn-around" cycles.
 6. Inspection procedures.



7. Shop Drawings and Product Data.
8. Fixture lamping schedule.

3.04 OPERATION AND MAINTENANCE:

- A. Operation and Maintenance Instructions: Prior to Substantial Completion, arrange for each installer of equipment that requires regular operation and maintenance to meet with designated OWNER personnel to provide instruction in proper operation and maintenance. Provide instruction by manufacturer's representatives if installers are not experienced in operation and maintenance procedures. Include a detailed review of the following items:
 1. Maintenance manuals.
 2. Spare parts and materials.
 3. Tools.
 4. Lubricants.
 5. Fuels.
 6. Identification systems.
 7. Control sequences.
 8. Hazards.
 9. Cleaning.
 10. Warranties and bonds.
 11. Maintenance agreements and similar continuing commitments.
- B. As part of instruction for operating equipment, demonstrate the following procedures:
 1. Start-up.
 2. Shutdown.
 3. Emergency operations.
 4. Noise and vibration adjustments.
 5. Safety procedures.
 6. Economy and efficiency adjustments.



7. Effective energy utilization.

C. Notice Of Termination: CONTRACTOR shall submit a Notice of Termination (NOT) to the local Regional Water Quality Control Board, RWQCB. Provide a copy of NOT to OAR.

3.05 FINAL CLEANING

A. General: Related sections of the Contract Documents specify general cleaning during performance of the Work. General cleaning is included in Division 01 Section “Construction Facilities and Temporary Controls”.

B. Cleaning: Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to the condition expected in a normal, commercial building cleaning and maintenance program. Comply with manufacturer’s instructions.

1. Complete the following cleaning operations before requesting inspection for a certificate of Substantial Completion.

a. Remove labels that are not permanent labels.

b. Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compounds and other substances that are noticeable vision-obscuring materials. Replace chipped or broken glass and other damaged transparent materials.

c. Clean exposed exterior and interior hard-surfaced finished to a dust-free condition, free of stains, films, and similar foreign substances. Restore reflective surfaces to their original condition. Leave concrete floors broom clean. Vacuum carpeted surfaces.

d. Wipe surfaces of mechanical and electrical equipment. Remove excess lubrication and other substances. Clean plumbing fixtures to a sanitary condition. Clean light fixtures and lamps.

e. Clean the Project site, including landscape development areas, of rubbish, litter, and other foreign substances. Sweep paved areas broom clean; remove stains, spills, and other foreign deposits. Rake grounds that are neither paved nor planted to a smooth, even-textured surface.

END OF SECTION – 01 7700



SECTION 01 78 36

WARRANTIES

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. This Section includes administrative and procedural requirements for warranties, including manufacturers and installer's standard warranties on products and special product warranties.
 - 1. Refer to the General Conditions for terms of the guarantee period for the Work.

1.02 RELATED REQUIREMENTS

- A. Section 01 60 00 - Product Requirements.
- B. Section 01 73 29 - Cutting and Patching.
- C. Section 01 77 00 - Contract Closeout.

PART 2 - PRODUCTS (Not applicable)

PART 3 - EXECUTION

3.01 WARRANTY REQUIREMENTS

- A. Disclaimers and Limitations: Manufacturer's disclaimers and limitations on product warranties shall not relieve CONTACTOR of the warranty of the Work incorporating such materials, products, and equipment. Manufacturer's disclaimers and limitations on warranties do not relieve suppliers, manufacturers, installers, and Subcontractors of the requirement to countersign special warranties with CONTRACTOR.
- B. Standard warranties are preprinted written warranties published by individual manufacturers for particular products and are specifically endorsed by the manufacturer to OWNER.
- C. Special warranties are written warranties required by or incorporated in the Contract Documents, either to extend time limits provided by standard warranties or to provide greater rights for OWNER.



- D. Related Damages and Losses: When correcting failed or defective warranted Work, remove and replace Work that has been damaged as a result of such failure or which must be removed and replaced to provide access for correction of warranted Work.
- E. Reinstatement of Warranty: When Work covered by a warranty has failed and been corrected by replacement or rebuilding, reinstate the warranty by written endorsement with the reinstated warranty equal to the original warranty.
- F. Replacement Cost: Upon determination the Work covered by a warranty has failed and/or is defective, replace or rebuild the Work to an acceptable condition complying with requirements of the Contract Documents. CONTRACTOR is responsible for the cost of replacing or rebuilding defective Work regardless of whether OWNER has benefited from use of the Work through a portion of its anticipated useful service life.
- G. OWNER Recourse: Expressed warranties made to OWNER are in addition to implied warranties and shall not limit the duties, obligations, rights, and remedies otherwise available under the law. Expressed warranty periods shall not be interpreted as limitations on the time in which OWNER can enforce such other duties, obligations, rights, or remedies.
- H. Rejection of Warranties: OAR reserves the right to reject warranties and to limit selection to products with warranties not in conflict with requirements of the Contract Documents.
- I. Where the Contract Documents require a special warranty, or similar commitment on the Work or part of the Work, OAR reserves the right to refuse to accept the Work until CONTRACTOR presents evidence the entities required to countersign such commitments have done so.

3.02 SUBMITTALS

- A. Submit written preliminary warranties prior to Substantial Completion and final warranties prior to Contract Completion. If the certificate of Substantial Completion designates a commencement date for warranties other than the date of Substantial Completion for the Work, submit written warranties as set forth in the certificate of Substantial Completion.
 - 1. When a designated portion of the Work is partially used and/or occupied by OWNER, submit properly executed warranties to ARCHITECT within fifteen days of the Partial Use or Occupancy of the designated portion of the Work.
- B. When the Contract Documents require CONTRACTOR, or CONTRACTOR and a Subcontractor, installer, supplier or manufacturer to execute a special warranty, prepare a written document containing appropriate terms and identification, ready for execution by the required parties. Submit a draft to OAR, through the ARCHITECT, for approval prior to final execution.



1. Refer to Divisions 02 through 49 for specific content requirements and particular requirements for submitting special warranties.
- C. Form of Submittal: Prior to Contract Completion, compile two copies of each required final warranty properly executed by CONTRACTOR, or by CONTRACTOR and Subcontractor, installer, supplier, or manufacturer. Organize the warranty documents into an orderly sequence based on the Specifications.
- D. Bind warranties and bonds in heavy-duty, commercial-quality, durable three ring, vinyl-covered loose-leaf binders, thickness as necessary to accommodate contents, and sized to receive 8½ by 11 paper.
1. Provide heavy paper dividers with celluloid covered tabs for each separate warranty. Mark the tab to identify the item or installation. Provide a typed description of the product or installation, including the name of the product, and the name, address, and telephone number of the installer.
 2. Identify each binder on the front and spine with the typed or printed title “WARRANTIES,” Project title and/or name, and name of CONTRACTOR.
 3. When warranted Work requires operation and maintenance manuals, provide additional copies of each required warranty, as necessary, for inclusion in each required manual.

END OF SECTION – 01 7836



SECTION 01 79 00

MAINTENANCE AND OPERATIONS (M&O) STAFF DEMONSTRATION AND TRAINING

PART 1 – GENERAL

1.01 SECTION INCLUDES

- A. Administrative and procedural requirements for training OWNER’s personnel.
 - 1. Demonstration of operations of systems, subsystems and equipment.
 - 2. Training in operation and maintenance of systems, subsystems, and equipment.

1.02 RELATED REQUIREMENTS

- A. Project Commissioning Plan (CxP).
- B. CHPS Best Practices Manual.
- C. CAL/OSHA Minimum Ventilation Standard, Title 8, Section 5142.
- D. California Building Code, Chapter 12.
- E. Division 01 - General Requirements.
- F. Division 22 - Plumbing.
- G. Division 23 – Heating Ventilating and Air Conditioning.
- H. Division 26 - Electrical.
- I. Division 27 – Communications.

1.03 SUBMITTALS

- A. Submittals, including training modules, require the Commissioning Services Provider’s (CxSP) review and OAR acceptance prior to implementation.
- B. Instruction Program:
 - 1. Ninety days prior to Startup and Testing, submit a draft outline of the instructional program for demonstration and training, including the training module objectives and outline for each training module, schedule of proposed



- training dates, training times, length of instruction time and instructors' names for each training module. Submittal(s) shall be on a CD-ROM in a MS Word 2013 format file. CxSP, OAR and Project Inspector will review and OAR accept, based on their recommendation, CONTRACTOR's proposed Instruction Program or comment and return to CONTRACTOR for revision and incorporation of comments within 30 days of receipt.
2. Revise and resubmit finalized Instruction Program 45 days prior to Startup and Testing. CxSP, OAR and Project Inspector will review CONTRACTOR's revised Instruction Program and OAR, based on their recommendation, accept or return for further revision and incorporation of unaddressed revisions and/or comments or unacceptable revisions within five days of receipt.
 3. Revise and incorporate comments and resubmit to OAR within five days of receipt. CxSP, OAR and Project Inspector will review CONTRACTOR's revised Instruction Program and OAR, based on their recommendation, accept the revised Instruction Program within five days of receipt or require CONTRACTOR to meet with OAR and CxSP within five days of receipt to revise and incorporate unaddressed revisions and/or comments. CONTRACTOR shall be assessed reasonable fees and expenses incurred by CxSP for these meetings.
- C. Upon completion of training, submit two complete training manuals for OWNER's use and one CD-ROM including materials in the complete training manual in the Adobe PDF format. Each manual shall contain specific training and instruction manuals and hand-outs for the following designated end-users:
1. Administration.
 2. OWNER Maintenance and Operations (M&O) Personnel.
- D. Qualification Data: Three weeks prior to start of training, CONTRACTOR shall submit Letters of Qualifications and Project Lists for persons and firms providing instruction including:
1. Training Facilitator Qualifications: A firm or individual experienced in training or educating maintenance personnel and end-users in training program similar to that required for this Project, and who has a record of successful training performance.
 2. Training Instructor Qualifications: Instructor shall be factory-authorized service representative, experienced in operation and maintenance procedures and training for each system, subsystem or piece of equipment.



3. References: The name of owner and the name and telephone number of the plant manager and maintenance supervisor on three similar projects for reference.
- E. Attendance Record: For each training module, submit the proposed list of participants, sign in sheets and length of instruction time a minimum of 15 days prior to start of training of the module.
- F. Evaluations: For each participant and for each training module, submit results and documentation of performance-based tests a minimum of seven days following completion of training of each module.
- G. Demonstration and Training Video: CONTRACTOR shall video record each classroom training and demonstration session and submit a copy on CD-ROM or DVD in a format compatible with MS Windows Media Player at end of each training module. CONTRACTOR shall include a copy of manufacturer training video materials presented during training and demonstration session.

1.04 COORDINATION

- A. Coordinate instruction schedule with the OAR, CxSP, and OWNER's M&O personnel. Adjust schedule as required to reasonably accommodate the schedules of participants and to minimize disrupting OWNER operations.
- B. Coordinate with instructors, including providing notification of scheduled dates, times, length of instruction time and course content.
- C. Coordinate content of training modules with content of approved Emergency Manual and Operations and Maintenance Manual. Do not submit instruction program until manual has been reviewed and accepted by the OAR.

1.05 INSTRUCTION PROGRAM

- A. Program Structure: Develop instruction program that includes individual demonstration and training modules for the operation, maintenance, minor repair (completion in under two hours) and calibration of systems and components in the system as required by Section 01 91 13, Divisions 22, 23 and Division 26 and as specified in Part 3 of this Section, "DEMONSTRATION AND TRAINING".
- B. Training Modules: Develop learning objective and teaching outline for each module, specific and as applicable, for the following OWNER personnel:
 1. Administration.
 2. Operations and Maintenance.



- C. Include description of specific skills and knowledge that participant is expected to master.
- D. For each module, include instruction for the following:
 - 1. Basis of System Design (for OWNER Operations and Maintenance Personnel), Operational Requirements and Criteria, including, but not limited to:
 - a. System, subsystem and equipment descriptions.
 - b. Performance and design criteria if CONTRACTOR is delegated design responsibility.
 - c. Operating standards.
 - d. Regulatory requirements.
 - e. Equipment function.
 - f. Operating characteristics.
 - g. Limiting conditions.
 - h. Performance curves.
 - 2. Documentation (for OWNER Operations and Maintenance Personnel): Review in detail the following documentation:
 - a. Emergency manuals.
 - b. Operations manuals.
 - c. Maintenance manuals.
 - d. Project Record Documents.
 - e. Identification systems.
 - f. Warranties.
 - g. Maintenance service agreements and similar continuing commitments.
 - 3. Emergencies (for OWNER Operations and Maintenance Personnel): Review, without limitation, the following, as applicable:
 - a. Instructions on meaning of warnings, trouble indications, and error messages.



- b. Instructions on stopping.
 - c. Shutdown instructions for each type of emergency.
 - d. Operating instructions for conditions outside of normal operating limits.
 - e. Sequences for electric or electronic systems.
 - f. Special operating instructions and procedures.
4. Operations (for OWNER Operations and Maintenance Personnel): Review, without limitation, the following as applicable:
- a. Startup procedures.
 - b. Equipment or system break-in procedures.
 - c. Routine and normal operating instructions.
 - d. Regulation and control procedures.
 - e. Control sequences.
 - f. Safety procedures.
 - g. Instructions on stopping.
 - h. Normal shutdown instructions.
 - i. Operating procedures for system, subsystem or equipment failure.
 - j. Seasonal and weekend operating instructions.
 - k. Required sequences for electric or electronic systems.
 - l. Special operating instructions and procedures.
5. Adjustments (for OWNER M&O Personnel): Review, without limitation, the following as applicable:
- a. Alignments.
 - b. Checking adjustments.
 - c. Noise and vibration adjustments.
 - d. Economy and efficiency adjustments.



6. Troubleshooting (for OWNER M&O Personnel): Review, without limitation, the following as applicable:
 - a. Diagnostic instructions.
 - b. Test and inspection procedures.
7. Maintenance (for OWNER M&O Personnel): Review, without limitation, the following, as applicable:
 - a. Inspection procedures.
 - b. Types of cleaning agents to be used and methods of cleaning.
 - c. List of cleaning agents and methods of cleaning detrimental to product.
 - d. Procedures for routine cleaning.
 - e. Procedures for preventative maintenance.
 - f. Procedures for routine maintenance.
 - g. Instruction on use of special tools.
8. Repairs (for OWNER M&O Personnel): Review, without limitation, the following as applicable:
 - a. Diagnostic instructions.
 - b. Repair instructions.
 - c. Disassembly; component removal, repair and replacement and reassembly instructions.
 - d. Instructions for identifying parts and components.
 - e. Review of parts needed for operation and maintenance.
9. Facility Training:
 - a. Manual for the basic operation/control of the HVAC room sensor/thermostat and lighting controls.
 - b. Organizational chart structure, to be completed by OWNER, for repair or emergency requests for the systems including contact information of the Plant Manager.



1.06 PREPARATION

- A. Training Facilitator: Engage qualified training facilitator no later than 120 days prior to start of training to prepare instruction program and training modules, to coordinate instructors, and to coordinate between CONTRACTOR, OAR and CxSP for number of participants, instruction times and location.
- B. Training Instructor: Engage qualified training instructors to instruct OWNER's personnel to adjust, operate and maintain systems, subsystems and equipment not part of a system no later than 30 days prior to start of training of assigned modules.
- C. Scheduling: Provide instruction at mutually agreed on times.
 - 1. Schedule training with OWNER, through OAR, with at least two weeks advance notice.
 - 2. Schedule training to conform to personnel availability at Site.
 - 3. Conduct training(s) after the execution of commissioning Pre-functional and Functional Tests are completed.
 - 4. Base duration of training on hours specified in the applicable specifications or minimums defined in Article 1.08.
- D. Evaluation: At conclusion of each training module, assess and document each participant's mastery of module by use of oral, written, demonstration, or combination of oral, written, and demonstration based testing.
- E. Demonstration and Training Video: Record each training module separately. Include classroom instructions and demonstrations, board diagrams and other visual aids, excluding attendee practice or testing.
 - 1. Make demonstration and testing videos at Site to ensure video is representative of installed system. As part of training, devote one lesson plan to reviewing of video to allow new employees to view the video recordings at their own convenience and be able to operate the video system without need for instructor attendance.
 - 2. At the beginning of each video recording for the training module, incorporate a chart presenting the learning objective and lesson outline.
- F. In addition to technical training, attendees shall be trained on how to provide future training for new employees.
- G. Familiarize OWNER staff regarding CAL/OSHA Title 8, section 5142 Requirements.



- H. Cleanup: Collect excess copies of educational materials and give to OAR. Remove instruction equipment. Restore systems and equipment to condition existing just before commencing training.

1.07 OPERATIONS AND MAINTENANCE MANUALS

- A. CONTRACTOR shall direct Subcontractors to compile and prepare M&O Manuals and other required documentation for the equipment and systems that are provided and/or installed per their scope of work for submittal to OAR prior to project closeout.
- B. The OAR shall receive a copy of the Operations and Maintenance manuals prior to initiation of demonstration and training for review and acceptance or rejection.
- C. Operations and Maintenance manuals shall meet the respective requirements of Divisions 22,23 and Division 26, and Section 01 7700; and comply with the following:
 - 1. Quantity: Two.
 - 2. Format: 8 ½ by 11 loose leaf binders. Each binder shall be clearly labeled on the spine and meet the requirements of Section 01 7700. Dividers shall be made of card stock with permanently marked index tabs to separate each section and sub section. Tab labels shall not be handwritten. Binders will meet other formatting requirements as outlined in DIVISIONS 02 to 49, as applicable.
 - 3. Contents: There shall be a title page and table of contents at the beginning of each binder. The table of contents shall be an outline that identifies the equipment or systems documentation included in the binder and references the specification sections relating to the equipment and systems that are being included in each part of the binder. Each part of the binder shall contain the information described below, in the following order.
 - a. CONTRACTOR. The first page shall contain the name, address, and telephone number of the manufacturer and installing CONTRACTOR, as well as the 24-hour number for emergency service for each piece of equipment identified in this section.
 - b. Preventive Maintenance Instructions. This section shall list the location of preventative maintenance instructions. The list shall show the piece of equipment, the Operations and Maintenance document name, and the O&M document page number that contains the instructions.
 - c. Submittal and Product Data. This section shall include product data not covered by manufacturer's Operations and Maintenance instructions and associated shop drawings.



- d. Warranty and Service Contracts. This section shall include the following for each piece of equipment, as applicable:
 - 1) Copy of the equipment warranty information provided as part of Section 01 78 36.
 - 2) Additional Warranties in accordance with Warranty requirements in DIVISIONS 02 to 49, as applicable. Equipment Warranties shall clearly list requirements to maintain the Warranty in effect, conditions or acts that would invalidate or void the Warranty, and Warranty expiration date.
 - 3) Service contracts issued. Contracts shall clearly indicate contract dates and scope of work included.

- e. Operation and Maintenance Instructions. These shall be the written manufacturer's maintenance and operating instructions with the model number and features of the installed equipment or system clearly identified. This section shall include applicable data on the following:
 - 1) Installation, startup, and break-in instructions.
 - 2) Starting, normal shutdown, emergency shutdown, manual operation, seasonal changeover and normal operating procedures and data, including any special limitations.
 - 3) Operations and Maintenance and installation instructions that were shipped with the unit.
 - 4) Preventative maintenance and service procedures and schedules.
 - 5) Troubleshooting procedures.
 - 6) A parts list, edited to omit reference to items which do not apply to this installation.
 - 7) A list of any special tools required to service or maintain the equipment.
 - 8) Performance data, ratings, and curves.

- f. Control Drawings. This section contains controls drawings and the final sequence of operations, set points, and schedules as set during the Commissioning Process. If shop drawings, portions of the project manual, or record drawings clearly show this information, a copy of this information may be inserted. Otherwise, original drawings shall be generated and included in this section.



- D. Division 23 Special Air Balance Documentation. The Balancing Subcontractor will compile and submit the following with other documentation that may be specified elsewhere in the Project Specifications.
1. Final report containing an explanation of the methodology, assumptions, test conditions, and the results in a clear format with designations of all uncommon abbreviations and column headings.
 2. The Balancing Subcontractor shall mark on the drawings where all traverse and other critical measurements were taken and cross reference the location in the Test and Balance report.

1.08 DEMONSTRATION AND TRAINING SCHEDULE

- A. The following applies to the minimum duration of demonstration and training provided City Maintenance and Operations Personnel.
1. HVAC Systems:
 - a. Air-Conditioning System: Minimum 4 hours.
 2. HVAC Controls: Minimum 4 hours.
 3. Lighting Systems and Controls: Minimum 4 hours.

PART 2 – PRODUCTS – N/A

PART 3 – EXECUTION – N/A

END OF SECTION – 01 7900



SECTION 01 81 19 INDOOR AIR QUALITY PROCEDURES

Part 1 - GENERAL

1.01 SUMMARY

- A. Section includes administrative and procedural requirements governing protection of indoor air quality (IAQ), absorbent materials, and mechanical system from contamination during demolition and building flush out along with baseline indoor air quality testing prior to Owner occupancy.

1.02 REFERENCES

- A. ASHRAE Standard 52.2-Method of Testing General Ventilation Air-Cleaning Devices for Removal Efficiency by Particle Size; 1999.
- B. SMACNA (OCC) - IAQ Guideline for Occupied Buildings under Construction; 2nd Edition, 2007, ANSI/SMACNA 008-2008 (Chapter 3).
- C. EPA Compendium of Methods for the Determination of Air Pollutants in Indoor Air.

1.03 DEFINITIONS

- A. Absorptive Materials: Gypsum board, acoustical ceiling tile and panels, carpet and carpet tile, fabrics, fibrous insulation, and other similar products.
- B. Contaminants: Gases, vapors, regulated pollutants, airborne mold and mildew, and the like, as specified.
- C. Particulates: Dust, dirt, and other airborne solid matter.
- D. Wet Work: Concrete, plaster, coatings, and other products that emit water vapor or volatile organic compounds during installation, drying, or curing.

1.04 SUBMITTALS

- A. Action Submittals: Construction Indoor Air Quality Management (IAQ) Plan
 - 1. General: Develop an IAQ plan based upon SMACNA IAQ Guidelines. The plan shall describe in detail measures specific to this project to be taken during construction to promote adequate indoor air quality upon completion.
 - a. HVAC Protection: Describe steps to protect ductwork and HVAC equipment from dust and water damage.



- b. Source Control: Identify sources of VOCs and appropriate measures to mitigate their impacts.
 - c. Pathway Interruption: Manipulate air paths to reduce contaminants of finished spaces.
 - d. Housekeeping: Describe cleaning and dust control procedures.
 - e. Scheduling: Identify each interior finish that either generates odors, moisture, or vapors or is susceptible to adsorption of odors and vapors, and indicate air handling zone, sequence of application, and curing times.
 - f. Prohibit the use of tobacco products during construction inside the building and within 25 feet of building entrances.
2. Quality Assurance and IAQ Monitoring: Describe steps to ensure compliance by Contractor and subcontractors.
 3. Photograph Documentation – Submit six photographs of the 5 SMACNA measures taken throughout construction and submitted on a monthly basis. Identify date and SMACNA measure featured in each photograph.
 4. Indoor Air Quality Assessment: The IAQ plan shall describe in detail measures specific to this project to be taken before occupancy to promote adequate indoor air quality upon completion, following one of the following options.
 - a. Indoor Air Quality Flush-Out:
 - 1) Narrative describing the Project’s specific flush-out procedures.
 - b. Indoor Air Quality Testing
 - 2) Narrative describing IAQ testing process.
 5. Interior Finishes Installation Schedule: Identify each interior finish that either generates odors, moisture, or vapors or is susceptible to absorption of odors and vapors, and indicate air handling zone, sequence of application and curing times.

Part 2 - PRODUCTS (NOT USED)

Part 3 - EXECUTION

1.01 PLAN IMPLEMENTATION

- A. Refer to SMACNA IAQ Guideline for Occupied Buildings under Construction for avoiding unnecessary contamination due to construction procedures.
- B. Building HVAC system and supply air ductwork may be used for ventilation during construction:



1. Begin construction ventilation when building is substantially enclosed.
 2. Operate HVAC system with 100 percent outside air and with 1.5 air changes per hour, minimum.
 3. Ensure that air filters are correctly installed prior to starting use; replace filters when they lose efficiency.
 4. Do not use return air ductwork for ventilation unless absolutely necessary.
 5. Where return air ducts shall be used for ventilation, install MERV 8 filters at return inlets, sealed to ducts; replace filters when they lose efficiency.
- C. Prevent the absorption of moisture and humidity by adsorptive materials by:
1. Sequencing the delivery of such materials so that they are not present in the building until wet work is completed and dry.
 2. Delivery and storage of such materials in fully sealed moisture-impermeable packaging.
 3. Provide sufficient ventilation for drying within reasonable time frame.
- D. HVAC Protection:
1. Protect air handling and distribution equipment, and air supply and return ducting during demolition.
 2. Adequately cover and protect exposed air inlets and outlets, openings, grilles, ducts, plenums, as required to prevent water, moisture, and other contaminant intrusion.
 3. Apply protection immediately after installation of equipment and ducting.
 4. Do not store construction materials or waste in mechanical or electrical rooms.
 5. Prior to using return air ductwork without intake filters clean up and remove dust and debris generated by construction activities.
 6. Inspect duct intakes, return air grilles, and terminal units for dust.
 7. Clean plenum spaces, including top sides of lay-in ceilings, outsides of ducts, tops of pipes and conduit.
 8. Clean tops of doors and frames.



9. Clean mechanical and electrical rooms, including tops of pipes, ducts, and conduit, equipment, and supports.
10. Clean return air plenums of air handling units.
11. Remove air intake filters only after cleaning is complete.
12. Do not perform dust or dirt- producing work after starting use of return air ducts without intake filters on return air ducts.

E. Pathway Interruption:

1. Provide solid physical barriers to isolate areas of construction. Securely attach and seal at floor and structure above.
2. Openings within the designated work area shall be sealed.
3. Adequate exhaust ventilation equipment shall be installed to maintain a negative pressure differential between the work area and adjacent areas of the building.
4. Ventilation units shall be exhausted to the outside of the building.

F. Source Control:

1. Limit construction traffic and motor idling in the vicinity of air intake louvers when the HVAC systems are activated. Restrict motor vehicles to the loading dock area, well removed from air intakes and operable windows, preventing emissions from being drawn into the building.
2. Use electric or natural gas alternatives for gasoline and diesel equipment where possible and practical.
3. Cycle equipment off when not being used or needed.
4. Avoid the use of materials and products with high VOC and/or particulate levels. Use products and installation methods with low VOCs such as paints, sealers, sealants, filler materials, insulation, adhesives, caulking and cleaners. Comply with the requirements in other specification Sections.
5. Keep containers of wet products closed as much as possible. Cover and seal waste materials, which can release odor or dust.



6. Protect materials, especially absorbent materials such as insulated ductwork, against moisture during delivery to and storage at the job site. Store materials inside the structure in a dry and clean environment pending installation. Building materials shall be kept dry to avoid the introduction of moisture into the building interior.
 7. Avoid the use of moisture-damaged materials. Any porous materials that have been wetted shall be dried thoroughly before installation. Any porous materials that have been damaged remained wet longer than 48 hours, or show signs of visible mold shall be discarded.
 8. Ensure that the construction process will not result in moisture intrusion.
 9. Avoid tracking pollutants into work areas. Once the framing and mechanical system installation starts, access to the building interior shall be controlled to minimize the tracking in of contaminants. Material deliveries and construction waste removal shall be routed via the most direct route to the building exterior of the building rather than through the space.
 10. Provide rough track-off grates or matting at the entryway to remove moisture and containments from entering the building.
 11. Prevent the ingress of rodents and pests.
 12. Prohibit the use of tobacco products during construction inside the building and within 25 feet of building entrances.
- G. Housekeeping:
1. Provide temporary ventilation during demolition to minimize accumulation of dust fumes, vapors, or gases in the building.
 2. Suppress dust with wetting agents or sweeping compounds.
 3. Clean-up dust using a wet rag or damp mop.
 4. Increase the cleaning frequency when dust build-up is noted.
 5. Remove spills or excess applications of solvent-containing products as soon as possible.
 6. Remove accumulated water and keep work areas as dry as possible.
 7. Store volatile liquid containers closed when the container is inside of the building and not in use.



8. Keep volatile liquid containers closed when the container is inside of the building and not in use.
9. HEPA vacuuming and duct cleaning.
10. Use nontoxic cleaning materials and procedures.

H. Scheduling:

1. Comply with the scheduling requirements of Article, "Sequence of Finish Installation" of this Section.
2. To avoid potential contamination of porous or absorbent materials such as ceiling tiles, install furnishings after interior finishes (drywall, paint, and floor finishing) have cured.
3. Phased Completion: Implement IAQ control measures in each tenant area until construction in that area is complete. Do not allow contaminants from an area under construction to enter the HVAC ductwork systems or to migrate to completed areas.
4. Filters: Install new MERV 8 filters at the central fan system, immediately prior to the first phase of building occupancy. Install new MERV 8 filters at fan systems serving limited areas immediately prior to occupancy for each respective area.

1.02 CONSTRUCTION INDOOR AIR QUALITY ASSESSMENT

- A. Prior to flush-out or air testing, the building shall have interior finishes installed including, but not limited to, millwork, doors, paint, carpet, acoustic tiles and movable furnishings (e.g. workstations, partitions), and major VOC punch-list items must be finished.
- B. Option 1, Path 1: Flush-out, Before Occupancy
 1. After construction ends, prior to occupancy and with interior finishes and furniture installed, perform a building flush-out by supplying a total volume of 14000 cu. ft. of outdoor air per sq. ft. (sq. m) of floor area while maintaining an internal temperature of at least 60 degrees F (16 degrees C) and a relative humidity no higher than 60 percent. Indicate operating procedure for each HVAC system and piece of equipment and the operating duration required for flush-out.
 - a. Follow the manufacturer operating procedures for each HVAC system and piece of equipment and the operating duration required for flush out.
- C. Option 2: Air Testing:



1. Conduct baseline indoor-air-quality testing, after construction ends and prior to occupancy, using testing protocols consistent with the EPA's Compendium of Methods, or ISO Methods, as detailed in the USGBC's "Reference Guide for Building Design and Construction," version 4 (v4).
2. Demonstrate that the contaminant maximum concentrations listed below are not exceeded:
 - a. Formaldehyde: 27 ppb.
 - b. Particulates (PM10): 50 micrograms/cu. m.
 - c. Ozone: 0.075 ppm.
 - d. Total Volatile Organic Compounds (TVOCs): 500 micrograms/cu. m.
 - e. Target Chemicals listed in CDPH Standard Method v1.1, Table 4, except formaldehyde: CHPH Standard Method v1.1, Allowable Concentrations, Table 4-1.
 - f. Formaldehyde: 27 ppb.
 - g. Carbon Monoxide (CO): 9 ppm and no greater than 2 ppm above outdoor levels.
3. Measurements shall be conducted prior to occupancy but during normal occupied hours, and with building ventilation system starting at the normal daily start time and operated at the minimum outside air flow rate for the occupied mode throughout the duration of the air testing.
4. Prior to testing, the building shall have interior finishes installed including, but not limited to, millwork, doors, paint, carpet, acoustic tiles and movable furnishings (e.g. workstations, partitions), and major VOC punch-list items must be finished.
5. Test at least one location per ventilation system for each occupied space type. There must be a minimum of one test per floor. The locations selected for testing must represent the worst-case zones where the highest concentrations of contaminants of concern are likely to occur.
6. Test areas no larger than 5,000 square feet. If there is evidence that the air in the space is well mixed and sources of contaminants of concern are uniform, project teams may test a single location in that space.
7. For each sampling point where the maximum concentration limits are exceeded, take corrective action and retest for the noncompliant contaminants at the same sampling points. Repeat until all requirements are met.



1.03 SEQUENCE OF FINISH INSTALLATION

- A. Sequence of Finish Installation: Project schedule shall address construction scheduling/sequencing requirements and procedures necessary to optimize Indoor Air Quality (IAQ) levels for the completed Project.
1. Scheduling Contractor's Project Schedule for finish applications should allow for: Dissipation of high emissions from finishes that off-gas perceptible quantities of deleterious material during curing Separation of off-gassing effects from the installation of adsorptive materials that would act as a "sink" for storage and subsequent release of these unwanted substances into building spaces and mechanical systems after project occupancy.
 2. When Contractor's "Project Schedule" requires less than optimal sequencing of finish installation, related to IAQ, provide supplemental filtered "fresh air" ventilation of work areas during construction and restrict / control the use of permanent building mechanical systems prior to Owner's acceptance of building to prevent contamination of systems by construction wastes and other deleterious substances.
- B. Finish Types:
1. Type 1: Materials and finishes which have a potential for short-term levels of off-gassing from chemicals inherent in their manufacturing process, or which are applied in a form requiring vehicles or carriers for spreading which release a high level of particulate matter in the process of installation and/or curing. Type 1 Finishes include, but are not limited to the following:
 - a. Adhesives, sealants, and glazing compounds, specifically those with petrochemical vehicles or carriers.
 - b. Wood preservatives, finishes, and paint.
 - c. Control and/or expansion joint fillers.
 - d. All hard finishes requiring adhesive installation.
 - e. Gypsum board and associated finish processes.
 - f. Sealants and associated filler materials.
 2. Type 2: Finishes: Materials and finishes which are woven, fibrous, or porous in nature and tend to adsorb chemicals off-gassed by Type 1 finishes or may be adversely affected by particulates. These materials become "sinks" for deleterious substances, which may be released much later, or collectors of contaminants that may promote subsequent bacterial growth. Type 2 Finishes include, but are not limited to the following:
 - a. Carpet and padding.



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- b. Fabric wallcovering.
 - c. Insulation exposed to the airstream.
 - d. Acoustic ceiling materials.
 - e. Fabric covered acoustic wall panels.
 - f. Upholstered furnishings.
 - g. Materials that can be categorized as both Type 1 and Type 2 materials shall be considered to be Type 1 materials.
- C. Optimal Order of Installation: Apply Type 1 interior finishes throughout the entire controlled air zone of each enclosed building or building segment and allow such finishes to completely cure according to intervals and times stated in respective finish manufacturer's printed instructions before commencing installation of any Type 2 materials in the same area.
- 1. Do not store any Type 2 materials in areas where installation or curing of Type 1 materials is in progress.

END OF SECTION - 01 81 19



SECTION 02 26 00

ASSESSMENT

PART 1 – GENERAL

1.01 SUMMARY

- A. Description: This Section includes requirements regarding discovery of suspect or confirmed hazardous substances encountered on the Project and Contractor use of hazardous substances.
- B. Section Includes:
 - 1. Discovery
 - 2. Assessment
 - 3. Contractor Generated Waste
 - 4. Contractor Use of Hazardous Substances

1.02 REGULATORY REQUIREMENTS AND GOVERNMENTAL REFERENCES

- A. 29 Code of Federal Regulations 1910 Occupational Safety and Health Standards for General Industry
- B. 29 CFR 1926 Occupational Safety and Health Standards for the Construction Industry
- C. 40 CFR 260 Hazardous Waste Management Systems: General
- D. 40 CFR 261 Identification and Listing of Hazardous Waste
- E. 40 CFR 262 Standards Applicable to Generators of Hazardous Waste
- F. 40 CFR 263 Standards Applicable to Transporters of Hazardous Waste
- G. 40 CFR 264 Standards for Owners and Operators of Hazardous Waste Treatment, Storage and Disposal Facilities
- H. 40 CFR 265 Interim Status Standards for Owners and Operators of Hazardous Waste Treatment, Storage and Disposal Facilities
- I. 49 CFR 171.8 Department of Transportation Research & Special Programs Administration
- J. 49 CFR 172.101 Department of Transportation Hazardous Materials Table

1.03 RELATED CONTRACT DOCUMENTS

- A. Section 02 61 01 – Removal and Disposal of Hazardous Substances



- B. Section 02 41 16 – Demolition
- C. Section 02 82 00 – Asbestos Cement Pipe Removal & Disposal
- D. Asbestos Survey and Hazardous Materials Inspection Report for the Goleta Train Depot, prepared by All Phase Environmental, Inc., December 6, 2023.
- E. Lead-Based Paint Survey Report for the Goleta Train Depot, prepared by All Phase Environmental, Inc., November 30, 2023.
- F. Soil Management Plan for the Goleta Train Depot, prepared by All Phase Environmental, Inc., March 4, 2024.
- G. Santa Barbara Air Pollution Control District Form 07A if VOCs are detected in the soil.

1.04 DEFINITIONS

- A. Hazardous Substance means any substance designated or listed under paragraphs 1 through 4 of this definition, exposure to which results or may result in adverse affects on the health or safety of employees:
 - 1. Any substance defined under section 101(14) of CERCLA;
 - 2. Any biological agent and other disease-causing agent which after release into the environment and upon exposure, ingestion, inhalation, or assimilation into any person or organism, either directly from the environment or indirectly by ingestion through food chains, will or may reasonably be anticipated to cause death, disease, behavioral abnormalities, cancer, genetic mutation, physiological malfunctions (including malfunctions in reproduction) or physical deformations in such persons or their offspring;
 - 3. Any substance listed by the U.S. Department of Transportation as hazardous materials under 49 CFR 172.101 and appendices; and
 - 4. Hazardous waste as herein defined.
- B. Hazardous waste means -
 - 1. A waste or combination of wastes as defined in 40 CFR 261.3, or
 - 2. Those substances defined as hazardous wastes in 49 CFR 171.8.
 - 3. Hazardous waste having the characteristics identified under or listed pursuant to section 3001 of the Resource Conservation and Recovery Act of 1976 (RCRA), as amended, (42 U.S.C. § 6921) (but not including any waste the regulation of which under RCRA (42 U.S.C. § 6901 et seq.) has been suspended by Act of Congress), any toxic pollutant listed under section 1317(a) of Title 33, any hazardous air pollutant listed under section 112 of the Clean Air Act (42 U.S.C. § 7412), and any imminently hazardous chemical substance or mixture with respect to which the Administrator (of EPA) has taken action pursuant to section 2606 of Title 15.



1.05 SUBMITTALS

- A. Hazardous Substance Screening and Sampling Plan (HSSSP)
 - 1. Elements
 - a. Standard operating procedures (SOPs) for sample collection
 - b. Standard operating procedures for field screening and/or testing
 - c. Laboratory test methods
 - 2. Schedule of Submittals
 - a. Submit HSSSP to OWNER not more than 30 days after receipt of Notice to Proceed
 - b. Allow not less than 30 days for review by OWNER
 - c. No adjustment for time or money will be made if resubmittal of the HSSSP is required due to deficiencies.

- B. Hazardous Substances Health and Safety Plan (HSHSP)
 - 1. The HSHSP shall conform to guidance developed by the U.S. Environmental Protection Agency. It is noted that a Health and Safety Plan is provided in the appendix section of the Soil Management Plan (SMP) which may be utilized during excavation activities. For other hazardous substances encountered, at a minimum, the HSHSP shall include:
 - a. Schedule of activities.
 - b. The identity and locations of identified sites containing hazardous substances and procedures for handling materials encountered at these sites.
 - c. Methods and procedures to remove, stage, and store hazardous substances, and the equipment to be used for these activities.
 - d. Methods and procedures for the transport, disposal, and off-site treatment of regulated and non-regulated hazardous substances, in compliance with applicable federal, state, and local laws and regulations, including the identification of haul routes, disposal and treatment facilities, and the use of certified, licensed transporters.
 - e. Equipment decontamination procedures.
 - f. Worker decontamination procedures.
 - g. Contingency plans to address the removal or abandonment in place of an underground storage tank (UST) if one is encountered.
 - h. Contingency plans to address the procedures that will be followed if unknown contamination is encountered during the Work which conform with 3.01.
 - i. Sampling and analysis procedures that cover the Contractor's sampling responsibilities, including the characterization of tank contents and releases of hazardous and hazardous substances for which the Contractor is responsible under the Contract.
 - j. Spill prevention procedures and spill contingencies.



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- k. Sampling plan for determining the waste designation for materials identified as Lead containing.
 - l. Procedures for documenting and reporting to OWNER.
 2. Schedule
 - a. Submit HSHSP to OWNER not more than 30 days after receipt of Notice to Proceed
 - b. Allow not less than 30 days for review by OWNER
 - c. No adjustment for time or money will be made if resubmittal of the HSHSP is required due to deficiencies.
 3. Perform no work, with the exception of site inspections and surveys, until OWNER has accepted the HSHSP.
- C. Submit qualifications of the Task Supervisor and the person conducting environmental sampling.
- D. Storm Water Pollution Prevention Plan (SWPPP)
1. The SWPPP will include elements such as silt traps and hay bales to minimize surface water runoff from the site into storm drains. Berms will be used to control runoff, and soil stockpiles will be covered during the rainy season (November through March) to minimize sediment runoff.
- E. Submit copies of current certifications for training, medical surveillance, and respiratory fit test, as appropriate for workers.
- F. Submit surveys, cross-sections, and areas of excavation delineating areas of hazardous substances.
- G. Submit the Contractor's analytical testing documentation to OWNER within 24 hours of receipt.
- H. Submit evidence that a state-licensed transporter is being used to transport hazardous substances. If transport will occur across state boundaries, each transporter shall be licensed in the state through which the waste is transported.
- I. Submit evidence that all hazardous substances are disposed at appropriately licensed facilities.
- J. Closeout Submittals: Submit a closeout document at completion of the task, containing sample chains of custody, analytical laboratory test results, surveys, logs, waste manifests, and certificates of disposal/destruction.



1.06 GENERAL REQUIREMENTS

- A. To the fullest extent permitted by law, indemnify and hold harmless OWNER, its elected and appointed officials, agents, employees, volunteers, OWNER's consultant and the officers, directors, partners, employees, agents, other consultants and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys and other professionals and all court or arbitration or other dispute resolution costs) arising out of or resulting from such hazardous environmental condition created by Contractor or anyone for whom Contractor is responsible.
- B. Safeguards, signs, and notices: Erect and maintain, as required by existing conditions and performance of the Contract, reasonable safeguards for safety and protection, including posting danger signs and other warnings and notices against hazards, promulgating safety regulations and notifying owners and users of adjacent site and utilities.
- C. Follow the guidelines of the provided Soil Management Plan (SMP) during excavation and grading activities.

1.07 QUALITY ASSURANCE

- A. Qualifications
 - 1. Work shall be directed by a supervisor (Task Supervisor) trained and experienced in working with materials containing hazardous substances. The supervisor shall have completed Occupational Safety and Health Administration (OSHA) training requirements for working with hazardous substances including the 8-hour supervisory course. The supervisor shall have a minimum of 3 years of experience managing projects involving the removal, treatment or disposal of hazardous substances. Submit a copy of the supervisor's qualifications and experience for OWNER review.
 - 2. Personnel working with hazardous substances and waste shall have received training and have experience for the Work to be performed.
 - 3. Personnel taking and managing samples shall have the necessary OSHA training and have a minimum of 1 year of experience in environmental sampling.
- B. Certification:
 - 1. All safety personnel shall have current certifications in accordance with their required qualifications.
 - 2. Contractor's and subcontractors' personnel who perform or supervise hazardous materials work requiring Level C or Level D protection, as defined by the Hazard Communication Site Health and Safety Plan, shall have received appropriate safety training in compliance with 29 CFR 1910.120 and 29 CFR 1910.134. A minimum of 40 hours of health and safety training, 24 hours of on-the-job training, 8 hours of annual refresher training, and annual medical monitoring by an occupational physician



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is required. A minimum of 8 hours of additional specialized training in managing hazardous waste operations is required for supervisory personnel. Workers without current certification will not be allowed to enter an Exclusion Zone.

3. Contractor's and subcontractors' personnel who perform or supervise hazardous materials work requiring Level A or Level B protection, as defined by the Hazard Communication Site Health and Safety Plan, shall have received all appropriate safety training in compliance with 29 CFR 1910.120, 29 CFR 1910.134, needed for the hazardous environment in which they will be working.
 4. Comply with the medical surveillance program requirements of OSHA Standard 29 CFR 1910.120, 29 CFR 1910.134. Provide documentation that personnel have received medical examinations and are certified for respirator use (if necessary), within the last 12 months, and are cleared to work on hazardous sites before entering an Exclusion Zone or contacting hazardous substances.
 5. Contractor shall submit samples for analysis to an independent, third party laboratory with a current certification from governmental agency having jurisdiction.
 6. Required certifications, physicals, and fit test requirements for asbestos and lead-based paint personnel are detailed in Specification Section 02 26 01.
- C. Contractor may be asked to attend meetings to discuss sample results and the course of action.

PART 2 – PRODUCTS

NOT USED

PART 3 – EXECUTION

3.01 ASSESSMENT OF HAZARDOUS SUBSTANCES

A. Immediate Response

1. Discovery of Anticipated Hazardous Substances
 - a. Anticipated Hazardous Substances include any soil, water, liquid, gas or other hazardous substance.
 - b. If Contractor encounters hazardous substances identified in the Contract Documents, Contractor must immediately notify OWNER and then proceed with work activities needed to address the hazards associated with the material and the precautions to be taken when the materials are encountered.
2. Discovery of Unanticipated Hazardous Substances
 - a. Unanticipated Hazardous Substances include any soil, water, liquid, gas or other hazardous substance.



- b. If Contractor encounters unanticipated hazardous substances, Contractor must immediately:
 - 1) Secure or otherwise isolate such condition;
 - 2) Stop all construction that may encounter or disturb the discovered suspect hazardous substance (except in an emergency) and take appropriate steps for worker and public safety.
 - 3) Conduct a hazardous substance assessment in accordance with Section 3.01 B and consult the Soil Management Plan for guidance.
 - 4) Notify OWNER within 24 hours after discovering suspect hazardous substances and confirm such notice in writing. The notice shall include all available information regarding the site conditions, including, but not limited to (a) a written description of the media/material and the possible hazardous substance; (b) drawings illustrating the area where potentially hazardous substances were encountered and (c) photographs, if any.
 - 5) Submit one or more figures identifying the locations and depths from the ground surface at which samples were collected, a description of the physical characteristics of each sample, and the results of analytical testing to OWNER within 24 hours of receipt of the analytical data.

B. Hazardous Substance Assessment

1. Worker safety and health protective measures shall be appropriate for the exposure and in accordance with applicable U.S. Department of Labor, Occupational Safety & Health Administration (OSHA) regulations.
 - a. Worker safety exposure assessment shall comply with regulatory Action Levels (AL) and Permissible Exposure Limits (PEL) established by OSHA for the substance of concern.
 - b. For purposes of immediate worker safety, atmospheric analysis shall be conducted using the PID and Combustible Gas Indicator (CGI). Samples of the general atmosphere shall be measured on all four sides of the area where work is being conducted. Work shall continue based on the PID/CGI readings and by pre-determined action levels set by the Contractor.
2. Visually inspect soil samples for staining, debris, slag, or sheen. If unusual odors are noted, they shall also be used to identify the likely presence of contamination.
3. Field Screening Techniques
 - a. When soil samples are collected in areas with likely contamination caused by volatile organic carbon compounds, as indicated by the known historical uses of the site, or olfactory or visible evidence of volatile organic compounds is indicated, measure headspace to determine the presence for VOCs. Contractor is responsible for establishing action levels that correlate with current HDOH Office of Solid Waste Management soil reuse standards and the measurement properties of Contractor's test equipment.



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- b. Headspace Test
 - 1) Screen samples collected from the removed materials in the areas of possible contamination with a Photoionization Detectors (PID) for the presence of volatile organic compounds.
 - 2) Headspace analysis shall be conducted by placing suspect material into an inert sealable container (a glass jar or “ziploc” bag), allowing the material to equilibrate for several minutes, and collecting measurements of the air within the container.
 - 3) Field screening tests may be used to screen for potential for contamination.
4. Collection of Samples for Laboratory Analysis
 - a. Samples Used to Characterize the Site Conditions
 - 1) Collect all samples that will be used to identify the chemicals of concern and their concentrations.
 - b. Samples Used to Characterize whether the Material is Hazardous Waste
 - 1) Contractor is responsible for characterization sampling and analysis of the excavated materials.
 - 2) Collect and analyze all samples that will be used to characterize waste in accordance with U.S. EPA regulations, the requirements of the transporter and receiving disposal or treatment site, the requirements of the H.
 - 3) Sample and analyze all materials potentially containing hazardous substances generated during site investigation and abatement activities.
 - 4) Conduct confirmation sampling associated with Contractor’s generation, use, and/or release of hazardous or contaminated substances for which the Contractor is responsible under the General Conditions.
 - c. Collection of Unanticipated Suspect Hazardous Substance Samples
 - 1) Perform required sampling and chemical analyses relating to the Contractor’s generation, use, release, and/or disposal of hazardous substances in the course of the Contractor’s operation, for which the Contractor is responsible under the General Conditions. Provide OWNER with advance notice of such activities and provide OWNER with access to perform concurrent verification sampling.
 - 2) Perform required sampling and chemical analyses relating to existing potentially hazardous substances, unless this is otherwise provided herein or in the Contract. Such sampling shall include characterization sampling and sampling necessary to determine disposal methods. Disposal of material shall not occur until directed to do so by OWNER.
 - d. Collection of On-site Discharge Water
 - 1) Sample and analyze water that will be directly or indirectly discharged to rivers, streams, or other surface waters to ensure compliance with discharge or disposal requirements specified in the HSHSP and/or permits.



- 2) Provide OWNER with advance notice of all sampling activities
- 3) Provide OWNER with access to collect concurrent verification samples if it elects to do so.

5. Laboratory Analysis

a. Previously confirmed hazardous substances

- 1) Hazardous substances encountered by the Contractor within the sites identified in the Contract Documents will be the Contractor's responsibility to manage appropriately.
- 2) Contractor may use laboratory test data for waste characterization if it is acceptable to the receiving waste treatment or disposal facility and transporter. Contractor has the responsibility of confirming the adequacy of these data with the receiving waste treatment or disposal facility and transporter before work commences. OWNER is not responsible for delays or additional expenses if the transporter or receiving waste treatment or disposal facility is unwilling to accept the data for waste characterization.
- 3) The identification, testing, assessment, containment, removal, disposal and/or treatment of hazardous substances identified in the Contract Documents is considered to be included with the related item of work in the General Conditions, or incidental to the Work.

C. Long-term Response

1. If analytical testing shows that hazardous substance are present, Contractor shall provide information to OWNER in summary form with supporting documentation within 60 working days.
 - a. Identity of chemicals of concern (COCs).
 - b. Concentrations of COCs at each sampled locations.
 - c. Estimated extent of contamination.
 - d. Required construction work in the contaminated area.
 - e. Effect of the contamination on the work that will need to be done.
 - f. Adequacy of the data in identifying the nature and extent of contamination, and how limitations in the data might affect the selection of an abatement method.
 - g. Options for how contamination can be abated or otherwise addressed while performing needed construction work in the contaminated area
 - 1) Costs for each option, including the estimated probable value, the estimate low value, the estimated high value, and the limitations in the data that affect the adequacy of the cost estimates. The compensation for each abatement option shall be based upon the unit prices identified in the Construction Agreement. If an abatement activity requires the use of equipment, materials, or the performance of work not anticipated in the Construction Agreement, Contractor shall identify the unit cost of each, the number of units that are



- required, the method that should be used to identify each unit, and the total estimated cost for each item.
 - 2) Impact of each abatement option on the environment, including the movement or relocation of contamination.
 - 3) Impact of each abatement option on the construction schedule.
 - 4) Health and safety risks associated with each abatement option.
2. OWNER, with the advice of Contractor, shall select an abatement method to address the encountered contamination.
 3. OWNER shall have the option of seeking other technical advice and bids, and contracting with others to complete any and all abatement work not identified in the Construction Agreement.
 4. Upon selection of an abatement option and within 20 working days after an agreement with Contractor to conduct the abatement work has been authorized, Contractor shall modify and submit to OWNER the HSHSP to address the hazards associated with the condition and required work activities associated with the abatement methods.

3.02 CONTRACTOR GENERATED WASTE

- A. All waste material generated by the Contractor is to be tested as required by the accepting authority (i.e. landfill), and disposed of properly. The testing of the waste material (whether “clean” or containing hazardous substances) is considered to be included with the related item of work in the General Conditions, or incidental to the Work.
- B. Hazardous substance waste must be disposed per Section 02 61 01. All waste must be reused or disposed in accordance with all applicable Federal, State, and local regulations.

3.03 CONTRACTOR USE OF HAZARDOUS SUBSTANCES

- A. Contractor use of hazardous substances shall be in accordance with 29 CFR 1910.1200 Hazard Communication and the Contractor’s accepted Site Safety and Security Plan.
- B. Contractor is solely responsible for materials creating a hazardous substances condition brought to the Site by the Contractor, subcontractors, suppliers, or anyone else for whom Contractor is responsible.
- C. The use, generation, handling and disposal of hazardous substances shall be addressed in Contractor’s Hazardous Substances Health and Safety Plan (HSHSP).
- D. Contractor must comply with the requirements of all laws to ensure that Project personnel are informed and trained on the use of hazardous substances and know the possible health and safety risks.



- E. Contractor is responsible for proper transport, storage, handling and disposal of hazardous substances and wastes generated by or incidental to the Contractor's operations including lubricants, antifreeze, engine fluids, paints, and solvents.
- F. In addition to all other remedies provided by applicable laws or the Contract, OWNER may withhold from or recover from the Contractor any money that OWNER is required to expend, remediate, remove, or dispose of hazardous substances used by the Contractor, as well as the cost of any fines or impositions made by appropriate enforcement agencies from Contractor use of such items and material, whether or not the Contractor exercised due care.

END OF SECTION – 02 26 00



SECTION 02 26 01

REMOVAL AND DISPOSAL OF HAZARDOUS SUBSTANCES

PART 1 – GENERAL

1.01 SUMMARY

A. Description:

1. This Section includes excavating, dewatering, handling, stockpiling, temporarily storing, and/or disposing of existing hazardous and contaminated materials that are known or that may be encountered during the Work.
2. This Section includes preparation of plans to manage contaminated materials including those defined in General Conditions requirements.
3. This Section also includes procedures applicable to the Contractor's generation, use, and/or release of hazardous or contaminated substances in the course of the Contractor's operation, for which the Contractor is responsible under the General Conditions requirements. Complete the removal of lead-containing materials, asbestos, polychlorinated biphenyls (PCB) articles, and underground storage tanks.

B. Section Includes:

1. Contractor's Assistance
2. Existing Structures and Utilities
3. Contaminated Material Removal
4. Sampling and Analysis
5. Contaminated Material Staging
6. Spills
7. Backfill
8. Off-Site Disposal

1.02 REFERENCES

A. ASTM International (ASTM):

1. ASTM D5434 Standard Guide for Field Logging of Subsurface Explorations of Soil and Rock



1.03 REGULATORY REQUIREMENTS

A. Code of Federal Regulations (CFR):

1. 29 CFR 1910 Occupational Safety and Health Standards
2. 40 CFR 262 Standards Applicable to Generators of Hazardous Waste
3. 40 CFR 264 Standards for s and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities
4. 40 CFR 268 Land Disposal Restrictions
5. 40 CFR 280 Technical Standards and Corrective Action Requirements for s and Operators of Underground Storage Tanks (UST)
6. 40 CFR 302 Designation, Reportable Quantities, and Notification
7. 29 CFR 1926 OSHA Construction Industry Standard, including but not limited to 29 CFR 1926.20, 29 CFR 1926.1101, 29 CFR 1926.28, 29 CFR 1926.59, and 29 CFR 1926.62.
8. 29 CFR 1910 OSHA General Industry Standard, including but not limited to 29 CFR 1910.134, 29 CFR 1910.1025, 29 CFR 1910.1200, 29 CFR 1910.146, and 29 CFR 1910.147
9. 40 CFR 61(M) EPA Asbestos NESHAP
10. 40 CFR 763(E) Appendix C EPA Model Accreditation Program
11. 49 CFR 107 et al. DOT

B. Cal/OSHA California Code of Regulations (CCR):

1. Title 8, Section 1529; Asbestos Standards in Construction
2. Title 8, Section 5208; Asbestos Standards in General Industry
3. Title 8, Section 5208.1; General Industry Standard relating to Non-Asbestiform Tremolite, Anthophyllite, and Actinolite3. Title 8, Section 5208.1; General
4. Title 8 1532.1; Construction Safety Orders, Lead
5. Title 8 17 Div 1, Ch 8; Accreditation, Certification, and Work Practices for Lead-Based Paint and Lead Hazards
6. Title 8 5144; Respirator Protection



7. Title 8 5194; Hazard Communication
8. Title 22; Department of Toxic Substances Control (DTSC)
- C. Santa Barbara County Air Pollution Control District Regulations (CCR):
 1. Title 17, Section 93105; Asbestos Air Toxic Control Measures (ATCM) for Construction, Grading, Quarrying and Surface Mining Operations
 2. Notification for Renovation and Demolition; ENF-28
- D. State, county, and city codes and ordinances as applicable

1.04 RELATED CONTRACT DOCUMENTS

- A. Section 31 10 00 – Site Clearing
- B. Section 31 22 00 - Grading

1.05 DEFINITIONS

- A. Hazardous substance- means any substance designated or listed under paragraphs 1 through 4 of this definition, exposure to which results or may result in adverse affects on the health or safety of employees:
 1. Any substance defined under CERCLA 42 U.S.C. § 9601(14);
 2. Any biological agent and other disease-causing agent which after release into the environment and upon exposure, ingestion, inhalation, or assimilation into any person, either directly from the environment or indirectly by ingestion through food chains, will or may reasonably be anticipated to cause death, disease, behavioral abnormalities, cancer, genetic mutation, physiological malfunctions (including malfunctions in reproduction) or physical deformations in such persons or their offspring;
 3. Any substance listed by the U.S. Department of Transportation as hazardous materials under 49 CFR 172.101 and appendices; and
 4. Hazardous waste as herein defined.
- B. Hazardous waste means -
 1. A waste or combination of wastes as defined in 40 CFR 261.3, or
 2. Those substances defined as hazardous wastes in 49 CFR 171.8.
 3. Hazardous waste having the characteristics identified under or listed pursuant to section 3001 of the Resource Conservation and Recovery Act of 1976 (RCRA), as



amended, (42 U.S.C. § 6921) (but not including any waste the regulation of which under RCRA (42 U.S.C. § 6901 et seq.) has been suspended by Act of Congress), any toxic pollutant listed under section 1317(a) of Title 33, any hazardous air pollutant listed under section 112 of the Clean Air Act (42 U.S.C. § 7412), and any imminently hazardous chemical substance or mixture with respect to which the Administrator (of EPA) has taken action pursuant to section 2606 of Title 15

1.06 GENERAL REQUIREMENTS

- A. During construction, existing potentially hazardous substances may be encountered. These conditions may require the excavation, handling, stockpiling, temporary storing, and disposal of hazardous substances. Perform remediation and other tasks of this Section at the direction of OWNER, in compliance with applicable statutes and regulations.
- B. Potential hazardous substances that may be encountered include, but are not limited to, asbestos, lead, total petroleum hydrocarbons (TPH), gasoline, diesel, and oil-range; metals; polynuclear aromatic hydrocarbons (PAHs); polychlorinated biphenyls (PCB); and volatile organic compounds (VOCs), such as benzene, toluene, ethylbenzene, xylenes (BTEX); perchloroethene (PCE), trichloroethene (TCE), and vinyl chloride. Some of these substances and locations where there is a greater likelihood of impacted materials are discussed in the Hazardous Materials Technical Report (DTS 2008).
- C. Conduct the work of this Section in accordance with Contract requirements; direction received from OWNER; the accepted plans for managing hazardous substances; and applicable federal, state, and local statutes, regulations, and standards.
- D. Obtain all required permits and notifications for removal (excavation/dewatering), storage, transportation, and disposal of hazardous substances. In furtherance of this requirement, OWNER will provide the Contractor with sampling results, if any, and other information developed by OWNER, if any. Permits shall be obtained at no additional cost to OWNER.
- E. Implement the water discharge requirements set forth in the General Conditions.

1.07 SUBMITTALS

- A. Refer to submittals in Section 01 33 00 – Submittal Procedures.

PART 2 – PRODUCTS

2.01 BACKFILL MATERIAL

- A. Obtain backfill material in accordance with Section 31 23 13 – Excavation and Fill.



2.02 SPILL RESPONSE MATERIALS

- A. Provide spill response materials, including but not limited to containers, adsorbents, shovels, and personnel protective equipment. Spill response materials shall be available at all times when hazardous materials/wastes are being handled or transported. Spill response materials shall be compatible with the type of materials and contaminants being handled.

2.03 STAGING MATERIAL

- A. Geomembranes to be used as liner or material cover shall be chemical resistant with minimum thickness of 10 mils.

PART 3 – EXECUTION

3.01 CONTRACTOR’S ASSISTANCE

- A. Assist OWNER in performing general excavation and site remediation activities. This includes providing access for OWNER to document site activities and collect soil and water samples. Such assistance may also include collecting soil samples with a backhoe at the direction of OWNER or an authorized representative. Be aware and anticipate that a reasonable time will elapse between collecting confirmation samples and completing chemical laboratory analyses, and secure and maintain excavation areas during that time. Such assistance may also include attendance at regular project meetings.
- B. Assist OWNER in the duties specified under the General Conditions. Such assistance includes providing access to sampling sites so that OWNER may monitor discharges. Monitoring may be required under applicable permits.
- C. Provide access for City representatives to conduct its own testing and monitoring at its sole discretion to satisfy itself regarding compliance with regulatory or permit requirements. Inspection, monitoring, and testing by OWNER does not relieve the Contractor of responsibility for compliance.

3.02 EXISTING STRUCTURES AND UTILITIES

- A. Take necessary precautions to avoid damage to existing structures, their appurtenances, monitoring wells, or utilities that may be affected by work activities. Coordinate with OWNER and/or property s to locate underground utilities prior to beginning construction. Utilities encountered that were not previously shown or otherwise located shall not be disturbed without approval from the property or OWNER.
- B. Repair damage to existing site features to be protected at no additional cost to OWNER.



3.03 HAZARDOUS SUBSTANCE REMOVAL

- A. Unless directed otherwise by OWNER, give notification at least 7 calendar days prior to the start of excavation of known contaminated material. Unless otherwise directed by OWNER, be responsible for contacting regulatory agencies in accordance with applicable reporting requirements. Notification is to include the type of materials being removed, the levels of contamination, and the destination/final disposal site of the material.
- B. Strip and stockpile “clean” material separately from contaminated material. Segregate potentially contaminated material into material that exceeds field screening levels and material that does not exceed these levels. Be responsible for protecting “clean” material from becoming contaminated. This may include covering the materials with plastic sheeting. Materials that become contaminated as a result of Contractor activities shall be disposed of at the Contractor’s expense.
 - 1. Excavate areas of contamination as directed by OWNER and in compliance with State and local jurisdiction landfill requirements. Perform excavation in a manner that will limit the potential for contaminated material to be mixed with uncontaminated material.
- C. Maintain a log of the materials and visible signs of hazardous substances encountered during excavation for each area of excavation. Prepare excavation logs in accordance with ASTM D5434.
- D. Divert surface water to prevent entry into the excavation. Limit dewatering to that necessary to ensure adequate access and a safe excavation, and to ensure that compaction requirements can be met.
- E. Perform field surveys immediately prior to and after excavations of contaminated material to determine the volume of contaminated material removed. Provide cross-sections on 10-foot intervals and at obvious break points for excavated areas. Survey the locations of confirmation samples. Perform surveys using tape and compass methods.
- F. Contain contaminated water and store on site in accordance with applicable federal, state, and local disposal regulations until analytical results are obtained. Analyses for contaminated water to be taken to an off-site treatment facility shall conform to the requirements of the treatment facility. Analyses for storm drain or sanitary sewers shall be as specified in the General Conditions.
- G. Provide the approved containers, vehicles, equipment, labor, signs, labels, placards and manifests, and associated disposal notices and notifications necessary for accomplishing the Work.
- H. Provide documentation of proper disposal or treatment to OWNER.



3.04 SAMPLING AND ANALYSIS

3.05 OWNER HAZARDOUS SUBSTANCE MATERIAL STAGING

- A. Place material containing hazardous substances (herein referred to as contaminated material) in a staging unit immediately after excavation while awaiting test results. This Article describes acceptable methods of material staging. Staging units shall be in good condition and constructed of materials that are compatible with the material or liquid to be staged. If multiple staging units are required, clearly label each unit with an identification number and keep a written log to track the source of contaminated material in each staging unit.
- B. Isolate confirmed and/or suspected contaminated material from the environment. The maximum stockpile size shall be 100 cubic yards. Stockpiles shall be constructed to include:
 - 1. A chemically resistant geomembrane liner. The ground surface on which the geomembrane is to be placed shall be free of rocks greater than 0.5 inch in diameter and other objects that could damage the membrane.
 - 2. Geomembrane cover to prevent precipitation from entering the stockpile. The cover material shall be anchored to prevent it from being removed by wind.
 - 3. Berms surrounding the stockpile shall be a minimum of 12 inches high. Vehicle access points shall also be bermed.
 - 4. Liquid collected from excavations and stockpiles shall be temporarily stored in 55-gallon barrels or portable tanks. Liquid storage containers shall be watertight.
- C. Watertight roll-off units lined with 10-mil plastic sheeting may be used to stage contaminated material. Place an impermeable cover over the units to prevent precipitation from contacting the stored material. Remove and store liquid that collects inside the units.

3.06 SPILLS

- A. In the event of a Contractor spill or release of a hazardous substance, as defined in the General Conditions requirements, notify OWNER immediately. If the spill exceeds the regulatory reporting threshold, follow the pre-established procedures described in the HSHSP (described in Section 01 74 20 - Discovery and Assessment of Suspect and Confirmed Hazardous Substances) for immediate reporting and containment. Take immediate containment actions to minimize the effect of spills or leaks. Perform cleanup in accordance with applicable federal, state, and local regulations. As directed by OWNER, perform additional sampling and testing to verify spills have been cleaned up. Perform cleanup and testing of spills resulting from the negligent actions of the Contractor at no additional cost to OWNER.



3.07 BACKFILL

- A. Backfill excavations only after confirmation sample test results have been received and/or upon OWNER's direction. Contaminated material removal shall be considered complete after the bottom of the excavation is determined to have soil contamination levels below applicable state cleanup standards, and/or at OWNER's direction. Excavation shall be dewatered if necessary. Stockpiled material that was sampled for testing shall be used as backfill if it is found to conform to the requirements of clean fill in accordance with Section 31 23 13 – Earth Moving. Place and compact backfill in accordance with Section 31 23 13 – Earth Moving.

3.08 OFF-SITE DISPOSAL

- A. Load contaminated material for off-site disposal. Costs associated with this task shall be included in the unit price for material handling and disposal.
- B. Provide transportation in accordance with hazardous substance regulations and federal, state, and local requirements, including obtaining necessary permits, licenses, and approvals. In submittals, include evidence that a state-licensed transporter is being used. The contaminated material may be shipped by truck, ship, or rail. Provide coordination of all activities. Double-line the bed of the truck or rail car with 6-mil plastic sheeting for each load. Subsequently, cover each load with plastic sheeting and tarpaulin prior to leaving the site.
- C. Treatment, Disposal, and Recycling:
 - 1. Perform treatment, disposal, and recycling of contaminated materials in accordance with all applicable laws, regulations, and conditions specified herein. This work shall include all necessary personnel, labor, transportation, packaging, equipment, and reports.
 - 2. Where approved by governmental requirements, contaminated material can be treated or landfilled.
 - 3. If treated, transport contaminated material to a local licensed facility in accordance with applicable requirements.
 - 4. If landfilled, dispose of contaminated materials in a landfill licensed to receive the material, in accordance with applicable requirements.
- D. Records: Maintain records of all waste determinations, including appropriate results of analyses performed, substances and sample location, the time of collection, and other pertinent data as required by 40 CFR 280 Section 74 and 40 CFR 262 Subpart D, and other applicable regulations. Record and make available for inspection the following: transportation, treatment, disposal methods and dates, quantities of waste, names and addresses of each transporter, and disposal or reclamation facility. Also make copies of the following documents available:



1. Manifests.
 2. Waste analyses or waste profile sheets.
 3. Certifications of final treatment/disposal signed by the responsible disposal facility official.
 4. Land disposal notification records required under 40 CFR 268 for hazardous wastes.
 5. Records shall be provided in accordance with applicable federal, state, and local regulations. Following Contract closeout, records shall become OWNER's property.
- E. Manifesting of hazardous waste shall conform to EPA, DOT, and all other applicable federal, state, and local regulations. For disposal of all hazardous waste (with the exception of wastes resulting from the release of hazardous or contaminated substances negligently disturbed, removed, or handled by the Contractor, its employees, agents, officers, or subcontractors, or any other persons for whom the Contractor may be contractually or legally responsible), the Generator's Certification portion of the Uniform Hazardous Waste Manifest shall be signed only by OWNER's Hazardous Materials Coordinator or by an individual delegated with such authority by OWNER (OWNER's Representative).
- F. Documentation of Treatment or Disposal:
1. Transfer wastes, other than recyclable or reclaimable product or metal, to a treatment, storage, or disposal facility which has EPA or appropriate state permits and hazardous or special waste identification numbers and complies with the provisions of the disposal regulations.
 2. Furnish to OWNER the original return copy of the hazardous waste manifest, signed by the operator of a facility legally permitted to treat or dispose of those materials furnished, not later than 5 working days following the delivery of those materials to the facility.
 3. Furnish a statement of agreement from the proposed treatment, storage or disposal facility and certified transporters to accept hazardous or special wastes.

3.09 ASBESTOS REMOVAL SUMMARY OF WORK

- A. Work Included:
1. The asbestos materials to be removed and disposed of are detailed in the asbestos survey entitled, "*Asbestos Survey and Hazardous Materials Inspection, Goleta Train Depot, 27 South La Patera Lane, Goleta, California, 93117*" by All Phase Environmental, Inc. dated December 6, 2023.



2. Contractor shall verify actual quantities present and shall not rely on the quantities described in the asbestos survey.
3. Contractor shall establish work area containment(s) and remove asbestos-containing materials utilizing the required engineering controls and personal protective equipment (PPE). The Contractor shall decontaminate work area containments and dispose of ACM waste.
4. Contractor shall be responsible for performing personnel air monitoring and analysis.
5. The Contractor is hereby advised that asbestos has been determined by the U.S. Government to be a CANCER CAUSING AGENT and Contractor shall provide workers with respirators which, at a minimum, shall meet the requirements of OSHA 29 CFR 1910.134 and protective clothing during establishment of work area containment, prior to commencing asbestos removal, during actual asbestos removal, and until results of satisfactory final air tests are accepted by OWNER'S Representative
6. Contractor shall leave the work area in a condition ready for renovation by others.

B. Work Not Included:

1. Daily and clearance ACM air monitoring will be performed by the OWNER'S Representative.
2. Replacement or reinstallation of materials removed during abatement.

C. Work Plan and Schedule:

1. The Contractor shall prepare a detailed plan of the work procedures to be used, the method(s) of area isolation and fiber control, locations of decontamination units and HEPA exhausts, and the storage of wastes. This plan shall also include a schedule of on-site activities indicating when asbestos removal will be conducted to include the start and completion dates. The schedule must state when each phase of work is anticipated to begin and end. The Contractor shall notify the OWNER'S Representative a minimum of 72 hours prior to changing the schedule.
2. Work shall be conducted in one 8 hour shift Monday through Friday between 6:00 am to 6:00 pm unless specifically authorized by the OWNER.

D. Notifications:

1. The Contractor shall prepare and submit in writing, on behalf of OWNER, a 10-working day notification of impending commencement of asbestos removal activities to the Santa Barbara County Air Pollution Control District (APCD) as required on the Notification Form ENF-28. The Contractor shall also provide the OWNER and the APCD at least 10 business days' notice prior to the start of work.



2. The Contractor shall be responsible for timely payment of the applicable abatement notification fees and all permits, as required; and, for timely revision of the notice as needed over the course of the Work

E. Submittals:

1. The Contractor shall provide required submittals in a timely manner and at appropriate times in the execution of the Work to allow for sufficient and prompt review by OWNER'S Representative, and revise and resubmit as necessary to establish or maintain compliance with the specified requirements.
2. The Contractor shall submit two complete sets of Pre Job Submittals to OWNER'S Representative for review, prior to the Work. Work may not proceed until the complete Pre Job Submittal package has been reviewed and accepted as complete by the OWNER'S Representative.
3. The Contractor shall submit documentation specified in this Section for individual workers to the Owner's Representative prior to using those employees on the Work. Workers without documentation shall not be allowed inside the regulated areas until such documentation has been reviewed and accepted by the OWNER'S Representative.
4. Pre Job Submittals must include the following:
 - a. Copy of the 10-working day notification of impending commencement of asbestos abatement work.
 - b. Copy of the Contractor's asbestos abatement contractor license valid for the period of time covered by the Work.
 - c. Copy of a work plan and schedule describing how the areas will be isolated and the methods that will be used to remove the ACMs. Plans showing bracing; hoists; scaffolding; temporary supports; and visual barriers, if needed.
 - d. Copy of Contractor's insurance certificate showing coverages and insureds as required by the Contract Documents (as provided by the OWNER).
 - e. All required licensure, permits, and arrangements for transport and disposal of waste materials, including without limitation:
 - 1) Location, including name and address of operator, of landfill proposed for disposal of asbestos wastes generated by the Work
 - 2) Evidence that the landfill proposed for disposal of asbestos waste generated by the Work is approved by applicable federal, state, and/or local regulatory agencies
 - 3) The name and address of the waste hauler to be used for transportation of asbestos wastes; and
 - 4) evidence that the waste hauler is experienced in the transportation of wastes and possesses applicable license(s) for transport.



- f. A list of the subcontractors to be utilized during the Work, including the subcontractor's name, address, contact name and phone number and the services they will provide during the Work. Provide copies of licenses for those subcontractors providing a service, which requires state or local licensure (e.g. personnel air monitoring).
- g. Written descriptions and shop drawings for proposed "non-standard" work practices or work practices that would vary from those specified in this document.
- h. Listing of the asbestos abatement employees proposed to be used for the Work, including list of supervisory personnel. Documentation for each and every worker and supervisor proposed for use during the Work. No worker shall be allowed into a controlled work area without complete and accepted documentation that shall include, without limitation, the following:
 - 1) Copy of California asbestos worker and supervisor certificates, valid for the period of time covered by the Work
 - 2) Copies of applicable fit-testing records, for each respirator to be worn, valid for the period of time covered by the Work, and;
 - 3) Copies of medical approval forms signed by a doctor for performing asbestos work using respiratory protection.
- i. Progressive Submittals - Provide at least two copies of the following to the OWNER'S Representative, for review on the Site, during the course of the Work:
 - 1) Revisions to the 10 working day notification
 - 2) required documentation, as specified previously, for additional workers, as needed, and;
 - 3) Revisions to the Project schedule, including working hours and days.
- j. Post-Job Submittals – Release of final payment will not be recommended until the complete Post-Job Submittals are reviewed and accepted. Provide at least two copies of the following to the OWNER'S Representative, for review on the Site, during the course of the Work:
 - 1) Documentation of waste disposal that includes manifests for transport, receipts from landfill operator acknowledging receipt of asbestos-containing waste. All documentation shall be dated and indicate the quantity of materials delivered, signed by an authorized representative of landfill.
 - 2) An listing of each asbestos abatement employee used on the Work and the exact dates on which he or she was present in the controlled work areas.
 - 3) Employee air monitoring results relative to OSHA exposure limits. Results shall at a minimum include the employee's full name and last four digits of their social security number, the activity monitored, respiratory protection employed, and location where the employee was monitored.



- 4) Where full containment work areas are employed, documentation recording continuous reduced air pressure maintained in contained work areas, compiled on a daily basis.

F. Utilities:

1. The OWNER shall provide water and electrical service as available within reasonable proximity to the Work areas. The Contractor will take precautions to not damage existing utilities and shall be responsible for the costs of replacing utilities damaged during abatement activities. The Contractor should presume that the site will have pressurized water supply and 110 / 115 VAC power source.
2. The Contractor shall provide lighting and extensions of utilities as required during the Work. The Contractor shall remove lighting and extension of utilities at the conclusion of the Work.
3. The Contractor shall provide a temporary fused disconnect switch at the power source and provide ground fault protection using portable multi-outlet units designed for construction project sites.
4. The Contractor shall install temporary piping and valves necessary to deliver water to the work areas. Source of water and pipe route shall be coordinated with the OWNER'S Representative. The Contractor shall provide back flow protection at source of connection satisfactory to the OWNER as necessary. The Contractor shall coordinate with the OWNER'S Representative for details of connection to existing source.
5. Work related to temporary lighting, utilities or the extension of existing utilities shall only be conducted by Contractor employees or sub-contractors who are trained and licensed as required for the work conducted.

3.10 ASBESTOS REMOVAL

A. Description

1. The Contractor shall perform the planning, administration, execution, and cleaning necessary to safely remove designated ACM.
2. Approval of or acceptance by OWNER or OWNER'S Representative of various construction activities or methods proposed by Contractor does not constitute an assumption of liability by OWNER, or OWNER'S Representative for inadequacy or adverse consequences of said activities or methods.

B. Work Included

1. The Contractor shall establish work area containments as required by federal, state, and local regulations. The Contractor shall conduct abatement activities in no more than two (2) areas at one time unless otherwise permitted by the OWNER'S



Representative. The Contractor is responsible for performing abatement work in the Phases established by the OWNER'S Representative.

2. The Contractor shall remove non-ACM interior finishes and fixtures as needed to access the Work. The Contractor shall alleviate unsafe conditions resulting from the Work by conducting additional removal or temporary improvements as needed.
3. The Contractor shall clean and decontaminate work area containments as described herein.
4. The Contractor is responsible for personnel air monitoring and analysis of personnel air samples to comply with applicable federal and state regulations.
5. The Contractor shall properly dispose of asbestos-containing waste off-site in accordance with applicable state and federal regulations, and as specified herein.
6. The Contractor shall:
 - a. Maintain an on-site supervisor who shall be able to speak, read, and write English and to effectively communicate with workers
 - b. Provide one experienced job foreman for every ten asbestos abatement workers utilized for the Work. Foreman shall remain inside the contaminated work areas while the Work is in progress, and;
 - c. Use only trained, licensed, and experienced asbestos removal workers to perform the Work.
7. Results of tests of suspect ACM taken from building surfaces within the scope of this Work have been provided to the Contractor in the aforementioned Asbestos Survey report. Contractor is cautioned that, should interpretations be made, opinions be formed, and conclusions be drawn as a result of examining the test results, those interpretations, opinions, and conclusions will be those made, formed, and drawn solely by Contractor. Inasmuch as randomly and/or arbitrarily selected areas were sampled, OWNER and OWNER'S Representative make no representation, warranty, or guaranty that the conditions indicated by the test reports either are representative of those conditions existing throughout the area, or that unforeseen developments may not occur, or that materials other than, or in proportions different from, those indicated may not exist.

C. Personnel Protection

1. The Contractor acknowledges and agrees that Contractor is responsible for enforcing worker protection requirements at least equal to those specified in this Section.
2. Compliance with Cal OSHA requirements, including, but not limited to the provision of a Competent Person and development of Negative Exposure Assessments are the sole responsibility of the Contractor.



3. The Contractor shall provide workers with personally issued and marked respiratory equipment approved by NIOSH for the type of work being performed. Each worker shall be able to show, upon request during the course of work, dated proof of fit testing performed by qualified personnel for each respirator worn.
4. Where respirators with disposable filters are used, the Contractor shall provide sufficient filters for replacement as necessary by the workers, or as required by applicable regulations. Filter cartridges to be used shall be N100, P100 or R100 HEPA filters approved by NIOSH for asbestos related work.
5. The Contractor shall provide respiratory protection as needed from the time of the first operation involving contact with ACM until notified by the OWNER'S Representative and the containment/work area removal is completed.
6. The Contractor shall provide at a minimum half-face respirators for workers during the phases of Work in which asbestos may be disturbed, including, but not limited to: preparation of work areas, removal, cleaning, teardown, and waste handling
7. Regarding personnel air monitoring, Contractor shall:
 - a. schedule air sampling necessary for demonstrating compliance of Contractor's respiratory protection program with OSHA regulations;
 - b. ensure that the personnel monitoring strategy employed will result in suitable samples for analysis;
 - c. post at Work Site daily results of personnel monitoring upon receipt; and
 - d. provide a copy of the results to Owner's Representative.
8. The Contractor shall permit no visitors in the work areas after commencement of ACM disturbance or removal, except for governmental inspectors having jurisdiction, or as authorized by OWNER or OWNER'S Representative.
9. The Contractor shall provide workers with sufficient sets of protective disposable clothing, consisting of full body coveralls, head covers, gloves, and foot covers, of sizes to properly fit individual workers.
10. The Contractor shall leave reusable equipment, apparel and protection devices (excluding respirators) in the contaminated equipment room until the end of the ACM removal work, at which time such items shall be disposed of as contaminated waste or decontaminated for reuse.
11. The Contractor shall provide authorized visitors and OWNER'S Representative with suitable protective disposable clothing, respiratory protection (including suitable replacement filters), headgear, eye protection, footwear and other protective equipment of sizes to properly fit visitors whenever they enter the work area.

D. Materials



1. The Contractor shall provide materials as required including but not limited to the following.
 - a. **Plastic Sheeting** Shall be flame retardant, of the thickness as specified, in sizes to minimize the frequency of joints. Sheeting used for visual barriers shall be entirely opaque.
 - b. **Tape** Shall be glass fiber reinforced or other type capable of sealing joints of adjacent sheets of plastic and for attachment of plastic sheet to finished or unfinished surfaces under both dry and wet conditions.
 - c. **Surfactant (wetting agent)** Shall consist of a mixture of commercial surfactant mixed with water according to manufacturer's specifications.
 - d. **Sealant (encapsulant)** Commercial encapsulant mixed according to manufacturer's specification and approved specifically for use in asbestos contaminated environments. It is the responsibility of Contractor to determine compatibility of the sealant with the materials and conditions.
 - e. **Impermeable Containers** Shall be suitable to receive and retain ACM or asbestos contaminated materials until disposal at an approved landfill and shall be labeled in accordance with applicable regulations. Containers shall be both air and water tight.
 - f. **Warning Labels and Signs** Shall be as required by the local regulations and OSHA 29 CFR 1926.1101 and posted in both English and Spanish.
 - g. **Other Materials** Provide other materials, such as lumber, nails and hardware, which may be required to construct and dismantle the decontamination systems and the barriers that isolate the work areas.

E. Tools and equipment

1. Contractor shall provide suitable tools for ACM removal including but not limited to the following:
 - a. Water sprayers - Utilize airless or other low pressure sprayers for amended water (wetting agent/surfactant) application. Pressure washers or sprayers may not be used.
 - b. Airless sprayer - Use airless sprayer of sufficient capacity to apply spray-applied encapsulant in accordance with manufacturer's recommendations.
 - c. Air purifying equipment (for maintaining negative air pressure within the work area if needed) - Shall include HEPA filtration systems. Ensure that no purification equipment exhausts contaminated air from inside the work area into uncontaminated areas.



- d. Air purifying equipment (for internal re-circulation in the work area) - Shall include HEPA filtration systems. Ensure that no internal air movement system or purification equipment exhausts contaminated air from inside the work area into uncontaminated areas.
- e. Vacuum equipment (for pre-cleaning and cleaning in the work area) - Shall include HEPA filtration systems for exhaust. The equipment shall be maintained and used in accordance with the manufacturer's specification and meet the requirements of applicable laws and regulations.
- f. Scaffolding and ladders - Shall be as required to accomplish the specified work and shall meet applicable safety regulations.
- g. Transportation - As required for loading, temporary storage, transit, and unloading of contaminated waste without exposure to persons or property. Use only enclosed dumpsters, trailers or other transports to haul waste containers to prevent loss or damage of containers in route to landfill.

F. Work Area Preparation by Contractor

- 1. Restrict access to Work Area.
- 2. Verify, lock out and seal HVAC equipment supplying or within work areas with a minimum of two layers of six-mil plastic sheeting, individually applied, during the abatement activities.
- 3. Verify and lockout electrical power to work areas, though lighting may be maintained where practical. Provide temporary power and lighting as necessary to maintain safe and comfortable work environment.
- 4. Seal work areas from those in which removal will not occur, with a critical barrier consisting of a minimum two-layers of six-mil plastic sheeting. Seal ceiling, roof, plenum, wall and floor penetrations with critical barriers.
- 5. Maintain emergency and fire exits from the work areas, or establish alternative exits satisfactory to local fire officials. Mark fire exits appropriately on work area side.
- 6. Construct a decontamination unit in compliance with EPA guidelines concerning number, size and placement of airlocks, etc. Shower in personnel decontamination unit shall open into airlock on both contaminated and uncontaminated sides and shall be equipped with running water. Construct decontamination units of appropriate materials (including plastic sheeting) to provide airtight barriers to allow continuous reduced air pressure to be maintained in work areas. Post OSHA decontamination procedures, in both English and Spanish, in clean room for duration of Project.
- 7. If the entry to the decontamination unit opens directly to the exterior of the building, it shall be made of durable materials and have a locking door at the entrance to facilitate securing the work area.



8. Trap shower waste water using filters having a final filter pore size of not larger than 5.0 micron, and drain into a sanitary sewer. Replace contaminated filters when they become clogged. Dispose of filters as asbestos-contaminated waste.
9. For full containment work areas, place work areas under reduced air pressure as specified, utilizing HEPA filtration systems which comply with ANSI Z9.2 79, local exhaust ventilation. Submit the proposed route of air filtration exhaust to OWNER'S Representative for review prior to initiating its use.
10. Cover floors within the containment where removal will not take place with (if applicable) a minimum of two layers of plastic sheeting.
11. Ensure that barriers and plastic sheeting enclosures remain effectively sealed and taped for duration of abatement and subsequent cleaning. Repair damaged barriers and remedy defects immediately upon discovery.
12. Visually inspect work areas at the beginning and end of each work period. Repair damaged barriers and remedy defects immediately upon discovery.
13. Maintain a sign in/out log, as specified, in the immediate area of the change room to be signed by every person each time upon entering and leaving the work areas.
14. Place in work areas at least one fire extinguisher with a minimum NFPA rating of 10BC (dry chemical) for every 1,000 square feet, or fraction, of work area.
15. Notify OWNER'S Representative for observation of the preparation of work areas prior to disturbance of asbestos-containing material. Prior to notification, complete plasticizing of work area, and construction of the decontamination unit. No removal work can begin until preparations have been observed and accepted by OWNER'S Representative.

G. Removal of Asbestos Containing Materials

1. The Contractor shall remove and properly dispose of asbestos-containing materials indicated to be removed in accordance with federal, state, and local laws and regulations or as more stringently specified herein.
2. For the removal of all the designated ACM, Contractor shall:
 - a. Prepare work area as specified;
 - b. thoroughly wet the ACM to be removed with amended water prior to handling, stripping or tooling to reduce fiber dispersal into the air;
 - 1) Accomplish wetting by a fine mist of amended water;
 - 2) Saturate materials sufficiently to wet the substrate without causing excess dripping. Allow time for water to penetrate materials thoroughly;
 - 3) Spray materials repeatedly during the work process to maintain a continuously wet condition throughout progress of the removal work; and,



- 4) Wetting agent shall be applied in such a manner so as to minimize drips and puddles.
- c. Contractor shall remove the saturated ACM in small sections. Do not allow materials to dry out. As they are removed, place the materials in sealable plastic bags of six mil minimum thickness.
- d. Bags containing ACM or asbestos-contaminated materials shall be placed by Contractor in plastic bags of six mil minimum thickness, sealed, and labeled with the appropriate wording per regulatory agencies having jurisdiction (EPA, OSHA, EPD, DOT).
- e. Contractor shall double-bag used protective clothing, cleaning tools, plastic sheeting and other secondary waste in six-mil plastic bags and for disposal.
- f. Contractor shall maintain general cleanup of work area concurrent with the removal of all ACM, and not permit accumulation of debris on work area floors.
- g. After removal of ACM, Contractor shall wet clean all hard surfaces in the work area to remove residual accumulated materials, and continue wet cleaning until all hard surfaces are free of visible debris.
- h. After removal of ACM, Contractor shall HEPA-vacuum all porous surfaces in the work area to remove residual accumulated materials until all porous surfaces are free of visible debris.

H. Asbestos Abatement Clean Up

1. The Contractor shall provide general cleanup of work areas concurrent with the removal of asbestos-containing materials. Do not permit accumulation of debris within work areas.
2. Containment clearance sequence for negative pressure work areas if needed, the Contractor shall:
 - a. Wet clean and HEPA-vacuum surfaces in the work areas.
 - b. Clean equipment (excluding that which will be needed for further cleaning phases) used in the work areas and remove from work areas via the equipment decontamination enclosure system.
 - c. Replace pre-filters in air filtration devices with clean filters. Clean air filtration devices.
 - d. Contractor shall maintain critical barriers.
 - e. HEPA-vacuum and wet clean surfaces in the work area.
 - f. Notify OWNER'S Representative for observation to determine completeness of cleaning. Work area will be observed for the presence of visible dust, dirt and debris. The Contractor shall re-clean, and continue to clean at Contractor's expense, areas with observed visible dust, dirt or debris
3. The Contractor shall consider work areas complete when:



- a. Surfaces are free from dust, dirt, residue, and debris from abatement operations or other activities subordinate to these operations.
- b. The level of cleanliness has been approved by OWNER'S Representative; and,
- c. Air testing performed by the OWNER'S Representative indicates that the air in the work area is acceptable, as specified.

I. Disposal of Asbestos Contaminated Waste

1. Asbestos-containing waste (including but not limited to: used cleaning tools, towels, protective suits, used plastic sheeting and spray-applied plastic sheeting shall be treated as non-friable waste materials) shall be transported to the authorized landfill double bagged.
2. Follow decontamination procedures as follows:
 - a. After double-bagged contaminated waste is moved out through the decon system, Contractor shall wet wipe bags to remove contamination from them before they are moved into uncontaminated space.
 - b. As each bag of waste is removed from the work area, Contractor shall note in the asbestos waste log as specified.
3. Contractor shall remove sealed and labeled containers of asbestos-containing material and waste and transport them for disposal to an approved sanitary landfill as follows.
 - a. Line dumpster, trailer or other waste transport with at least two layers of six-mil plastic sheeting.
 - b. Notify OWNER'S Representative prior to removing each trailer or other waste transport from the Site.
 - c. Notify OWNER or OWNER'S Representative not less than 48 hours prior to the proposed time of delivery of asbestos-containing waste to the landfill. The OWNER or OWNER'S Representative may elect to observe this operation.
 - d. Asbestos containing waste material shall be treated, packaged, labeled, transported, and disposed of in accordance with 29 CFR 1926.1101 (OSHA), 40 CFR 61.150 (EPA) and 49 CFR 107 et al., (DOT).
 - e. Allow only sealed plastic bags to be deposited in landfill. Place leaking or unsealed bags in a new bag and seal prior to deposition.
 - f. Ensure that there are no visible emissions to the outside air from Site where materials and waste are deposited.
4. Alternative methods of transporting asbestos-containing debris will be considered by OWNER'S Representative but must not be used until accepted by OWNER'S Representative.

J. Final Visual and Final PCM Clearance Testing



1. Once the work is complete and the area is free of all identified asbestos, asbestos contaminated materials, waste bags, equipment, and materials the OWNER'S Representative will perform a final visual inspection to ensure all visible asbestos has been removed.
2. The OWNER'S Representative will test for final air clearance when work area is observed by OWNER'S Representative to be visually decontaminated.
3. At least one sample per work area will be collected and analyzed. Each work area will be considered clean if samples indicate airborne fiber concentrations are 0.01 fibers per cubic centimeter (f/cc) or less of if the airborne fiber concentrations are below the ambient prevalent level.
4. The Contractor shall re-clean, and continue to clean at the Contractor's expense, areas which do not comply with the specified final clearance level.
5. The Contractor shall bear the cost of follow-up testing necessitated by failure of the air tests to meet the specified final clearance level.
6. Upon notification from the OWNER'S Representative that final clearance samples indicate acceptable airborne levels, the Contractor shall dismantle work area containment and thoroughly HEPA-vacuum and wet clean immediate areas.
7. The Contractor shall dispose of debris from removal operation, used cleaning materials, unsalvageable materials used for sturdy barriers, and other remaining materials. The Contractor shall consider the materials to be contaminated, and dispose of accordingly.

3.11 LEAD REMOVAL SUMMARY OF WORK

A. Work Included:

1. The lead containing materials to be removed and disposed of are detailed in the report entitled, "*Lead-Based Paint Survey, Goleta Train Depot, 27 South La Patera Lane, Goleta, California, 93117*" by All Phase Environmental, Inc. dated November 30, 2023.
2. Contractor shall verify actual quantities present and shall not rely on the quantities described in the report.
3. Contractor shall establish work area containment(s) and remove the lead containing components utilizing the required engineering controls and personal protective equipment (PPE). The Contractor shall decontaminate the work area containments and dispose of the lead waste.
4. The Contractor shall supply all labor, materials, equipment, services, insurance and incidentals, which are necessary or required to perform the Work. The Work shall be



performed in accordance with applicable governmental regulations and these Specifications.

5. The Contractor will be responsible for all medical monitoring before and after abatement in accordance with applicable laws and regulations including without limitation OSHA 29 CFR 1910.1025, 1926.62 and Title 8, CCR 1532.1.
6. The Contractor will be responsible for all environmental and health and safety monitoring including without limitation conducting personal breathing zone monitoring and the posting of results.
7. The Contractor will be responsible for conducting all lead waste characterization tests to determine the proper disposal of lead waste generated by lead related paint/component removal or paint stabilization activities. Testing conducted by the Contractor, the OWNER'S Representative will observe all sample collection and shall be provided copies of the sample analysis prior to disposal of the Lead waste. This may include but is not limited to Total Threshold Limit Concentration (TTLC), Soluble Threshold Limit Concentration (STLC) and Toxicity Characteristic Leaching Procedure (TCLP) (when applicable) testing.
8. The Contractor will be responsible for the removal, as specified, and proper packaging, labeling, storage, and transportation and disposal of all Lead-containing/lead based paint and lead materials removed from surfaces as well as all removed components in the affected area(s).
9. The Contractor is responsible for performing abatement work in the Phases established by the OWNER'S Representative.

B. Exposure Monitoring

1. Sample of breathing zone exposure as if no respirator were worn.
2. Sample for at least (7) hours of the 8-hour work shift.
3. Sample the most exposed employee for each job classification in each different work area.
4. Full shift samples must be representative of the employees' regular daily exposure to Lead.
5. The employer must determine by air sampling if employees are exposed to lead at or above the Action Level or above the Permissible Exposure Limit.
6. A final report of all records shall be submitted to the OWNER'S Representative.
7. Frequency: If initial monitoring results show that occupational exposure of workers is below the Action Level, then only periodic monitoring is required.



C. Housekeeping

1. Maintain the surfaces as free of Lead as practical.
2. Air cleaning with air hoses or blowers on surfaces is prohibited.
3. Shoveling, or gross removal may only be done in enclosed, ventilated areas and where employees are properly protected.
4. Where vacuuming is used, the vacuum must be fitted with a HEPA filter.
5. Hygiene Facility: The employer shall provide clean, adequate hygiene facilities to comply with 29 CFR 1926.62 and CCR Title 8, 1532.1. Washing facilities are required. Employees need to wash their hands and face before eating, drinking, chewing, or smoking.
6. Medical Surveillance: The employer shall make available initial medical surveillance to employees occupationally exposed on any day to lead at or above the action level. The employer shall also initiate a program of medical surveillance for all employees who are or may be exposed at or above the action level for more than 30 days in any consecutive 12 months. The medical surveillance shall be made by a licensed physician using the protocol defined in 29 CFR 1926.62 and CCR Title 8, 1532.1.
7. The safety of the Contractor's employee used under this contract specification and any visitors on the job site are the sole responsibility of the Contractor.
8. Maintain the surfaces as free of Lead as practical.

D. PERMITS AND NOTIFICATIONS. Secure all necessary permits in conjunction with the Lead related work and provide timely notification of such actions as may be required by Federal, State or Local authorities. Except, as negotiated, the Contractor shall procure and pay for all permits and inspections, except those performed by the OWNER or OWNER'S Representative. The Contractor will be responsible for the determination of required notifications and postings to the California Department of Public Health (Title 17, Div 1, Ch 8) and/or Cal-OSHA, for the lead work to be conducted.

E. Work Plan, Schedule, and Submittals:

1. The Contractor shall prepare a detailed plan of the work procedures to be used, the method(s) of area isolation and fiber control, locations of decontamination units, and the storage of wastes. This plan shall also include a schedule of on-site activities indicating when lead removal will be conducted to include the start and completion dates. The schedule must state when each phase of work is anticipated to begin and end. The Contractor shall notify the OWNER'S Representative a minimum of 72 hours prior to changing the schedule.
2. Work shall be conducted in one 8 hour shift Monday through Friday between 6:00 am to 6:00 pm unless specifically authorized by the OWNER.



3. Testing Laboratory: Submit the name, address and telephone number of the testing laboratory selected for any necessary monitoring of airborne concentrations of Lead as well as the lead waste characterization testing. The analytical laboratory shall be accredited by AIHA, ELLAP, or NLLAP and be a current participant in the AIHA, NIOSH, EPA Environmental Lead Proficiency Analytical Testing Program (ELPAT).
4. The results of air monitoring or blood Lead analyses shall be submitted to the OWNER'S Representative for review within 24 hours after the Contractor receives them.
5. Submit copies of any required permits as they pertain to the identified Lead related work as applies, and proof that all arrangements have been made for the transportation and disposal of the Lead bearing materials and refuse to a dumpsite approved by the EPA or local authorities.
6. Close Out Documentation: within 10 days of project completion Contractor must provide all documentation generated during the project. Documentation shall include but is not limited to: supervisors daily logs, signed daily personnel logs, visitor entry/exit logs, employee entry/exit logs for regulated areas, manometer print reports or logs (as applicable), filter change logs for all air filtration units, water, and respirators, air monitoring sample results for personnel, work areas, air monitoring sample results for air filtration (when required), safety meeting attendance and any other contractor generated documentation.

3.12 LEAD REMOVAL PRODUCTS

- A. Respirators: Select respirators from those currently approved by the National Institute for Occupational Safety & Health (NIOSH) as defined in the NIOSH Certified Equipment List (most current). Provide respirators of the type listed in the Tables of 29 CFR 1910.134 and CCR Title 8, 5144 for the airborne concentrations of Lead encountered for handling, removal, decontamination, packaging or disposal. If the lead related work to be conducted does not fall into one of the OSHA "Trigger Tasks," the Contractor must initially measure the airborne concentrations and select the appropriate respirator. Historical data may be relied upon for proper respirator selection if the data conforms with the OSHA, Cal-OSHA requirements including any exceptions.
- B. Plastic sheet used for Lead abatement shall be used in sufficient size and length to reduce the number of joints. Typically accepted is 4 mil for walls and 6 mil for floors.
- C. Any plastic bags used for containment of Lead bearing material refuse, contaminated clothing or tools, or other materials used in the work area shall be polyethylene and a minimum of 6 mil in thickness. The bags must be labeled with a proper warning/generator label, sealed and placed into a secure holding vessel.
- D. Protective Clothing: The Contractor must provide workers who may be exposed to Lead dust, or airborne concentrations above the OSHA PEL, protective clothing and work



clothing, such as coveralls, or similar full body clothing, head covers, gloves, hats, shoe covers, and face shield or goggles, where required.

- E. The Contractor shall post the following warning signs in each work area where the PEL could reasonably be exceeded:

DANGER

LEAD WORK AREA

MAY DAMAGE FERTILITY OR THE UNBORN CHILD

CAUSES DAMAGE TO THE CENTRAL NERVOUS SYSTEM

DO NOT EAT, DRINK OR SMOKE IN THIS AREA

3.13 LEAD REMOVAL WORK PROCEDURES

- A. All Lead related work must be performed in accordance with all applicable Federal, State and local regulations. At a minimum, the following procedures that are known to control the release and spreading of Lead dust must be utilized:
1. Wet removal procedures.
 2. Proper housekeeping (continual cleaning of work area) including the use of HEPA vacuums.
 3. Personal Protective Equipment must be worn where workers are in contact with Lead dust and use of hygiene facilities to prevent spread of contamination.
 4. Negative pressure enclosures to enclose Lead paint removal operations where mechanical sanding and abrasive blasting methods are used.
- B. Establish designated limits to the Lead work area by using Lead Warning tape and install hard barriers such as temporary fencing or temporary walls around the perimeter of the work area if necessary
- C. Properly demarcate with bilingual Lead Warning signs at all approaches to the regulated work areas to prevent unauthorized personnel entering the regulated work area(s).
- D. Install a Decontamination area.
- E. Continual misting (wet methods) shall be conducted prior to and during all demolition activities including segregation and loading of debris.
- F. Clean-up activities must be conducted by the Contractor on a continuous basis. If the OWNER'S Representative observes a large amount of accumulated lead debris the removal activities will cease, and clean-up activities will continue until approval by the OWNER'S Representative to resume the lead-related demolition activities.



- G. After thorough cleaning of the workspace, and satisfactory degree of cleanliness has been achieved, the Contractor shall notify the OWNER'S Representative that the workspace is ready for inspection. The OWNER'S Representative and the Contractor shall then visually inspect the workspace for the detection of any visible lead dust or lead contamination. If the visual inspection does not reveal any dust or other signs of contamination, final testing may commence.
- H. The Contractor will then perform lead dust wipe sampling on the floor and/or horizontal surfaces in accordance with the clearance sampling requirements specified in the HUD Guidelines at a minimum under the observation of the OWNER'S Representative. All fees associated with taking and analyzing clearance sampling shall be borne by the Contractor.
- I. Lead –Contaminated Dust is defined by the California Department of Public Health as dust that contains an amount of lead equal to, or in excess of, ten micrograms per square foot (10 $\mu\text{g}/\text{ft}^2$) for interior floor surfaces, 100 $\mu\text{g}/\text{ft}^2$ for interior horizontal surfaces, and 400 $\mu\text{g}/\text{ft}^2$ for exterior floor and exterior horizontal surfaces. The California Department of Public Health Standards for clearance shall apply.
- J. Areas exceeding the clearance level shall be re-cleaned, re-encapsulated and re-tested by the Contractor until acceptable clearance levels are obtained. All fees associated with taking and analyzing the re-testing clearance sampling shall be borne by the Contractor.
- K. Following the satisfactory completion of clearance lead dust wipe sampling testing, work area isolation barriers shall be removed by the abatement contractor and properly disposed of.

END OF SECTION – 02 26 01



SECTION 02 41 16

DEMOLITION

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes: Furnishing labor, materials and equipment necessary for demolition, dismantling, cutting and alterations as indicated, specified, or required for completion of the Work. Includes items such as the following:

1. Protection of existing improvements to remain.
2. Cleaning existing improvements to remain.
3. Disconnecting and capping utilities.
4. Removing debris, waste materials, and equipment.
5. Removal of items for performance of the Work.
6. Salvageable items to be retained by the Owner.

B. Related Requirements:

1. Division 01 - General Requirements.
2. Section 01 11 00 - Summary of Work.
3. Section 01 50 00 - Construction Facilities and Temporary Controls.
4. Section 01 73 29 - Cutting and Patching.
5. Section 01 74 19 - Construction and Demolition Waste Management.
6. Section 02 26 01 - Removal and Disposal of Hazardous Substances.
7. Division 22 — Plumbing.
8. Division 23 — HVAC.
9. Division 26 — Electrical.

1.02 SUBMITTALS

A. Shop Drawings: Submit Shop Drawings indicating the extent of items and systems to be removed. Indicate items to be salvaged or items to be protected during demolition. Indicate locations of utility terminations and the extent of abandoned lines to be removed. Include details indicating methods and location of utility terminations.



1.03 QUALITY ASSURANCE

- A. Perform the Work of this section by workers skilled in the demolition of buildings and structures. Perform the Work of this section under direct superintendence at all times.
- B. Prior to commencement of Work, schedule a walkthrough with the OAR, to confirm Owner property items have been removed from scheduled Work areas. Identify and mark remaining property items and schedule their removal.
- C. Coordinate demolition for the correct sequence, limits, and methods. Schedule demolition Work to create least possible inconvenience to the public and facility operations.
- D. Related Standard: ANSI/ASSE A10.6.

1.04 PROJECT CONDITIONS

- A. Drawings may not indicate in detail all demolition Work to be performed. Examine existing conditions to determine the full extent of required demolition.
- B. Repair damage to existing improvements or damage due to excessive demolition.
- C. Provide all measures to avoid excessive damage from inadequate or improper means and methods, improper shoring, bracing or support.
- D. If conditions are encountered that varies from those indicated, promptly notify the Architect for clarification before proceeding.

PART 2 - PRODUCTS

2.01 HANDLING OF MATERIALS

- A. Items scheduled for salvage by the Owner shall be delivered to a location designated by the OAR. Items shall be cleaned, packaged and labeled for storage.
- B. Items scheduled for reuse shall be stored on the Project site and protected from damage, theft and other deleterious conditions.

PART 3 - EXECUTION

3.01 GENERAL

- A. Protection:
 - 1. Do not commence demolition until safety partitions, barricades, warning signs and other forms of protection are installed. Refer to Section 01 5000 - Construction Facilities and Temporary Controls.



2. Provide safeguards, including warning signs, lights and barricades, for protection of workers, occupants, and the public.
 3. Do not commence demolition of the structure until asbestos containing materials, lead-based paint materials, hazardous materials, and universal wastes have been removed. Refer to Section 02 26 01 - Removal and Disposal of Hazardous Substances.
- B. If safety of existing construction appears to be endangered, take immediate measures to correct such conditions; cease operations and immediately notify the OAR.

3.02 DEMOLITION

- A. Do not throw or drop materials. Furnish ramps or chutes as required by the Work.
- B. Remove existing construction only to extent necessary for proper installation of Work and interfacing with existing construction. Cut back finished surfaces to straight, plumb or level lines as required for a smooth transition.
- C. Where openings are cut oversize or in improper locations, replace or repair to required condition.

3.03 CUTTING EXISTING CONCRETE

- A. Cutting of existing concrete shall be performed by skilled workers familiar with the requirements and space necessary for placing concrete. Perform concrete cutting with concrete cutting wheels and hand chisels. Do not damage concrete intended to remain.
- B. Extent of cutting of structural concrete shall be as indicated on Drawings. Cutting of non-structural concrete shall be as indicated on Drawings or as reviewed by the Architect or structural engineer. Replace concrete demolished in excess of amounts indicated.
- C. Prior to cutting or coring concrete, determine locations of hidden utilities or other existing improvements and provide necessary measures to protect them from damage.

3.04 REMOVAL OF EXISTING PLUMBING AND ELECTRICAL EQUIPMENT AND SERVICES

- A. Remove existing plumbing and electrical equipment fixtures and services not indicated for reuse and not necessary for completion of the Work. Remove abandoned lines and cap unused portions of existing lines.

3.05 REMOVAL OF OTHER MATERIALS

- A. Masonry: Cut back to joint lines and remove mortar without damaging units to remain. Allow space for repairs to backing where applicable.
- B. Woodwork: Cut or remove to a joint or panel line.



- C. Roofing: Remove as required, including accessory components such as insulation and flashings. At penetrations through existing roofing, trim cut edges back to sound roofing with openings restricted to the minimum size necessary to receive Work.
- D. Sheet Metal: Remove back to joint, lap, or connection. Secure loose and unfastened ends or edges and provide a watertight condition. Re-seal as required.
- E. Glass: Remove broken or damaged glass and clean rebates and stops of glazing channels.
- F. Modular materials such as acoustical ceiling panels, resilient tile, or ceramic tile: Remove to a natural joint without leaving damaged or defective Work where joining new Work. After flooring removal, clean substrates to remove setting materials and adhesives.
- G. Gypsum Board: Remove to a panel joint line on a stud or support line.
- H. Plaster: Saw cut plaster on straight lines, leaving a minimum 2-inch width of firmly attached metal lath for installing new lath and plaster.
- I. Remove existing improvements not specifically indicated or required but necessary to perform Work. Cut to clean lines, allowing for installation of Work.

3.06 PATCHING

- A. Patch or repair materials to remain when damaged by the performance of the Work of this section. Finish material and appearance of patch and/or repair Work shall match existing.

3.07 CLEANING

- A. Clean existing materials to remain with appropriate tools and equipment.
- B. Protect existing improvements during cleaning operations.
- C. Debris shall be dampened by fog water spray prior to transporting by truck.
- D. Debris pick-up area shall be kept broom-clean and shall be washed daily with clean water.
- E. Remove waste and debris, other than items to be salvaged. Turn over salvaged items to Owner, or store and protect for reuse where required. Continuously clean up and remove items as demolition Work progresses.
- F. Remove rubbish, debris, and waste materials and legally dispose of off the Project site.

END OF SECTION – 02 41 16



SECTION 02 82 00

ASBESTOS CEMENT PIPE REMOVAL & DISPOSAL

PART 1 – GENERAL

1.01 REQUIREMENTS

- A. The Contractor may encounter asbestos cement pipe (ACP) during the prosecution of this work. The Contractor shall remove and dispose of ACP in accordance with State of California requirements, and the Contract Documents. Removal of ACP shall be performed by a Contractor licensed and certified by Cal/OSHA for such removal.
- B. Where Asbestos Cement Transmission and Distribution Pipe are encountered, the Contractor shall follow the AWWA guidelines for handling, removing and disposing of ACP as stated in the applicable sections of AWWA Standards C400, C401, C402, and C403 covering Asbestos Cement Transmission and Distribution Pipe. Where conflict occurs between the two guidelines, the Contractor shall abide by the more stringent of the two.
- C. Section 02 26 01 - Removal and Disposal of Hazardous Substances provides requirements for training, certifications, notifications, and coordination with the OWNER that apply in the event ACP is encountered.

1.02 RELATED WORK SPECIFIED ELSEWHERE

- A. Section 31 23 16 – Trenching, Backfill and Compaction.

1.03 SUBMITTALS

- A. **Asbestos Cement Pipe Removal and Disposal Plan:** The Contractor shall complete and submit to the Goleta Water District Inspector an “Asbestos Cement Pipe Removal and Disposal Plan.” The Contractor shall clearly describe his proposed methods for the removal and disposal of ACP that ensures no exposure to airborne asbestos by the Contractor’s personnel. The written plan shall be submitted to the District Inspector for review and approval at least one week in advance of the proposed date of removal.
- B. Provide proof of licensing and certification for performing asbestos removal and disposal work.
- C. Provide chain of custody for removal and disposal of asbestos material removed from this site.



- D. If soil was impacted by asbestos and removed, submit a Non-Compliance Reporting Form, ENF-88, to the Santa Barbara County Air Pollution Control District.

PART 2 – PRODUCTS

2.01 EQUIPMENT

- A. Snap cutting tools shall be used for the removal of asbestos cement pipe whenever the removal of intact pipe sections is not possible. Power “Cut-Off” saws, hand-saws, and other devices and methods that result in the release of asbestos fibers into the air shall not be used for the removal of ACP.

2.02 ENCAPSULANT

- A. If during the removal of ACP broken edges occur, the broken edges shall be encapsulated with Certane 1000 Post Removal Encapsulant, or approved equal.

PART 3 – EXECUTION

3.01 GENERAL

- A. The Contractor shall perform all cutting and handling of asbestos cement pipe in accordance with State of California requirements. The Contractor shall provide sufficient supervision and perform monitoring to assure conformance with State requirements. Under no circumstances shall the Contractor utilize methods of removal that result in the release of asbestos fibers into the air.

3.02 REMOVAL

- A. The Contractor shall, whenever possible, accomplish the removal of ACP by removing intact pipe sections. Where connections are to be made to existing ACP waterlines, the ACP shall be removed in sections back to the nearest ACP coupling. The Contractor shall pothole and expose the pipe and ACP couplings prior to developing his proposed “Asbestos Cement Pipe Removal and Disposal Plan.”
- B. Where feasible, the Contractor shall take measures such as wrapping polyethylene sheeting around the ACP and placing sheeting below the pipe to prevent the inadvertent contamination of soil and other surfaces below the pipe when performing the removal.
- C. Snap cutting tools shall be used for the removal of asbestos cement pipes whenever the removal of intact pipe sections is not possible. The pipe shall be wetted prior to the snapping operation being performed. Use of a hammer and chisel to gradually split an



ACP coupling lengthwise may only be performed if the “Asbestos Cement Pipe Removal and Disposal Plan” developed by the Contractor incorporates measures to prevent the release of asbestos fibers into the air, and is approved by the District. Power “Cut-Off” saws, hand-saws, and other devices and methods that result in the release of asbestos fibers into the air shall not be used for the removal of ACP.

- D. The Contractor shall continuously wet the ACP around the snap cutting tool during the removal operation. All personnel handling the ACP shall wear properly fitted respirators during the removal and bagging operation, and shall be trained in the use of the respirator equipment. All pedestrian traffic shall be rerouted to maintain 30 feet clear of the ACP work area.
- E. All removed sections or pieces of ACP shall be bagged and prepared for disposal immediately after removal as described below. If during the removal of ACP broken edges occur, the broken edges shall be encapsulated with Certane 1000 Post Removal Encapsulant, prior to bagging, in accordance with the manufacturers’ recommendations.
- F. All asbestos material remaining in place shall be thoroughly covered immediately after all material to be removed has been completed. Where remaining asbestos material was broken during the removal process, the broken edges shall be encapsulated with Certane 1000 Post Removal Encapsulant, prior to back filling. Remaining asbestos material shall have a minimum one-foot cover.

3.03 DISPOSAL

- A. The Contractor shall transport all sections and pieces of ACP in accordance with State requirements and shall be delivered to the District yard for disposal. All sections or pieces of ACP shall be wetted and double wrapped or bagged with polyethylene wrap immediately after removal. The minimum thickness of polyethylene wrap shall be 6 mils. The outer wrap shall be securely held in place with tape in a manner to prevent the release of airborne asbestos fibers.
- B. At no time shall asbestos material be stored on-site. Once asbestos material has been bagged it shall be placed in the disposal transport unit and removed from the site at end of each day. The disposal transport unit shall be made secure at all times while on the site.

END OF SECTION – 02 82 00



SECTION 03 01 30

RESTORATION AND CLEANING OF CONCRETE

PART 1 - GENERAL

1.01 SUMMARY

- A. Section includes epoxy resin adhesive for:
 - 1. Epoxy injection of cracks.
 - 2. Grouting of cracks by gravity flow.
 - 3. Repair of spalling concrete.
- B. Related Requirements
 - 1. Division 01 - General Requirements.
 - 2. Division 07: Thermal and Moisture Protection.

1.02 SUBMITTALS

- A. Shop Drawings: Submit Shop Drawings indicating areas to receive restoration.
- B. Product Data:
 - 1. Submit manufacturer's product literature and installation procedures.
 - 2. Submit laboratory test reports indicating compliance with the Specifications.

1.03 QUALITY ASSURANCE

- A. Continuous inspection of epoxy repair procedures shall be performed by the Project Inspector in accordance with CBC.
- B. Inspection shall be performed by a representative of a testing laboratory selected by the Owner. The Owner will pay for inspection costs. Notify the laboratory 24 hours in advance of time concrete is to be mixed and notify the laboratory within 24 hours of postponement or cancellation of mixing.
- C. Installer of epoxy resin adhesive and concrete repair shall be certified by the manufacturer.
- D. Manufacturer: Regularly engaged in manufacture of epoxy resin products for at least 10 years. Provide references of at least five projects for which epoxy resin adhesive treatment was installed. ‘



1.04 PROJECT CONDITIONS

- A. Materials shall not be installed during existing or forecasted freezing or inclement weather.
- B. Protect adjacent surfaces from damage by equipment, tools, or materials.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to the Project site in manufacturer's unopened containers bearing manufacturer's name and product identification.
- B. Store and condition materials as recommended by product manufacturer.

PART 2 - PRODUCTS

2.01 MANUFACTURER

- A. Provide products by one of the following manufacturers:
 - 1. Sika Corporation.
 - 2. Fosroc Inc.
 - 3. The Euclid Chemical Co.
 - 4. Equal.

2.02 PERFORMANCE COMPLIANCE

- A. Core drill at least one test hole for every 100 feet of cracks, in accordance with CBC requirements. Refer to related Section 01 4523 - Testing and Inspection. Patch holes after core drilling samples.

2.03 MATERIALS

- A. Epoxy Resin Adhesive for Pressure Injection and Gravity Flow Grouting of Cracks:
 - 1. Modified epoxy resin containing suitable viscosity control agents and accelerators.
 - 2. Material shall not contain asbestos.
 - 3. Material shall be approved by the United States Department of Agriculture.
- B. Epoxy Resin Adhesives:
 - 1. Sikadur 35, Hi-Mod LV, by Sika Corporation.
 - 2. Nitofil LV, by Fosroc Inc.
 - 3. Euco #452 LV System, Euclid Chemical Company.



4. E-396 Series, by Micro Capsule Engineering.
 5. Equal.
- C. Materials for Repairing Spalling Concrete:
1. Surface Seal Paste: Sika Top/110 Armatec; Nitoprime Zincrich; Euco Zinc Prime, or equal.
 2. Patching Material: Sika Top 123 PLUS; Renderoc HB; Euco Verticoat, or equal.
- D. Materials for Patching Test Core Holes: One part Portland cement and three parts sand.

PART 3 - EXECUTION

3.01 PREPARATION

- A. Surfaces adjacent to cracks and spalled concrete shall be cleaned with all dust, grease, foreign particles and disintegrated materials removed by sandblasting, high-pressure water blasting, grinding, chipping or abrasive wheel. Cracks shall be free of standing water and/or frost.
- B. Installation of gravity flow grouting shall be performed by removing a V-notch portion of the crack to a maximum width of 1/4 inch and for the required length. Remove dust and loose debris. Where the underside of the concrete slab is accessible, seal visible cracks with epoxy resin adhesive paste or Portland cement based quick-setting compound to retain installed adhesive until cured.
- C. Remove broken and spalled concrete down to sound material and to a minimum depth of one inch around steel reinforcing bars. Clean steel bars by sand blasting.

3.02 APPLICATION OF EPOXY

- A. Manual application of epoxy resin shall be performed by mixing only that quantity of material that can be installed in 20 to 30 minutes at 73 degrees F. Automated application of high pressure injection shall be performed with a portable unit, equipped with positive displacement type pumps, air-powered or electric, with interlock for positive ratio control of exact material proportioning at the nozzle. Pumps shall provide in-line mixing and metering system and contain drain-back plugs.
- B. Placement Procedure:
 1. High Pressure Injection:
 - a. Provide porting devices as required by manufacturer, do not exceed maximum spacing. Spacing shall not exceed thickness of substrate and shall be calibrated to provide travel of material for grouting between ports. Fill cracks to maximum.



- b. On structures where both sides are accessible, provide porting devices on both sides at staggered elevations. Install mixed epoxy resin sealing adhesive over cracks and around each porting device, to provide an adequate adhesive seal during injection grouting.
 - c. Where required, install sealing adhesive to provide minimal defacing or discoloration of substrate.
 - d. Inject epoxy from bottom-most port. Install until epoxy appears out of next higher port. Plug lower port and start injecting into the port above. Repeat procedure until crack is grouted.
- 2. Low Pressure Injection: Material installation shall be performed by a manufacturer certified applicator in accordance with the manufacturer's written recommendations.
 - 3. Gravity Flow Grouting: Furnish mixed material into V-notches and install until cracks are completely filled.
- C. If penetration of a crack is not feasible, notify the Architect before discontinuing injection or grouting procedures. If modification of procedure is required to fill cracks, submit proposed modification to the Architect for review before proceeding.
 - D. Install materials for repair of spalling concrete in accordance with the manufacturer's written recommendations.

3.03 FILLING TEST HOLES

- A. Fill holes with mixture of sand, Portland cement, and water. Finish to match existing adjacent surface.

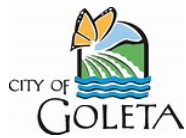
3.04 PROTECTION

- A. Protect the Work of this section until Substantial Completion.

3.05 CLEANING

- A. Remove rubbish, debris, and waste materials and legally dispose of off the Project site.

END OF SECTION – 03 01 30



SECTION 03 10 00

CONCRETE FORMING AND ACCESSORIES

PART 1 - GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Formwork for cast-in-place concrete as indicated.
 - 2. Installation of items to be embedded in concrete, such as anchor bolts, inserts, embeds, and sleeves.
- B. Related Requirements:
 - 1. Division 01 - General Requirements.
 - 2. Section 03 20 00: Concrete Reinforcing.
 - 3. Section 03 30 00: Cast-In-Place Concrete.

1.02 REFERENCES

- A. American Concrete Institute (ACI) Publication:
 - 1. ACI 318 – Building Code Requirements for Structural Concrete, Chapter 6, Formwork, Embedded Pipes, and Construction Joints.
 - 2. ACI 347 – Guide to Formwork for Concrete.
- B. American Plywood Association (APA):
 - 1. Form No. V345 - Concrete Forming Design/Construction Guide.
- C. National Institute of Standards and Technology (NIST):
 - 1. NIST Voluntary Product Standard PS 1.

1.03 SUBMITTALS

- A. Submit detailed structural calculations and drawings approved and signed by a California registered Civil Engineer where the height of the falsework or vertical shoring, as measured from the top of the sills to the soffit of the superstructure exceeds 14 feet, or where individual horizontal span lengths exceed 16 feet, or where provision for vehicular traffic through falsework or shoring occurs. For all other falsework and shoring submit layout signed by California registered Civil Engineer, manufacturer's authorized representative or a licensed contractor experienced in the usage and erection of falsework and vertical shoring. A copy of the plans and calculation shall be available at the jobsite at all times.
- B. Shop Drawings: Submit Shop Drawings indicating locations of forms, construction and expansion joints, embedded items, and accessories.
- C. Product Data: Submit manufacturer's Product Data for form materials and accessories.



- D. LEED Submittals: Complete the LEED Material Buyout Form (MBoF) with all materials provided to the project. A complete submittal includes providing all material costs in the MBoF and all of the supporting documentation for the following credits:
1. MRc2 - Environmental Product Declarations (EPD): Provide Industry-Wide or Product-Specific EPD.
 2. MRc3 - Sourcing of Raw Materials - Recycled Content: Provide product data for pre- and post- consumer recycled content.
 3. MRc3 - Sourcing of Raw Materials – Forestry Stewardship Council (FSC) Certified Wood: For all wood products designated in this specification as “FSC certified,” provide vendor invoices with the vendor’s Chain-of-Custody (COC) number and identify each FSC certified product on a line-item basis. If FSC wood products are modified off-site by an architectural woodworker or millworker, the woodworker must have an FSC COC number.
 4. MRc3 - Local/ Regional Material: Provide product data confirming product manufactured and extracted within 100 miles of the project site. Only applicable for products that also contain recycled content or FSC certified wood.
 5. MRc4 - Material Ingredients: Provide manufacturers Declare label, Health Product Declaration (HPD), Cradle to Cradle Certification, or Cradle to Cradle Health Product Certificate.
 6. IEQc2 - Low-Emitting Materials – Composite Woods: For composite woods, provide CARB Executive Order for the specific manufacturing location of the composite wood product confirming No Added Formaldehyde (NAF) resins or Ultra Low Emitting Formaldehyde (ULEF) resins. In addition, provide a statement from the manufacturer that reads "The XX product is a HWPW-CC/-VC/PB/MDF manufactured in our XX location which is authorized under CARB EO #XX."
 7. IEQc2 - Low-Emitting Materials – Interior Wet Applied Products: For paints, coatings, adhesives and sealants applied on site or used for laminating off-site, include product data indicating the VOC content (g/L) and testing certificates or third-party certification demonstrating compliance with California Department of Public Health (CDPH) v1.2-2017 emissions testing.

1.04 REGULATORY REQUIREMENTS

- A. California Building Code (CBC), Chapter 19A.
- B. California Code of Regulations, Title 8, Division 1, Chapter 4, Subchapter 4, Construction Safety Orders, Article 6, Excavations, Sections 1713 and 1717.

1.05 DELIVERY, STORAGE AND HANDLING

- A. Storage shall prevent damage and permit access to materials for inspection and identification.



PART 2 - PRODUCTS

2.01 GENERAL

- A. Form materials may be reused during progress of the Work provided they are completely cleaned and reconditioned, recoated for each use, capable of producing formwork of required quality, and are structurally sound.
- B. Form Lumber: WCLIB Construction Grade or Better, WWPA No. 1 or Better.
- C. Plywood: NIST Voluntary Product Standard PS 1, Group 1, Exterior Grade B-B Plyform or better, minimum 5-ply and 3/4 inch thick for exposed locations and at least 5/8 inch thick for unexposed locations, grade marked, not mill oiled. Furnished plywood with medium or high-density overlay is permitted.
- D. Coated Form Plywood: For exposed painted concrete, plastic overlaid plywood of grade specified above, factory coated with a form coating and release agent Nox-crete", or equal.
- E. Tube Forms: Sonoco "Seamless Sonotubes," Ceme-Tube, Quik-Tube, or equal, of the type leaving no marks in concrete, one-piece lengths for required heights.
- F. Joist Forms: Code recognized steel or molded plastic types as required.
- G. Special Forms: For exposed integrally-colored concrete, plywood as above with high density overlay, plywood with integral structural hardboard facing or fibrous glass reinforced plastic facing, providing specified finish.
- H. For Exposed Concrete Finish:
 - 1. Plywood: New, waterproof, synthetic resin bonded, exterior type Douglas fir or Southern pine plywood manufactured especially for concrete formwork and conforming to NIST Voluntary Product Standard PS 1, Grade B-B grade, Class I.
 - 2. Glass-Fiber-Fabric Reinforced Plastic Forms: Matched, tight fitting, stiffened to support weight of concrete without deflection detrimental to structural tolerances and appearance of finished concrete surfaces.
 - 3. Steel: Minimum 16 gage sheet, well matched, tight fitting, stiffened to support weight of concrete, without deflection detrimental to tolerances and appearances of finished concrete surfaces.
 - 4. Plywood: "Finland Form," "Combi Form" by North American Plywood Corporation, "Plyform" by Roy O. Martin, "ProForm" by Pacific Wood Laminates, or equal. The material shall be furnished with hard smooth birch face veneers with phenolic resin thermally fused onto panel sides. Edges shall be factory sealed.
- I. Form Ties: Prefabricated rod, flat band, wire, internally threaded disconnecting type, not leaving metal within 1 1/2-inch of concrete surface.
- J. Form Coating: Non-staining clear coating free from oil, silicone, wax, not grain-raising, "Formshield" by A.C. Horn, Inc., "Release" by Edoco/Dayton Superior, "Cast-Off" by Sonneborn/BASF Building Systems or equal. Where form liners are furnished, provide form coatings recommended by form liner manufacturer.



- K. Form Liner: Rigid or resilient type by L.M. Scofield, Symons, Greenstreak, or equal.
- L. Void Forms: Manufactured by SureVoid Products, Inc., Sonotube, Void Form International, or equal. Forms shall be "WallVoid" for temporary support of concrete walls and grade beams spanning between supports, and "SlabVoid" for creating gaps between concrete slabs or steps and underlying soils. Void forms shall be fabricated of corrugated paper with moisture resistant exterior, and shall be capable of withstanding working load of 1,500 psf. Provide accessories as required.

PART 3 - EXECUTION

3.01 GENERAL

- A. Forms shall be constructed so as to shape final concrete structure conforming to shape, lines and dimensions of members required by Drawings and Specifications, and shall be sufficiently tight to prevent leakage of mortar. They shall be properly braced or tied together to maintain position and shape. Forms and their supports shall be designed so that previously placed structures will not be damaged.
- B. Use form coating at all surfaces in contact with concrete.

3.02 TOLERANCES

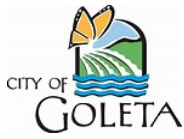
- A. Permitted abrupt or gradual irregularities in formed surfaces as measured within a 5 feet length with a straightedge shall per ACI 347, Table 3.1:

Class of Surface			
A	B	C	D
1/8 inch	1/4 inch	1/2 inch	1 inch

1. Class A: Use for concrete surfaces prominently exposed to public view.
2. Class B: Use for coarse-textured concrete-formed surfaces intended to receive plaster, stucco or wainscoting.
3. Class C: Use as a general standard for permanently exposed surfaces where other finishes are not specified.
4. Class D: Use for surfaces where roughness is not objectionable and will be permanently concealed.

3.03 ERECTION

- A. Plywood shall be installed with horizontal joints level, vertical joints plumb and with joints tight. Back joints by studs or solid blocking, and fill where necessary for smoothness. Reused plywood shall be thoroughly cleaned, damaged edges or surfaces repaired and both sides and edges oiled with colorless form oil. Nail plywood along edges, and to intermediate supports, with common wire nails spaced as necessary to maintain alignment and prevent warping.



- B. Openings for Cleaning: Provide temporary openings at points in formwork to facilitate cleaning and inspection. At base of walls and wide piers, bottom form board on one face for entire length shall be omitted until form has been cleaned and inspected.
- C. Chamfers: Provide 3/4 inch by 3/4-inch chamfer strips for all exposed concrete corners and edges unless otherwise indicated.
- D. Reglets and Rebates: As specified in Section 03 30 00: Cast-In-Place Concrete.

3.04 REMOVAL OF FORMS

- A. Forms shall not be removed until concrete has sufficiently hydrated to maintain its integrity and not be damaged by form removal operations. Unless noted otherwise and/or permitted by the Architect, columns and wall forms shall not be removed in less than five days, floor slabs in less than seven days, beams and girders in less than 15 days, pan forms for joists may be removed after three days, but joist centering shall not be removed until after 15 days, and ramp, landing, steps and floor slabs shall not be removed in less than seven days. Shoring shall not be removed until member has acquired sufficient strength to support its weight, load upon it, and added load of construction.
- B. Compressive strength of in-place concrete shall be determined by testing field-cured specimens representative of concrete location or members, as specified in Section 03 30 00: Cast-In-Place Concrete.

3.05 PROTECTION

- A. Protect the Work of this section until Substantial Completion.

3.06 CLEAN UP

- A. Remove rubbish, debris and waste materials and legally dispose of off the Project site.

END OF SECTION



SECTION 03 20 00

CONCRETE REINFORCEMENT

PART 1 – GENERAL

1.01 DESCRIPTION

- A. This Section includes specifications for furnishing all labor, materials, tools and equipment for furnishing, detailing, fabricating and placing steel to support cast-in-place concrete.

1.02 RELATED SECTIONS

- A. DIVISION 01 – GENERAL REQUIREMENTS
- B. Section 03 10 00 – Concrete Forming and Accessories
- C. Section 32 30 00 – Cast-In-Place Concrete
- D. Section 04 22 00 – Concrete Unit masonry

1.03 REFERENCES

- A. Steel Reinforcement
 - 1. American Society for Testing and Materials (ASTM):
 - a. ASTM A82 - Standard Specification for Steel Wire, Plain, for Concrete Reinforcement.
 - b. ASTM A185 - Standard Specification for Steel Welded Wire Reinforcement, Plain, for Concrete.
 - c. ASTM A615/A615M-14 - Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement.
 - d. ASTM A706/A706M-14 - Standard Specification for Low-Alloy Steel Deformed and Plain Bars for Concrete Reinforcement.
 - 2. American Concrete Institute (ACI) Publication:
 - a. ACI SP-66 – ACI Detailing Manual.
 - b. ACI 318 – Building Code Requirements for Structural Concrete, as modified by CBC Sections 1903A and 1908A.
 - 3. American Welding Society (AWS):
 - a. AWS D1.4 – Structural Welding Code – Reinforcing Steel.



- B. GFRP Reinforcement
 - 1. ACI 440.5-08
 - 2. ACI 440.6-08
 - 3. ACI 440.3R-12
 - 4. ASTM D30 and D30.05
 - 5. ASTM D7205
 - 6. ASTM D7337
 - 7. ASTM D7617
 - 8. ASTM D7705

1.04 SUBMITTALS

A. General

Submittals shall be made in accordance with “01 33 00 – Submittals” and shall include the following:

- 1. Shop Drawings:
Submit steel reinforcement Shop Drawings in accordance with ACI 315. Include assembly diagrams, bending charts and slab plans. Indicate lengths and location of splices, size and lengths of reinforcing steel.
- 2. Product Data:
Submit for review manufacturers' product data and installation instructions for proprietary manufactured materials and reinforcement accessories.
- 3. Certificates:
Contractor shall furnish mill affidavits or test reports of compliance or similar certification, certifying the grades and physical and chemical properties of the reinforcing steel and conformance with applicable ASTM Specifications, including ASTM A370, Method A9.
- 4. Test Reports: Submit manufacturer’s certified test reports for source quality control testing for material and mechanical properties.
 - Each bar size.
 - Each type of fiber reinforcement specified.
 - Each type of resin matrix specified.
- 5. Closeout Submittals: Record exact locations of reinforcing that vary from Shop Drawings.

- B. Contractor shall furnish a Certificate of Compliance for epoxy certifying compliance with requirements as set forth herein. In addition, a copy of the manufacturer's recommended installation procedure shall be provided to the Engineer at least 7 days prior to the start of work.



- C. LEED Submittals: Complete the LEED Material Buyout Form (MBoF) with all materials provided to the project. A complete submittal includes providing all material costs in the MBoF and all of the supporting documentation for the following credits:
1. MRc2 - Environmental Product Declarations (EPD): Provide Industry-Wide or Product-Specific EPD.
 2. MRc3 - Sourcing of Raw Materials - Recycled Content: Provide product data for pre- and post- consumer recycled content.
 3. MRc3 - Local/ Regional Material: Provide product data confirming product manufactured and extracted within 100 miles of the project site. Only applicable for products that also contain recycled content or FSC certified wood.
 4. MRc4 - Material Ingredients: Provide manufacturers Declare label, Health Product Declaration (HPD), Cradle to Cradle Certification, or Cradle to Cradle Health Product Certificate.
 5. IEQc2 - Low-Emitting Materials – Interior Wet Applied Products: For paints, coatings, adhesives and sealants applied on site or used for laminating off-site, include product data indicating the VOC content (g/L) and testing certificates or third-party certification demonstrating compliance with California Department of Public Health (CDPH) v1.2-2017 emissions testing

1.05 QUALITY ASSURANCE

- A. Comply with the following as a minimum requirement:
1. Concrete Reinforcing Steel Institute (CRSI) Manual of Standard Practice.
 2. American Welding Society (AWS).
 3. American Concrete Institute (ACI).
 4. CBC, Chapter 19A, Concrete.
- B. Tolerances
1. Fabrication shall comply with the applicable requirements of ACI 315.
 2. Adjustment:
Reinforcement and dowels may be moved as necessary to avoid interference with other conduits, or embedded items. Minimum spacing shall not be decreased, nor the required amount to be placed.
- C. Preplacement Meeting
1. Convene a preplacement meeting 2 weeks before the start of placing of FRP bars. Require attendance of parties directly affecting work of this section, including the Contractor, Engineer, concrete subcontractor, and FRP bar manufacturer's representative. Review placing of FRP bars and coordination with other work.



- D. Quality control for GFRP shall be carried out under the requirements of an ISO 9002 certified facility by testing GFRP bars before use, to ensure required performance. Test reports from testing conducted by an independent testing agency can be used when available. Perform following quality control tests in accordance with standard test methods. Testing shall include:
1. Guaranteed ultimate tensile strength, tensile modulus of elasticity, and ultimate strain.
 2. Bent bars tensile strength.
 3. Fatigue strength.
 4. Bond strength.
 5. Durability in alkaline environments.

1.06 DELIVERY, STORAGE AND HANDLING

- A. Deliver steel reinforcement to the job site, store, and cover in a manner that will ensure that no damage shall occur to it from moisture, dirt, grease, oil, or other cause that might impair bond with concrete.
- B. Deliver, store, and handle FRP bars in accordance with manufacturer's instructions to prevent damage.
- C. Storage:
1. Do not store FRP bars directly on ground. Place timber pallets under bars to keep them free from dirt and mud and to provide easy handling.
 2. Store FRP bars under covers to avoid direct sunlight and chemical substances if stored for extensive periods of time outdoors.

PART 2 – PRODUCTS

2.01 MATERIALS (STEEL)

- A. Reinforcement steel for cast-in-place reinforced concrete construction shall conform to the following requirements:
1. Bar reinforcement shall conform to the requirements of ASTM A 615 - Deformed and Plain Billet - Steel Bars, for Grade 60 reinforcement unless otherwise indicated.
 2. Welded wire fabric reinforcement shall conform to the requirements of ASTM A 1064 - Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete, and the details indicated. Welded wire fabric with longitudinal wire of W4 size wire and smaller shall be in flat sheets or in rolls with a core diameter of not less than 10 inches. Welded wire fabric with longitudinal wires larger than W4 size shall be in flat sheets only.



3. Spiral reinforcement shall be cold-drawn steel wire conforming to the requirements of ASTM A 1064 - Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete.

B. Accessories:

1. Accessories shall include all necessary chairs, slab bolsters, concrete blocks, tie wires, dips, supports, spacers, and other devices to position reinforcement during concrete placement. Bar supports shall meet the requirements of the CRSI Manual of Standard Practice including special requirements for supporting epoxy coated reinforcing bars. Wire bar supports shall be CRSI Class 1 for maximum protection with a 1/8-inch minimum thickness of plastic coating which extends at least 1/2-inch from the concrete surface. Plastic shall be gray in color.
2. Concrete blocks (dobies) used to support and position reinforcement steel shall have the same or higher compressive strength as required for the concrete in which they are located. Wire ties shall be embedded in concrete block bar supports.
3. Tie wire shall be No. 16 gauge or heavier, black or galvanized, soft or commercial grade steel. For galvanized reinforcement, provide zinc-coated wire.
4. Dowels shall be smooth round epoxy-coated steel conforming to the requirements of ASTM Designation: A 36M, and shall conform to the details shown on the Contractor's shop drawings and the provisions in Section 206-1, "Structural Steel, Rivets, Bolts, Pins, and Anchor Bolts," of the SSPWC, except galvanizing will not be required. Dowels shall be epoxy-coated and shall conform to the provisions in Section 52-2, "Epoxy-coated Reinforcement and Epoxy-coated Prefabricated Reinforcement," of the Standard Specifications, except that references made to ASTM Designation D 3963 shall be deemed to mean ASTM Designation A 934.

Dowels shall be to the length shown on the plans in ± 0.25 inch and shall be plain, smooth, round bars. Dowels shall be free from burrs or other deformations detrimental to free movement of the bars in the concrete.

5. Epoxy (Drill and Bond)

Epoxy for bonding dowels to Portland cement concrete shall be a two-component, epoxy-resin, conforming to the requirements of ASTM Designation: C 881, Type V, Grade 3 (Non-Sagging), Class A, B or C. The class used shall be dependent on the internal temperature of the hardened concrete at the time the epoxy is to be applied. Class A shall be used when the internal temperature is below 40°F, but not lower than recommended by the manufacturer. Class B shall be used when the internal temperature is from 40°F to 60°F. Class C shall be used when the internal temperature is above 60°F, but not higher than recommended by the manufacturer



6. Epoxy coating for reinforcing and accessories, where indicated, shall conform to ASTM A 775 - Epoxy - Coated Reinforcing Steel Bars

2.02 FABRICATION

- A. Fabrication of steel reinforcement and dowels shall be in accordance with the Plans and approved shop drawings. Where specific details are not indicated, comply with the applicable requirements ACI 318.
- B. Cutting and bending shall be performed at a central location, equipped and suitable for the purpose. Bars shall be accurately cut and bent as indicated on the shop drawings. Bars shall be bent cold. Heating of bars for bending or straightening will not be permitted. Bars shall not be bent or straightened in any manner that will injure the material.

2.02.1 BENDING

- A. Reinforcement bars shall only receive shop bending. Field bending is not allowed.

PART 3 – EXECUTION

3.01 REINFORCING STEEL BARS

- A. Reinforcing steel bars shall be placed in accordance with the approved shop drawings and with each section of the Technical Specifications where reinforcing steel bars are called for.
- B. Reinforcing steel shall be installed in place, and rigidly and securely tied or wired with tie wire at all splices and at crossing points and intersections in the positions indicated. Point ends of wire ties away from forms. All lateral and longitudinal reinforcing shall be placed in the lower half of the concrete slab unless otherwise indicated.
- C. Center-to-center distance between parallel bars shall be in accordance with the approved shop drawings. Where not indicated, the minimum clear spacing shall be two times the bar diameter but not less than 1-1/2 inches nor less than 1-1/3 times the maximum size aggregate.
- D. Longitudinal location of bar bends and ends may vary a maximum of plus or minus 3 inches from the indicated location provided that specified protective concrete cover at ends of members is not reduced by more than 1/2 inch.
- E. Lapped Splices shall be adequate to transfer stress by bond. Lap bars a minimum of 45 diameters. Wherever possible, splices of alternate bars shall be staggered a minimum clear offset of 4 feet between splices. Splices shall be tied with tie wire full length of lap.
- F. Welding of steel reinforcing bars shall not be allowed.



3.02 DOWELS

- A. Dowels shall be placed in accordance with the approved shop drawings and with each section of the Technical Specifications where dowels are called for.
- B. Dowels shall be placed by using mechanical insertion in existing adjacent concrete sections at spacing shown on Plans. Dowels shall be oriented at mid point of existing concrete section. Dowel alignment shall be plus or minus 0.25 inch per 12 inches of dowel length in both horizontal and vertical planes. Dowel core holes shall be filled with epoxy bonding agent. Core hole shall be filled fully to edge of concrete with no resulting voids.

3.03 CLEANING

- A. Steel reinforcement, at time of depositing concrete, shall be free of corrosion and coatings that may impair bond with concrete, such as form oil, mill scale, or loose deposits of rust and other corrosion.

3.04 FIELD QUALITY CONTROL

- A. The Contractor shall perform quality control inspections and tests including the following:
 - 1. Placement of reinforcement and dowels, including insertion depths, epoxy filling, spacing, alignment, splices, ties, and clearances.

END OF SECTION



SECTION 03 30 00

CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

1. Cast-in-place normal weight and lightweight concrete, placement and finishing.

B. Related Requirements:

1. Division 01 - General Requirements.
2. Section 03 10 00: Concrete Forming and Accessories.
3. Section 03 20 00: Concrete Reinforcing.
4. Section 07 26 00: Vapor Barriers.
5. Section 32 13 13: Portland Cement Concrete Paving.

1.02 REFERENCES

A. American Concrete Institute (ACI) Publication:

1. ACI 117 – Specifications for Tolerances for Concrete Construction and Materials.
2. ACI 301 – Specifications for Structural Concrete.
3. ACI 302.1R – Guide for Concrete Floor and Slab Construction.
4. ACI 305R - Specification for Hot Weather Concreting.
5. ACI 306.1 – Standard Specification for Cold Weather Concreting.
6. ACI 308R – Guide to External Curing of Concrete.
7. ACI 318 - Building Code Requirements for Structural Concrete, as modified by CBC Sections 1903A and 1905A.



B. American Society for Testing and Materials (ASTM) Standards:

1. ASTM C31 – Standard Specification for Making and Curing Concrete Test Specimens in the Field.
2. ASTM C33 - Standard Specification for Concrete Aggregates.
3. ASTM C39 - Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens.
4. ASTM C42 - Standard Test Method for Obtaining and Testing Drilled Cores and Sawed Beams of Concrete.
5. ASTM C88 - Standard Test Method for Soundness of Aggregates by use of Sodium Sulphate or Magnesium Sulphate.
6. ASTM C94 - Standard Specification for Ready-Mixed Concrete.
7. ASTM C143 - Standard Test Method for Slump of Hydraulic Cement Concrete.
8. ASTM C150 - Standard Specification for Portland Cement.
9. ASTM C156 – Standard Test Method for Water Loss (from a Mortar Specimen) Through Liquid membrane-Forming Curing Compounds for Concrete.
10. ASTM C171 - Standard Specification for Sheet Materials for Curing Concrete.
11. ASTM C172 – Standard Practice for Sampling Freshly Mixed Concrete.
12. ASTM C173 – Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method.
13. ASTM C260 – Standard Specification for Air-Entraining Admixtures for Concrete.
14. ASTM C289 - Standard Test Method for Potential Alkali-Silica Reactivity of Aggregates (Chemical Method).
15. ASTM C309 - Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete.
16. ASTM C330 - Standard Specification for Lightweight Aggregates for Structural Concrete.
17. ASTM C494 - Standard Specification for Chemical Admixtures for Concrete.



18. ASTM C567 - Standard Test Method for Determining Density of Structural Lightweight Concrete.
19. ASTM C618 - Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete.
20. ASTM C845 - Standard Specification for Expansive Hydraulic Cement
21. ASTM C989 - Standard Specification for Ground Granulated Blast-Furnace Slag for Use in Concrete and Mortars.
22. ASTM C1107 - Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink).
23. ASTM C1064 - Standard Test Method for Temperature of Freshly Mixed Hydraulic-Cement Concrete.
24. ASTM C1240 - Standard Specification for Silica Fume Used in Cementitious Mixtures.
25. ASTM C1315 – Standard Specification for Liquid Membrane-Forming Compounds Having Special Properties for Curing and Sealing Concrete.
26. ASTM D1308 – Standard Test Method for Effect of Household Chemicals on Clear and Pigmented Organic Finishes.
27. ASTM C1567 - Standard Test Method for Determining the Potential Alkali-Silica Reactivity of Combinations of Cementitious Materials and Aggregate (Accelerated Mortar-Bar Method).
28. ASTM D1751 - Standard Test Method for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Non-extruding and Resilient Bituminous Types).
29. ASTM D7234 – Standard Test Method for Pull-Off Adhesion Strength of Coatings on Concrete Using Portable Pull-Off Adhesion Testers.
30. ASTM E96 - Standard Test Methods for Water Vapor Transmission of Materials.
31. ASTM E1155 - Standard Test Method for Determining F_F Floor Flatness and F_L Floor Levelness Numbers.
32. ASTM E1643 - Standard Practice for Selection, Design, Installation, and Inspection of Water Vapor Retarders Used in Contact with Earth or Granular Fill under Concrete Slabs.



33. ASTM E1745 - Standard Specification for Water Vapor Retarders Used in Contact with Soil or Granular Fill under Concrete Slabs.
34. ASTM F710 – Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring.
35. ASTM F1869 – Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride.
36. ASTM F2170 – Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs Using In Situ Probes.
37. ASTM F3010 – Standard Practice for Two-Component Resin Based Membrane-Forming Moisture Mitigation Systems for Use under Resilient Floor Coverings.

1.03 SUBMITTALS

- A. Shop Drawings: Submit Shop Drawings indicating locations of cast-in-place concrete Work and accessory items such as vapor barriers. Include details and locations of reinforcing, embedded items, and interfacing with other Work.
- B. Mix Design Data: Submit concrete mix designs as specified herein and in Article 2.02.
 1. Submit name, address and telephone number of the concrete production facility which the contractor intends to engage to design the concrete mixes. Submit name and qualifications of the proposed concrete technologist.
 2. Mix Design: Submit a concrete mix design for each strength and type of concrete indicated in the drawings or specified. Include water/cement ratio, source, size and amount of coarse aggregate and admixtures. Predict minimum compressive strength, maximum slump and air content percentage. Clearly indicate locations where each mix design will be used.
 - a. Water/cement ration for concrete slabs on grade shall be 0.50 maximum.
 3. Test Reports: Submit copies of test reports showing that the proposed mixes produce concrete with the strengths and properties specified. Include tests for cement, aggregates and admixtures. Provide gradation analysis.
- C. Material Samples: Submit Samples illustrating concrete finishes and hardeners, minimum 12-inch by 12-inch.
- D. Certificates: Submit certification that each of the following conforms to the standards indicated:



1. Portland cement: ASTM C150.
 2. Normal weight concrete aggregates: ASTM C33.
 3. Lightweight concrete aggregates: ASTM C330.
 4. Aggregates: Submit evidence that the aggregate is not reactive in the presence of cement alkalis. In the absence of evidence, aggregate shall be tested by one of the methods in ASTM C33 Appendix XI, Methods for Evaluating Potential for Deleterious Expansion Due to Alkali Reactivity of an Aggregate. Aggregates deemed to be deleterious or potentially deleterious may be used with the addition of a material that has been shown to prevent harmful expansion in accordance with Appendix XI of ASTM C33, when approved by the building official, in accordance to CBC Section 1903A5A.
 5. Curing materials: ASTM C171.
- E. Admixtures: Submit product data for proposed concrete admixtures..

1.04 QUALITY ASSURANCE

A. Tolerances:

1. Concrete Tolerances: Comply with the requirements of ACI 117 as applicable. Coordinate with the requirements specified in Section 03 10 00, Concrete Forming.
 2. Tolerances for Slabs and Flatwork: Comply with the requirements specified under this section.
- B. Architectural Concrete: Where concrete is indicated as architectural concrete exposed to public view, such concrete shall be produced in accordance with applicable requirements of ACI 301.
- C. Monitoring of Formwork: Provide monitoring of forms and embedded items to detect movement, or forms and embedded items out-of-alignment, from pressure of concrete placement.
- D. Special Inspections and Tests shall be in accordance with CBC Chapter 17A, Reinforcement and Anchor testing per CBC Section 1910A.

1.05 DELIVERY, STORAGE AND HANDLING

- A. Store cement and aggregate materials so as to prevent their deterioration or intrusion by foreign matter. Deteriorated or contaminated materials shall not be furnished.



- B. Packaged materials shall bear the manufacturers and brand name label, and shall be stored in their original unbroken package in a weather tight place until ready for use in the work.

1.06 PROJECT CONDITIONS

- A. Cold Weather Requirements: Batching, mixing, delivering and placing of concrete in cold weather shall comply with the applicable requirements of ACI 306.1.
- B. Hot Weather Requirements: Batching, mixing, delivering and placing of concrete in hot weather shall comply with the applicable requirements of ACI 305R.
- C. Concrete temperature of freshly mixed concrete shall be determined per ASTM C1064.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Cement: ASTM C150. Portland Cement.
- B. Aggregates: Conform to the following standards:
 - 1. Normal weight concrete: ASTM C33.
 - 2. Lightweight concrete: ASTM C330, with fine aggregates per ASTM C33.
 - 3. Aggregate shall be tested for Potential Alkali Reactivity of Cement-Aggregate Combinations per ASTM C289.
 - 4. Nominal maximum size of coarse aggregate shall be no larger than:
 - a. $\frac{1}{5}$ the narrowest dimension between sides of forms, nor
 - b. $\frac{1}{3}$ the depth of slabs, nor
 - c. $\frac{3}{4}$ the clear spacing between individual reinforcing bars or wires, bundles of bars, individual tendons, or ducts.
 - d. CONTRACTOR may request the ARCHITECT waiver of the above limitations reported per ACI 318, provided that the workability and methods of consolidation are such that the concrete can be placed without honeycombs or voids.
- C. Water: Water for concrete mixes, curing and cleaning shall be potable and free from deleterious matter.



- D. Admixtures: Shall be shown capable of maintaining essentially the same composition and performance throughout the work as the product used in establishing concrete proportions in accordance with ACI 318, Section 3.6.
1. Admixtures containing chlorides or sulfides are not permitted.
 2. Air-entraining admixtures shall comply with ASTM C260. Air-entrained admixtures shall not be used for floor slabs to receive steel trowel finish.
 3. Admixtures for water reduction and setting time modification shall conform to ASTM C494.
 4. Admixtures for producing flowing concrete shall conform to ASTM C1017.
 5. Fly ash, pozzolan and ground granulated blast-furnace slag: Modify ACI 318 Sections 3.6.6 and 3.6.7 as follows:
 - a. Fly ash or other pozzolan used as a partial substitution for ASTM C150 Portland cement shall meet the following requirements:
 - 1) Shall conform to ASTM C618 for Class N or F materials (Class C is not permitted).
 - 2) 25 percent by weight of fly ash or other pozzolans shall substitute for ASTM C150 Portland cement provided the mix design is proportioned per ACI 318, Section 318 5.3.
 - b. Ground-granulated blast-furnace slag used as a partial substitution for ASTM C150 Portland cement shall meet the following requirements:
 - 1) Shall conform to ASTM C989.
 - 2) 25 percent by weight of ground-granulated blast-furnace slag shall substitute for ASTM C150 Portland cement provided the mix design is proportioned per ACI 318, Section 5.3.
 6. Admixtures containing ASTM C845 expansive cements shall be compatible with the cement and produce no deleterious effects.
 7. Silica fumes used as an admixture shall conform to ASTM C1240.
- E. Reinforcement Fibers: Chop strands of alkali-resistant polypropylene or nylon fibers added to the concrete mix for protection against shrinkage cracks.
- F. Expansion Joint Fillers: Preformed strips, non-extruding and resilient bituminous type, of thickness indicated, conforming to ASTM D1751.



G. Curing:

1. Curing Paper: Shall conform to ASTM C171 and consist of two sheets of kraft paper cemented together with a bituminous material in which are embedded cords or strands of fiber running in both directions. The paper shall be light in color, shall be free of visible defects, with uniform appearance.
2. Elevated slabs and slabs on grade may be cured at CONTRACTOR's option with curing and proactive water vapor emission and alkalinity control system. Products shall be approved by OWNER's Office of Environmental Health and Safety.
 - a. VaporSeal 309, by Floor Seal Technology, Inc., or equal.
 - 1) ASTM C156: 0.39 kg/m².
 - 2) ASTM C309: Exceeds requirements.
 - 3) ASTM C1315: Exceeds requirements.
 - 4) ACI 308R-01 Compliant.
 - b. Remedial Treatment: Water vapor emission and alkalinity control treatment, MES 100 by Floor Seal Technology, Inc. or equal.
 - 1) ASTM E96: <0.1 Perms.
 - 2) ASTM D1308: 14pH Resistant.
 - 3) ASTM D7234: 500+psi 100% concrete failure.
 - 4) ASTM F2170: 100%RH resistant.
 - 5) VOC Content: <100 g/L, meets SCAQMD Rule #1113.
 - 6) ASTM F3010: Meets Requirements.
 - c. Self-leveling Compounds: Ardex Engineered Cements, K15, or V1200, Schonox ZM Rapid, US Self Leveler Armstrong, S-194, or equal.

H. Floor Hardener: Water soluble, inorganic, silicate-based curing, hardening, sealing and dustproofing compound. Aquaseal W20 by Monopole Inc., Kure-N-Harden by BASF, Chem Hard by L&M, Liqui-Hard by W. R. Meadows, or equal.

I. Underlayment: Two component latex underlayment for filling low spots in concrete for both interior and exterior applications, from featheredge to a maximum of 3/8 inch in thickness. Underlayment shall be non-shrink and suitable for repairing exposed concrete



surfaces and for underlayment of carpet, resilient, tile and quarry floor coverings. La-O-Tex by TexRite, Underlay C, RS by Mer-Krete Systems, Underlayment 962 by C-Cure, or equal.

- J. Vapor Barrier: Refer to Section 07 26 00, Vapor Barriers.
- K. Stair Treads and Nosings: Two part stair tread and nosing with ribbed abrasive bars. Fabricated from 6063-T5 or 6063-T6 extruded aluminum, mill finish. Anti-slip abrasive filler consisting of aluminum oxide, silicon carbide, or a combination of both, in an epoxy-resin binder. Color shall extend uniformly throughout filler.
 - 1. American Safety Tread: TP-311R.
 - 2. Balco Inc.: DST-330.
 - 3. Nystrom: STTB-P3.375E.
 - 4. Wooster Products Inc.: WP-RN3SG.
 - 5. Equal.
- L. Grout: ASTM C1107, non-shrink type, pre-mixed compound consisting of non-metallic aggregate, cement, water reducing and plasticizing additives, capable of developing a minimum compressive strength of 7,000 psi at 7 days; of consistency suitable for application and a 30 minute working time.

2.02 CONCRETE MIX

- A. Mix shall be signed and sealed by a Civil or Structural Engineer currently registered in the State of California.
- B. Strength of Concrete: Strengths and types of concretes shall be as indicated in the Drawings. Unless otherwise indicated or specified, concrete shall be provided with minimum 28-day strength of 3000 psi (f'c).
- C. Concrete mix shall meet the durability requirements of ACI 318, Chapter 4.
- D. Concrete proportioning shall be determined on the basis of field experience and/or trial mixtures shall in accordance with ACI 318, Section 5.3. Proportions of materials shall provide workability and consistency to permit concrete to be placed readily into forms and around reinforcement under conditions of placement to be employed, without segregation or excessive bleeding.
- E. Ready-Mixed Concrete: Mix and deliver in accordance with requirements of ASTM C94.



PART 3 - EXECUTION

3.01 GENERAL

- A. Surfaces to receive concrete shall be free of debris, standing water, and any other deleterious substances before start of concrete placing.
- B. Time of Placing: Do not place concrete until reinforcement, conduits, outlet boxes, anchors, hangers, sleeves, bolts, and other embedded materials are securely fastened in place. Contact the Inspector at least 24 hours before placing concrete; do not place concrete until inspected by the Project Inspector.
- C. Pouring Record: A record shall be kept on the Project site of time and date of placing concrete in each portion of structure. Such record shall be maintained on the Project site until Substantial Completion and shall be available for examination by the ARCHITECT.

3.02 TOLERANCES

- A. Concrete construction tolerances shall be as specified in ACI 117 and as modified herein.
- B. Floor Flatness (F_F) and Floor Levelness (F_L) shall be as indicated below:

	Specified Overall Value		Minimum Local Value	
	F _F	F _L	F _F	F _L
Slabs on ground: mechanical and electrical rooms, parking structures and mortar bed set tile and quarry flooring.	20	15	15	10
Slab on ground: carpet.	25	20	17	15
Slab on ground: thinset tile and resilient flooring.	35	25	24	17
Suspended slabs: mechanical and electrical rooms, parking structures and mortar bed set tile and quarry flooring.	20	15	N/A	N/A
Suspended slabs: carpet.	25	20	N/A	N/A
Suspended slabs: thinset tile and resilient flooring.	35	20	N/A	N/A



- C. Refer to ACI 302.1R, Tables 8.1 and 8.2 Slab on Ground and Suspended Flatness/Levelness Construction Guide, for recommended concrete placing and finishing methods.
- D. Floor Flatness and Floor Levelness shall be tested in accordance to ASTM E1155. Floor measurements shall be made within 48 hours after slab installation, and shall precede removal of shores and forms.

3.03 PREPARATION

- A. For installation of vapor barrier refer to Section 07 2600, Vapor Barriers.
- B. Reglets and Rebates:
 - 1. Form reglets and rebates in concrete to receive flashing, frames and other equipment as detailed and required. Coordinate dimensions and locations required with other related Work.
 - 2. If concrete slabs on grade adjoin a wall or other perpendicular concrete surface, form a reglet in wall to receive and carry horizontal concrete Work. Reglet shall be full thickness of the slab and shall be 3/4 inch wide, unless otherwise indicated. Requirement does not apply to exterior walks, unless specifically indicated.
- C. Screeds: Install screeds accurately and maintain at required grade or slab elevations after steel reinforcement has been installed, but before starting to place concrete. Install screeds adjacent to walls and in parallel rows not to exceed 8 feet on centers.

3.04 INSTALLATION

- A. Conveying and Placing:
 - 1. Concrete shall be placed only under direct observation of the Project Inspector. Do not place concrete outside of regular working hours, unless the Inspector has been notified at least 48 hours in advance.
 - 2. Concrete shall be conveyed from mixer to location of final placement by methods that will prevent separation or loss of materials.
 - 3. Concrete shall be placed as nearly as practicable to its final position to avoid segregation due to re-handling or flowing. No concrete that has partially hydrated or has been contaminated by foreign materials shall be placed, nor shall re-tempered concrete or concrete which has been remixed after initial set be placed.



4. In placing concrete in columns, walls or thin sections, provide openings in forms, elephant trunks, tremies or other recognized devices, to prevent segregation and accumulation of partially hydrated concrete on forms or metal reinforcement above level of concrete being placed. Such devices shall be installed so that concrete will be dropped vertically. Unconfined vertical drop of concrete from end of such devices to final placement surface shall not exceed 6 feet.
5. Concrete shall be placed as a continuous operation until placing of panel or section is completed. Top surfaces of vertically formed lifts shall be level.
6. Concrete shall be thoroughly consolidated by suitable means during placement, and shall be thoroughly worked around reinforcement and embedded fixtures and into corners of forms.
7. Where conditions make consolidation difficult or where reinforcement is congested, batches of mortar containing same proportions of cement, sand, and water as provided in the concrete, shall first be deposited in the forms to a depth of at least one inch.

B. Cold Weather:

1. Provide adequate equipment for heating concrete materials and protecting concrete during freezing or near-freezing weather. All ground with which concrete is to come in contact shall be free from frost. No frozen materials or materials containing ice shall be used.
2. The temperature of concrete at the time of placement shall not be below the minimum temperatures given in Table 3.1 of ACI 306.1.
3. Concrete shall be maintained at a temperature of at least 50° F. for not less than 72 hours after placing or until it has thoroughly hardened. Cover concrete and provide sufficient heat as required. When necessary, aggregates shall be heated before mixing. Special precautions shall be taken for protection of transit-mixed concrete.

C. Hot Weather:

1. Concrete to be placed during hot weather shall comply with the requirements of ACI 318, Section 5.13.
2. Maintain concrete temperatures indicated in Table 2.1.5 of ACI 305R to prevent the evaporation rate from exceeding 0.2 pound of water per square feet of exposed concrete per hour.
3. Cool concrete using methods indicated in ACI 305R Appendix B.



4. Place and cure concrete as specified in ACI 305R Chapter 4.

D. Compaction and Screeding:

1. Tamp freshly placed concrete with a heavy tamper until at least 3/8 inch of mortar is brought to surface. Concrete shall then be tamped with a light tamper and screeded with a heavy straightedge until depressions and irregularities are eliminated, and surface is true to finish grades or elevations. Remove excess water and debris.
2. Where slabs are to receive separate cement finish or mortar setting bed, continued tamping to raise mortar to surface is not performed. Laitance shall be removed by brushing with a stiff brush or by light sandblasting to expose clean top surface of coarse aggregate.

E. Floating and Troweling:

1. When concrete has hydrated sufficiently, it shall be floated to a compact and smooth surface. After floating, wait until concrete has reached proper consistency before troweling. Top surfaces shall receive at least 2 troweling operations with steel hand trowel. Prior to and during final troweling, apply a fine mist of water frequently with an atomizing type fog sprayer. Omit troweling for slabs to receive a separate cement finish.
2. For interior finish slabs, final troweling shall provide a hard, impervious, and non-slip surfaces, free from defects and blemishes. Finished surface shall be within tolerances indicated in Article 3.02. Avoid burnishing. Do not add cement or sand to absorb excess moisture.
 - a. Floor of Walk-In Refrigerator: Finish as specified above, to a smooth finish.
 - b. Floor of Gymnasium Locker Rooms: After floating, and while the surface is still plastic, provide a fine textured finish by drawing a fine fiber bristle broom uniformly over the surface in one direction only. Floors sloped for drainage should be brushed in the direction of flow.
3. Vertical concrete surfaces shall be finished smooth and free from marks or other surface defects.

3.05 CURING

- A. Length of time, temperature and moisture conditions for curing concrete shall be in accordance with ACI 318, Section 5.11.



- B. Forms containing concrete, top of concrete between forms, and exposed concrete surfaces after removal of forms shall be maintained in a thoroughly wet condition for at least 7 consecutive days after placing.
- C. If weather is hot or surface has dried out, spray surface of concrete slabs and paving with fine mist of water, starting not later than 2 hours after final troweling and continuing until sunset. Surface of finish shall be kept continuously wet until curing medium has been installed.
- D. Immediately after finishing, monolithic floor slabs shall be covered with curing paper. Paper shall be lapped 4 inches at joints and sealed with waterproof sealer. Edges shall be cemented to finish. Repair or replace paper damaged during construction operations.
- E. When curing slabs with proactive water vapor emission and alkalinity control system:
 - 1. Coordinate and schedule application of curing compound with concrete pour schedule, while conforming to manufacturer's application instructions.
 - 2. When the surface of the concrete has hardened sufficiently to sustain foot traffic pre-cure slabs with liquefied product application following manufacturer's written instructions. Application shall be by trained applicators.
 - 3. Monitor Environmental Conditions: Set up weather station 20 to 30 inches above freshly placed concrete. Record temperature, humidity and wind velocity measurements at 15 minute maximum intervals.
 - 4. Calculate Evaporation Rate: Use recorded weather information in combination with nomograph per ACI 308R, Figure 4.1, Guide to Curing Concrete, to evaluate relevant evaporation rate.
 - 5. When the bleed water rate of the concrete is approximately equal to the surface water evaporation rate, spray curing compound material throughout surface of slabs and decks, following manufacturer's written instructions. Application shall be by trained applicators.
 - 6. Perform the following tests at least 28 days after placement of concrete and prior to floor covering installation. Submit to OAR test results indicating locations that do not comply with scheduled flooring installation requirements.
 - a. Calcium chloride testing per ASTM F1869.
 - b. Relative humidity testing per ASTM F2170.
 - c. Alkalinity testing per ASTM F710.



- d. Perform concrete bond layer humidity meter testing to determine substrate surface acceptability.
7. Areas emitting moisture and alkalinity at rates exceeding floor covering manufacturer's published ASTM F1869 limits, shall receive a corrective coating, at no cost to the OWNER, as follows:
- a) Mask and protect adjacent walls and floor surfaces from effects of scarification and application of remedial treatment.
 - b) Scarify slab surface in area of application by shot blasting or other method acceptable to corrective coating manufacturer.
 - c) Prepare and fill cracks, control joints and cold joints.
 - d) Apply two-component modified epoxy penetrant and coating with roller and squeegee over required treatment area; saturate surfaces to ensure a through mechanical bond.
 - e) Clean and fill divots, chips, voids and other surface irregularities with one hundred percent Portland cement based patching compound or cementitious fill.
 - f) Apply cementitious surfacing over coating in areas to receive resilient and wood floor coverings to facilitate adhesion; apply to a thickness of 1/8 inch.

3.06 FILLING, LEVELING AND PATCHING

- A. Concrete slabs exhibiting high or low spots and indicated to receive resilient floor covering or soft floor covering, shall have surfaces repaired. High spots shall be honed, or ground with power-driven machines to required tolerances. Low spots shall be filled with latex underlayment, installed in strict accordance with manufacturer's written recommendations.
- B. Holes resulting from form ties or sleeve nuts shall be solidly packed, through exterior walls, by pressure grouting with cement grout, as specified. Grouted holes on exposed surfaces shall be screeded flush and finished to match adjoining surfaces.
- C. Cement Base: Cement base shall be of the height, thickness, and shape detailed. Base shall be reinforced with one inch mesh, 18 gage, zinc-coated wire fabric. Base finish mixture shall be one part Portland cement, 2 parts of fine aggregate and one part pea gravel. Colored cement base shall include a chemically inert mineral oxide pigment in the mix.



3.07 FINISHING

- A. Soda and Acid Wash: Concrete surfaces to receive plaster, paint or other finish, and which have been formed by oil coated forms, shall be scrubbed with a solution of 1-1/2 pounds of caustic soda to one gallon of water. Surfaces where smooth wood or waste molds have been furnished shall be scrubbed with a solution of 20 percent muriatic acid. Wash with clean water after scrubbing.
- B. Sacking: Exposed concrete curbs, walls, and other surfaces shall be sacked by an application of Portland cement grout, floated, and rubbed. Sacking shall not be performed until patching and filling of holes has been completed. Entire sacking operation for any continuous area shall be started and completed within the same day.
 - 1. Mix one part Portland cement and 1-1/2 parts fine sand with sufficient water to produce a grout having consistency of thick paint. Wet surface of concrete sufficiently to prevent absorption of water from grout. Apply grout uniformly with a brush or spray gun, then immediately float surface with a cork or other suitable float, scouring wall vigorously.
 - 2. While grout is still plastic, finish surface with a sponge-rubber float, removing excess grout. Allow surface to dry thoroughly, then rub vigorously with dry burlap to completely remove dried grout. No visible film or grout shall remain after rubbing with burlap.
- C. Sandblasting: Exterior concrete surfaces to receive stucco dash coat finish, where plywood or other smooth forms have been furnished, shall be uniformly sand-blasted with sharp quartz sand under sufficient air pressure to remove dirt, form oil and other foreign materials, and roughen surface to provide a proper bond. Such surfaces shall be thoroughly washed with clean water after sandblasting.
- D. Abrasive: Concrete stair treads, landings, ramps and steps on interior and exterior of buildings, and interior exposed concrete floors in shop buildings shall receive an abrasive finish.
- E. Floor Hardener: Exposed interior concrete floors throughout shall be treated with floor hardener.
 - 1. Protect adjacent surfaces. Clean surfaces to receive treatment in accordance with manufacturer's instructions, ensuring that all stains, oil, grease, form release agents, laitance, dust and dirt are removed prior to application.
 - 2. Apply hardener in accordance with manufacturer's instructions as soon as concrete is firm enough to work on after final troweling.
- F. Cement Grout and Dry-Pack Concrete: Cement grout shall be mixed at the Project site and shall be composed of one volume of Portland cement and 2-1/2 volumes of fine



aggregate. Materials shall be mixed dry with sufficient water added to make mixture flow under its own weight. When grout is used as a dry pack concrete, add sufficient water to provide a stiff mixture, which can be molded into a sphere.

- G. Broom Finish: Exterior stair treads and landings shall be provided with a non-slip broom finish in addition to abrasive finish specified.
- H. Abrasive Stair Nosing: Nosing shall be installed according to manufacturers written recommendations.

3.08 EXPANSION AND CONSTRUCTION JOINTS

- A. Construction Joints: Details and proposed location of construction joints shall be as indicated on the Drawings, located to least impair strength of structure, in accordance with the following:
 - 1. Thoroughly clean contact surface by sand blasting entire surface not earlier than 5 days after initial placement.
 - 2. A mix containing same proportion of sand and cement provided in concrete plus a maximum of 50 percent of coarse aggregate shall be placed to a depth of at least one inch on horizontal joints. Vertical joints shall be wetted and coated with a neat cement grout immediately before placing of new concrete.
 - 3. Should contact surface become coated with earth, sawdust, or deleterious material of any kind after being cleaned, entire surface shall be re-cleaned before applying mix.
- B. Expansion Joints: Provide expansion joints where indicated in walks and exterior slabs. Space approximately 20 feet apart, unless otherwise indicated. Joints shall extend entirely through slab with joint filler in one piece for width of walk or slab. Joint filler shall be 3/8 inch thick, unless otherwise indicated.
- C. Tooled Joints: Slabs, walks and paving shall be marked into areas as indicated with markings made with a V-grooving tool. Marks shall be round-edged, free from burrs or obstructions, with clean cut angles and shall be straight and true. Walks, if not indicated, shall be marked off into rectangles of not more than 12 square feet and shall have a center marking where more than 5 feet wide.

3.09 TESTING

- A. Molded Cylinder Tests:
 - 1. Inspector or testing lab personnel will prepare cylinders and perform slump tests. Samples for concrete strength shall be taken in accordance to ASTM C172. Each



- cylinder shall be dated, given a number, point in structure from which sample was obtained, mix design number, mix design strength and result of accompanying slump test noted.
2. Separate tests of molded concrete cylinders obtained at same place and time shall be made at age of three days, seven days, and 28 days. A strength test shall be the average of the compressive strength of two cylinders, obtained from the same sample of concrete and tested at 28 days or at test age designated for determination of f_c .
 3. Test cylinders shall be prepared at the Project site and stored in testing laboratory in accordance with ASTM C31, and tested in accordance with ASTM C39.
- B. Core Test: At request of the ARCHITECT, cores of hardened concrete shall be cut from portions of hydrated structures for testing, in accordance with CBC and ASTM C42.
1. Provide 4 inch diameter cores at representative places throughout the structure as designated by the ARCHITECT.
 2. In general, provide sufficient cores to represent concrete placed with at least one core for each 4,000 square feet of building area, and at least 3 cores total for each Project.
 3. Where cores have been removed, fill voids with drypack, and patch the finish to match the adjacent existing surfaces.
- C. Concrete Consistency: Measure consistency according to ASTM C143. Test twice each day or partial day's run of the mixer.
- D. Adjustment of Mix: If the strength of any grade of concrete for any portion of Work, as indicated by molded test cylinders, falls below minimum 28 days compressive strength specified or indicated, adjust mix design for remaining portion of construction so that resulting concrete meets minimum strength requirements.
- E. Air Content Testing: Measure in accordance to ASTM C173 or ASTM C231, for each composite sample taken in accordance to ASTM C172.
- F. Defective Concrete:
1. Should strength of any grade of concrete, for any portion of Work indicated by tests of molded cylinders and core tests, fall below minimum 28 days strength specified or indicated, concrete will be deemed defective Work and shall be replaced or adequately strengthened in a manner acceptable to the ARCHITECT.
 2. Concrete Work that is not formed as indicated, is not true within 1/250 of span, not true to intended alignment, not plumb or level where so intended, not true to



intended grades and levels, contains sawdust shavings, wood or embedded debris, or does not fully conform to Contract provisions, shall be deemed to be defective Work and shall be removed and replaced.

- G. Concrete for Equipment Pads, Mechanical and Electrical Work: Unless otherwise indicated, strength shall have a minimum $f'c = 3,000$ psi. Exposed concrete shall be provided with a hand trowel finish with radius corners and edges. Form and place concrete where necessary as described in Section 03 10 00 Concrete Forming and Accessories, and reinforced as described in Section 03 20 00 Concrete Reinforcing. Calcium chloride shall not be furnished in any concrete mix provided for the installation of underground electrical conduits. For concrete encasement of more than one conduit, furnish 3/4 inch maximum aggregate.

3.10 CLEAN UP

- A. Remove rubbish, debris and waste materials and legally dispose of off the Project site.

3.11 PROTECTION

- A. Protect the Work of this section until Substantial Completion.

END OF SECTION



SECTION 03 48 00
PRECAST CONCRETE WALL CAPS

PART 1 - GENERAL

1.01 SUMMARY

- A. Section Includes: Concrete wall caps
- B. Related sections:
 - 1. Section 04 22 00 – Concrete Unit Masonry
 - 2. Section 04 73 00 – Manufactured Masonry Veneer

1.02 REFERENCES

- A. American Society of Testing and Materials (ASTM International)
 - ASTM C33 Concrete Aggregates
 - ASTM C39 Concrete Compressive Strength
 - ASTM C144 Aggregate for Masonry Mortar
 - ASTM C150 Portland cement
 - ASTM C595 Standard Specification for Blended Hydraulic Cements
 - ASTM C642 Water Absorption, Density, Voids in Hardened Conc
 - ASTM C666 Rapid Freeze/Thaw Resistance of Conc
 - ASTM C979 Pigments for Integrally Colored Concrete

1.03 SUBMITTALS

- A. Samples: Submit two full-sized samples of each type of precast concrete unit to show the full range of color and texture of unit for selection and approval. If sealer is to be applied to precast concrete slab, apply sealer on one sample.
- B. Product Data: Submit product data for specified products.
- C. Warranty: Provide certified copies of manufacturer's product warranties.
- D. Shop Drawings (Optional)
 - 1. Indicate layout, corners, terminals, radius sizes, junctions with dissimilar materials, accessories and setting details.



1.04 QUALITY ASSURANCE

- A. Qualifications of Manufacturer: Company specializing in manufacture of precast concrete wall cap units with a minimum of 10 continuous years of documented experience.
- B. Qualifications of Subcontractor: Subcontractor shall submit evidence of skill and not less than 5 years of experience in this product type.
- C. Pre-installation Conference: As directed by OAR.
- D. Precast concrete units shall have a compressive strength of 5,000 PSI minimum.

1.05 DELIVERY, STORAGE AND HANDLING

- A. Deliver all materials to the installation site in the manufacturer's original packaging. Packaging shall contain manufacturer's name, customer name, order, identification number, and other related information.
- B. Handle and store precast concrete units in accordance with manufacturer's recommendations.

1.06 ENVIRONMENTAL REQUIREMENTS

- A. Install mortar, set caps and grout when surface temperature is a minimum of 50 degrees F (10 degrees C) and rising but no greater than 90 degrees F (32 degrees C).
- B. Do not install mortar, set caps or grout when inclement weather conditions are expected within 48 hours of completion.

1.07 EXTRA MATERIALS

- A. Extra materials: Provide _ pcs of each size, color and accessories specified.

1.08 WARRANTY

- A. Provide warranty covering precast concrete wall cap units against defects in material and workmanship for a period of 5 years. Unusual abuse and neglect are excepted.
- B. Ordering: Comply with manufacturer's ordering instructions and lead time requirements to avoid construction delays.



PART 2 - PRODUCTS

2.01 MANUFACTURER

A. Basis of Design:

Stepstone, Inc.
17025 South Main Street
Gardena, CA 90248
(310) 327-7474
(800) 572-9029
FAX (310) 217-1424
www.stepstoneinc.com

B. Or approved equal

2.02 MATERIALS

A. Precast concrete wall cap units shall be precast concrete, consisting of Portland cement, aggregate, and color admixtures.

1. Portland cement: ASTM C 150, Type III, high early strength.
2. Aggregate: ASTM C 33.
3. Color Admixture: By Davis Colors, or equal, as required to achieve color as selected.
4. Aggregate for exposed aggregate surface: As selected.
5. Portland Cement Mortar that meets or exceeds ANSI A118.4 requirements when mixed with water or a latex admixture, and is designed for installation of large format tile – Pedestrian Installation.
6. Grout that meets or exceeds ANSI A118.7 when mixed with water or a latex admixture.

B. Precast concrete wall cap unit size and shape: As indicated in drawings

2.03 COLORS AND FINISHES

A. Colors: Davis Colors (or equal), integral color admixture. Integral color shall be throughout entire product. Color shall be as selected by Architect from manufacturer's color chart.

B. Finish: Smooth

C. Factory Application of Sealer: Factory apply one coat of penetrating sealer to all surfaces of wall cap units. Sealer shall be non-staining, penetrating material, suitable



for exterior or interior use, type which does not discolor or darken the surface.

2.04 PHYSICAL PROPERTIES:

- A. Compressive strength: Minimum 5,000 PSI.
- B. All wall cap styles have straight, end and corner pieces. Select wall cap styles have coordinating standard radius pieces where occurs.
- C. Unit size: Within 1/8" of designated length, width and thickness.
- D. Weight: 133 lbs/ft³
- E. Water absorption: Not more than 6.0 % average, not more than 7.0 % for any individual unit for standard colors.
- F. Wall Cap units will contain on average 6% entrained air, with no individual piece under 5%.

2.05 FABRICATION

- A. Wall Cap units shall be hand-made, wet-cast of cement conforming to ASTM C 150, Type III, aggregates conforming to ASTM C 33, and pigments for integrally colored concrete conforming to ASTM C979.

2.06 SOURCE QUALITY CONTROL

- A. Concrete for Wall Cap units shall be tested frequently to assure that mixes provide units having not less than 5,000 psi compressive strength at 28 days (average test strength not less than 4,500 psi).
- B. Minor chips, hairline cracks, air voids and slight variations in color and finish are normal in precast concrete. When viewed in typical daylight illumination from a distance of 20 feet, minor chips, hairline cracks and air voids that cannot be seen with the naked eye are not grounds for rejection.

PART 3 – EXECUTION

3.01 EXAMINATION

- A. Examine all surfaces.



- B. Verify all dimensions of in-place and subsequent construction.
- C. Notify the Contractor in writing of conditions detrimental to the proper and timely completion of the work.
- D. Do not proceed with the work until unsatisfactory conditions have been corrected.
- E. Installation of precast concrete wall caps, and associated construction, constitutes acceptance of the adjacent and underlying construction.

3.02 PREPARATION

- A. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.
 - 1. Ensure all substrates are clean and free of contaminants and have a roughened surface to encourage bonding.

3.03 CLEANING

- A. Clean exposed surfaces of precast concrete units. Use cleaners appropriate for precast concrete finishes and colors. Acid based cleaners will permanently alter finish and color.

3.04 SEALING

- A. Field-applied sealer for the prevention of freeze-thaw is optional in mild climates. If precast concrete units are factory sealed, test for compatibility before applying additional sealer.
- B. In geographic regions exposed to freeze-thaw conditions field-applied sealing the entire area, including joints, after installation is mandatory in order to maintain Stepstone's warranty. Follow sealer manufacturer's instructions for application and maintenance of the sealer.

3.05 COMPLETION

- A. Protect precast concrete units from damage due to subsequent building operations.
- B. After installation and before completion, inspect precast concrete units for construction damage and obtain new precast concrete units if required.
- C. Immediately prior to final acceptance of project, clean precast concrete units.



Department of Neighborhood Services and Public Safety
GOLETA TRAIN DEPOT PROJECT

END OF SECTION



SECTION 03 61 11

NON-SHRINK GROUT

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Cementitious Grout.
- B. Epoxy Grout.
- C. Epoxy Adhesive.

1.02 RELATED SECTIONS

- A. Section 03 30 00 - Cast-in-Place Concrete.
- B. Section 04 22 00 - Concrete Unit Masonry.
- C. Section 05 12 00 – Structural Steel Framing
- D. Section 05 12 13 – Architectural Exposed Steel Framing
- E. Division 9 – Finishes.

1.03 DEFINITION:

- A. For the purpose of these Specifications, “non-shrink grout” shall be defined as a high-strength mortar or grout which does not shrink in the plastic state, is dimensionally stable in the hardened state, and bonds permanently to clean metal surfaces and concrete substrate.

1.04 REFERENCES

- A. American Concrete Institute (ACI):
 - 1. ACI 503.2 Standard Specification for Bonding Plastic Concrete to Hardened Concrete with a Multi-Component Epoxy Adhesive
- B. American Society for Testing and Materials (ASTM):
 - 1. ASTM C109/C109M Standard Test Method for Compressive Strength of



Hydraulic Cement Mortars (Using 2-in. or 50-mm Cube Specimens)

2. ASTM C157/C157M Standard Test Method for Length Change of Hardened Hydraulic-Cement Mortar and Concrete
3. ASTM C579 Standard Test Methods for Compressive Strength of Chemical-Resistant Mortars, Grouts, Monolithic Surfacing and Polymer Concretes
4. ASTM C827/C827M Standard Test Method for Change in Height at Early Ages of Cylindrical Specimens from Cementitious Mixtures
5. ASTM C881/C881M Standard Specification for Epoxy-Resin-Base Bonding Systems for Concrete
6. ASTM C939 Standard Test Method for flow of Grout for Replaced-Aggregate Concrete (Flow Cone Method)
7. ASTM C1090/
C1090M Standard Test Method for Measuring Changes in Height of Cylindrical Specimens of Hydraulic-Cement Grout
8. ASTM C1107/
C1107M Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink)

C. U. S. Army Corps of Engineers, Concrete Research Division (CRD):

1. CRD-C620 Standard Method of Sampling Fresh Grout
2. CRD C621 Corps of Engineers Specification for Non-shrink Grout

1.05 SUBMITTALS

- A. General: Refer to Section 01 33 00, Submittal Procedures.
- B. Product Data: Submit manufacturer's product data and installation instructions.
- C. Certification: Submit certificates of compliance or laboratory test reports which indicate the following:
 1. Materials used in the grout are free from metallic components and corrosion-producing elements.
 2. Materials meet specified shrinkage and compressive strength requirements

1.06 ENVIRONMENTAL REQUIREMENTS



- A. Handle grout the same as concrete with regard to temperature and curing, as specified in Section 03 30 00, Cast-In-Place Concrete.

PART 2 – PRODUCTS

2.01 MATERIALS

- A. Cementitious Grout: Provide non-shrink, non-metallic, non-corrosive cement-based grout conforming to the following requirements:
 - 1. Applicable Standards: ASTM C1107/C1107M and CRD-C621.
 - 2. Grout shall be manufactured specifically for use in supporting heavy loads (loads in excess of 300 pounds per square foot concentrated load or 100 pounds per square foot uniform load). Grout: ASTM C1107/C1107M, Grade A, B, or C, as appropriate for the condition or circumstance.
 - 3. Shrinkage at 28 Days: No shrinkage before hardening (0.00 shrinkage when tested in accordance with ASTM C827/C827M and ASTM C1090/C1090M); no shrinkage after hardening (0.00 shrinkage when tested in accordance with CRD-C621).
 - 4. Compressive strength, minimum as specified in ASTM C1107/C1107M, Table 1:
 - a. At one Day: 1000 psi
 - b. At three Days: 2500 psi
 - c. At seven Days: 3500 psi
 - d. At 28 Days: 5000 psi
 - 5. Initial setting time, after addition of water: approximately one hour at 70 degrees Fahrenheit.
 - 6. Provide non-sag trowelability or flowability as necessary for the particular application.
- B. Water: Clean and potable, free of impurities detrimental to grout.
- C. Epoxy Grout: Provide non-shrink, non-metallic, non-corrosive epoxy grout conforming to the following requirements:
 - 1. Grout shall be manufactured specifically for use in supporting heavy loads.
 - 2. Shrinkage at 28 Days: None (0.00 shrinkage when tested in accordance with ASTM C827/C827M modified procedure) with a minimum effective bearing area (EBA) of 95 percent coverage of the tested base plate.
 - 3. Compressive strength, minimum: 10,000 psi at seven Days, when tested in accordance with ASTM C579.
 - 4. Initial setting time: Approximately one hour at 70 degrees Fahrenheit.



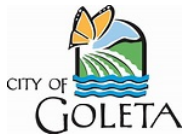
5. Provide flowable consistency as necessary for the particular application.
 6. Epoxy grouts which are volatile and which give off noxious fumes are not acceptable.
- D. Epoxy Adhesive: ASTM C881/C881M, Type V, epoxy-based bonding agent.

2.02 MIXING

- A. Mix grout ingredients for both cementitious grout and epoxy grout in accordance with the respective manufacturer's mixing instructions and recommendations. Mix grout materials in proper mechanical mixers.
- B. Mix grout as close to work area as possible.

2.03 SOURCE QUALITY CONTROL

- A. Inspections and Tests: Perform visual inspections and shrinkage tests using an appropriate independent testing laboratory, and strength tests as necessary to verify performance requirements of grout. Sampling and testing of grout shall conform with applicable ASTM or CRD-C620 requirements. The independent testing laboratory shall perform sampling, testing, and inspection in accordance with the provisions herein. The Contractor shall cooperate with and notify District at least 48 hours in advance of sampling, tests, and inspections being performed by the independent testing laboratory. District may elect to observe these procedures.
- B. Visual Inspections: Perform visual inspection of the grout mixing and placement to determine and verify that grout consistency, slump, and stiffness are appropriate and proper for the location and type of installation.
- C. Shrinkage Tests:
 1. Cementitious Grout: Grout shall meet the following performance requirements:
 - a. Expansion: 0.4 percent maximum at three, 14, and 28 Days. Grout shall exhibit no displacement when tested in accordance with ASTM C157/C157M.
 - b. Shrinkage: None (0.00 shrinkage at 28 Days when tested in accordance with ASTM C827/C827M and ASTM C1090/1090M). There shall be no vertical volume shrinkage of grout in the plastic or hardened stage at any time.
 2. Epoxy Grout: Grout shall meet the following performance requirements:
 - a. Expansion: Grout shall exhibit no displacement when tested in accordance with ASTM C827/C827M and ASTM C157/C157M, modified procedures.



- b. Shrinkage: None (0.00 shrinkage when tested in accordance with ASTM C827/C827M, modified procedure; specific gravity of indicator ball will be changed to approximately 1.0).
 - c. Effective Bearing Area: 95 percent minimum coverage of the tested base plate.
- D. Strength Tests: Compressive strength of grout shall meet the following requirements:
- 1. Cementitious Grout: 5,000 psi minimum at 28 Days when tested in accordance with ASTM C109/C109M.
 - 2. Epoxy Grout: 10,000 psi minimum at seven Days when tested in accordance with ASTM C579.

PART 3 – EXECUTION

3.01 SURFACE PREPARATION

- A. Concrete surfaces to receive grout shall be prepared by chipping, sandblasting, water blasting, or other accepted methods to remove defective concrete, laitance, dirt, oil, grease, and other foreign matter to achieve sound, clean concrete surfaces. Lightly roughen concrete for bond, but not enough to interfere with proper placement of grout.
- B. Cover concrete areas with protective waterproof covering until ready to place grout.
- C. Remove foreign matter from steel surfaces to be in contact with grout. Clean contact steel surfaces as necessary by wire brushing and wiping dust clean.
- D. Align and level components to be grouted, and maintain in final position until grout placement is complete and accepted.
- E. Install forms for grout around the column base plates and other spaces to be grouted. The tops of such forms shall be one inch above the surfaces to be grouted.
- F. Remove protective waterproof covering and clean contaminated surfaces immediately before grouting.
- G. Provide air-relief holes in large baseplates and in baseplates where underneath obstructions may cause air entrapment.
- H. Saturate concrete surfaces with clean water, and remove excess water immediately before grouting.



- I. Where necessary or appropriate for better bond, epoxy adhesive may be applied to clean, dry substrate surfaces in accordance with applicable requirements of ACI 503.2.

3.02 PLACING GROUT

- A. Place grout in accordance with the respective manufacturer's installation instructions and recommendations. Pour grout from one side only until grout rises at least one inch above the plate on opposite side of said plate. Strapping and plunging or other recommended method may be used to force grout to flow under the entire area.
- B. Neatly trowel edges of grout base, tapered at an angle of 60 degrees when measured from the horizontal, or as indicated. Provide dry-pack cementitious grout where additional grout is required for shoulders.
- C. Do not remove leveling shims for at least 48 hours after grout has been placed.
- D. After shims have been removed, if used, fill voids with grout, packing the material with a suitable tool.
- E. Do not use grout which has begun to set or if more than one hour has elapsed after initial mixing.

3.03 CURING

- A. Cementitious grout shall be cured the same as specified for concrete in Section 03 35 00, Concrete Finishing.
- B. Epoxy grout shall be cured as recommended by the grout manufacturer.

END OF SECTION



SECTION 04 01 20

MASONRY RESTORATION AND CLEANING

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

1. Pressure injection of epoxy resin and cleaning of existing masonry and stone work.
2. Repointing and caulking of cracks.
3. Removal of plant growth.

B. Related Requirements:

1. Division 01 - General Requirements.
2. Section 04 2200 - Concrete Unit Masonry.
3. Section 09 9000 - Painting and Coatings.

1.02 REGULATORY REQUIREMENTS

- A. State or municipal regulations governing sandblasting, cleaning, scaffolding, and protection of adjacent properties.
- B. Drawings detailing temporary support of structure shall be prepared, signed, and sealed by a structural engineer registered in the State of California.

1.03 SUBMITTALS

A. Shop Drawings: Submit Shop Drawings indicating areas to receive restoration.

B. Product Data:

1. Submit manufacturer's product literature and application procedures.
2. Submit laboratory test reports or approvals indicating conformance with the Specifications.

1.04 QUALITY ASSURANCE

A. Comply with the following as a minimum requirement:

1. ASTM C881 – Standard Specification for Epoxy-Resin-Base Bonding Systems for Concrete.
2. ASTM D638 – Standard Test Method for Tensile Properties of Plastics.



3. ASTM D695 - Standard Test Method for Compressive Properties of Rigid Plastics.
 4. ASTM D790 - Standard Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials.
- B. Continuous inspection of epoxy repair procedures shall be performed by the Project Inspector.
 - C. Inspection shall be performed by a representative of a testing laboratory selected by the City. Notify the laboratory 24 hours in advance of time epoxy is to be mixed, and promptly notify the laboratory of postponement or cancellation of mixing.
 - D. Applicator of epoxy resin adhesive and concrete repair shall be certified by the manufacturer.
 - E. Manufacturer: Regularly engaged in manufacture of epoxy resin products for at least 10 years. Provide references of at least five projects for which epoxy resin adhesive treatment was installed.
 - F. Immediately report any damage of existing masonry such as spalling, rust, structural movement, cracking, water stains, or loose units. Do not begin repair or restoration until City's structural engineer has inspected damage.
 - G. Tuck pointing requiring more than 3/4-inch removal of existing mortar shall be reviewed by City's Structural Engineer prior to replacement.
 - H. Comply with relevant code sections and standards on tucking pointing application.

1.05 PROJECT CONDITIONS

- A. Materials shall not be applied during existing or forecasted freezing or inclement weather.
- B. Adjacent surfaces, to the areas receiving treatment, shall be protected from damage from equipment, tools or materials.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to the Project site in manufacturer's unopened containers bearing manufacturer's name and product identification.
- B. Store and condition materials as recommended by product manufacturer.



PART 2 - PRODUCTS

2.01 MANUFACTURER

A. Manufacturers:

1. Sika Corporation.
2. Fosroc Inc.
3. The Euclid Chemical Company.
4. Equal.

2.02 MATERIALS

A. Epoxy Resin Adhesive:

1. New material within the shelf life recommended by manufacturer.
2. Two-part material made from 100 percent solids of modified epoxy resin containing suitable viscosity control agents and accelerators.
3. Mix components in ratio recommended by product manufacturer.
4. Material shall not contain butyl glycidyl ether or asbestos.
5. Epoxy resin adhesive shall be approved by the United States Department of Agriculture.

B. Materials for Masonry Restoration:

1. Sikadur 35, Hi-Mod LV, by Sika Corporation.
2. Nitobond LV, by Fosroc Inc.
3. Euco #452 LV System, by the Euclid Chemical Company.
4. Equal.

C. Materials for Cleaning Masonry:

1. Acid Solution: Clean, stain free, commercial hydrochloric (muriatic) acid mixed with potable water:
 - a. Use 10 parts water for dark colored brick.
 - b. Use 15 parts water for light colored brick.



- D. Mortar: ASTM C387, Type N or M, using gray or white cement, commercially prepared type.
- E. Hydrated Lime: ASTM C207.
- F. Quicklime: ASTM C5, non-hydraulic type.
- G. Sand (for sandblasting): Quartz type, sharp edged.
 - H. Masonry Anchors:
 - 1. DA 213 Seismic as fabricated by DUR-O-WAL, when brick is removed and installed.
 - 2. Masonry anchors shall be D 5300 series for brick veneer around wood framing when brick is left in place.

PART 3 - EXECUTION

3.01 GENERAL

- A. Sample Test Area for Cleaning: Before commencement of Work, cleaning procedures and solutions shall be applied to a sample test area of approximately 20 square feet. The effectiveness of the cleaning method will be determined by inspection of the test area at least one week after application.

3.02 PREPARATION

- A. Remove and store items such as finish hardware, fixtures, fittings, and accessories.
- B. Construct dustproof partitions to close off occupied areas from this Work. Protect adjacent materials from damage by the Work of this section.
- C. Surface adjacent to cracks must be clean and sound; cracks shall be free of standing water and frost. Remove dust, grease, foreign particles, and disintegrated materials on surface adjacent to cracks by sandblasting, high-pressure water blasting or high-pressure steam cleaning.
- D. For gravity flow grouting, V-notch surface of crack, to a maximum width of 1/4 inch and remove loose debris.

3.03 APPLICATION

- A. For manual application of epoxy resin adhesive, mix only that quantity of material that can be used in 20 to 30 minutes at 73 degrees F.
- B. For pressure injection, portable unit shall be provided with positive displacement type pumps, air-powered or electric, with interlock for positive ratio control of exact



proportions of material at nozzle. Pumps shall provide in-line mixing and metering system and contain drain-back plugs.

C. Placement Procedures:

1. Pressure Injection: To seal cracks, set porting devices as required by manufacturer. Spacing shall not exceed thickness of substrate and shall be accomplished to achieve travel of material for grouting between ports; fill grouts to maximum. On structures accessible on both sides, provide grouting devices on opposite sides at staggered elevations. Apply mixed epoxy resin adhesive for sealing, over cracks and around each porting device, to provide adequate seal to prevent escape of adhesive for injection grouting. Where required, apply adhesive for sealing in a manner to provide minimal defacing discoloration.

2. Gravity Flow Grouting: Place mixed material into V-notches and replenish reservoir with material until cracks are completely filled.

D. If penetration of crack is not possible, notify Architect before stopping the Work. If modification of procedure is required to fill cracks, submit proposed modifications for review prior to proceeding.

E. Provide masonry restoration materials in accordance with manufacturer's written recommendations.

3.04 CLEANING EXISTING MASONRY

A. Where serious staining is indicated, provide the following:

1. Apply high pressure (700 psi or greater) steam cleaning to masonry surfaces with detergent in accordance with manufacturer's directions.

2. If existing coating is lead-based paint, notify the Architect before proceeding.

B. Sandblasting: Do not sandblast brick or mortar.

3.05 CLEANING NEW MASONRY

A. Ensure that mortar is thoroughly set and cured.

B. Clean surfaces and remove large particles with wood scrapers, wire brushes, or chisels.

C. Saturate masonry with clean water and flush off loose mortar and dirt.

D. Scrub walls with detergent solution using stiff brush.

E. Thoroughly rinse and wash off cleaning solution, dirt, and mortar crumbs using clean, pressurized water.



3.06 RESTORATION CLEANING

- A. Clean surfaces and remove large particles of excess mortar with wood scrapers or wire brush.
- B. Apply masonry restoration cleaner, mixed into solution in strict accordance with manufacturer's instructions.
- C. Apply a second coat if required by preliminary test of a sample area.
- D. Allow sufficient time for solution to remain on masonry, agitate with soft fiber brush or sponge.
- E. Rinse from bottom up with potable water at high pressure.

3.07 TUCK POINTING

- A. Cut out loose or disintegrated mortar in joints, without damage to masonry units.
- B. Tuck pointing mortar shall not be denser than original mortar. In absence of information on the original mortar, provide pre-hydrated mortar.

3.08 AGING MASONRY

- A. Perform an aging process, if required to match existing Work by rubbing and then removing excess carbon black into mortar surface. Repeat process until new Work matches existing. Prepare a Sample panel for Architect review before performing the Work.
 - 1. Rub carbon black with burlap rags or medium bristle brush.
 - 2. After each installation, dust off surplus and wash down with medium pressure hose. Allow to thoroughly dry before proceeding with succeeding installations.

3.09 CLEANUP

- A. Remove rubbish, debris, and waste materials and legally dispose of off the Project site.

3.10 PROTECTION

- A. Protect the Work of this section until Substantial Completion.

END OF SECTION – 04 01 20



SECTION 04 22 00

CONCRETE UNIT MASONRY

PART 1 – GENERAL

1.01 SUMMARY

A. Section Includes:

1. Concrete masonry units.
2. Reinforcing steel.
3. Mortar, grout and grouting.
4. Bolts, anchors, hardware, metal frames, and other insert items.

B. Related Requirements:

1. Division 01 - General Requirements.
2. Section 01 45 23 - Testing and Inspection.
3. Section 03 10 00 - Concrete Forming and Accessories.
4. Section 03 20 00 - Concrete Reinforcing.
5. Section 03 30 00 - Cast-In-Place Concrete.
6. Section 05 12 00 - Structural Steel Framing.
7. Section 08 11 13 - Hollow Metal Doors and Frames.

1.02 REFERENCES

A. American Society for Testing and Materials International (ASTM):

1. ASTM A307 - Standard Specification for Carbon Steel Bolts and Studs, 60 000 PSI Tensile Strength.
2. ASTM C90 - Standard Specification for Load Bearing Concrete Masonry Units.
3. ASTM C94 - Standard Specification for Ready-Mixed Concrete.
4. ASTM C140 - Standard Test Methods for Sampling and Testing Concrete Masonry Units and Related Units.
5. ASTM C144 - Standard Specification for Aggregate for Masonry Mortar.
6. ASTM C150 - Standard Specification for Portland Cement.
7. ASTM C207 - Standard Specification for Hydrated Lime for Masonry Purposes.
8. ASTM C270 - Standard Specification for Mortar for Unit Masonry.



9. ASTM C404 - Standard Specification for Aggregates for Masonry Grout.
 10. ASTM C426 - Standard Test Method for Linear Drying Shrinkage of Concrete Masonry Units.
 11. ASTM C476 - Standard Specification for Grout for Masonry.
 12. ASTM C780 - Standard Test Method for Preconstruction and Construction Evaluation of Mortars for Plain and Reinforced Unit Masonry.
 13. ASTM C1019 - Standard Test Method for Sampling and Testing Grout.
 14. ASTM C1314 - Standard Test Method for Compressive Strength of Masonry Prisms.
 15. ASTM C1586 – Standard Guide for Quality Assurance of Mortars.
- B. Masonry Standards Joint Committee (MSJC), the Masonry Society (TMS), American Concrete Institute (ACI) and American Society of Civil Engineers (ASCE).
1. TMS 602/ACI 530.1/ASCE 6 – Specification for Masonry Structures.
 2. TMS 402/ACI 530/ASCE 5 – Building Code Requirements for Masonry Structures.

1.03 SUBMITTALS

- A. Mix Design: Submit grout and mortar mix designs. Mix designs shall be signed and sealed by a Civil or Structural Engineer registered in the State of California.
- B. Product Data: Submit manufacturer's Product Data for assembly components, materials, and accessories. Submit certificates and data assuring that the proposed materials meet the specified ASTM standards.
- C. Samples: Submit Samples for each type of required masonry unit, including reinforcement and accessories.
- D. Shop Drawings: Indicate wall reinforcement, splice locations and bending diagrams.
- E. Admixtures: Additives and admixtures to mortar and grout shall not be used unless approved by the enforcing agency. Submit product data for any proposed admixture.
- F. LEED Submittals: Complete the LEED Material Buyout Form (MBoF) with all materials provided to the project. A complete submittal includes providing all material costs in the MBoF and all of the supporting documentation for the following credits:
 1. MRc2 - Environmental Product Declarations (EPD): Provide Industry-Wide or Product-Specific EPD.
 2. MRc3 - Sourcing of Raw Materials - Recycled Content: Provide product data for pre- and post- consumer recycled content.
 3. MRc4 - Material Ingredients: Provide manufacturers Declare label, Health Product Declaration (HPD), Cradle to Cradle Certification, or Cradle to Cradle Health Product Certificate.
 4. IEQc2 - Low-Emitting Materials – Interior Wet Applied Products: For paints, coatings, adhesives and sealants applied on site or used for laminating off-site,



include product data indicating the VOC content (g/L) and testing certificates or third-party certification demonstrating compliance with California Department of Public Health (CDPH) v1.2-2017 emissions testing.

1.04 REGULATORY REQUIREMENTS

- A. Perform the Work in accordance with CBC, Chapter 21A.
- B. Comply with requirements of TMS 602.

1.05 QUALITY ASSURANCE

- A. Comply with the requirements of Section 01 4523 - Testing and Inspection.
- B. Concrete Masonry Units:
 - 1. Notify the testing laboratory a minimum of 45 days in advance of installing concrete unit masonry, to allow for preconstruction testing of the units.
 - a. Units will be sampled and tested in accordance with ASTM C140 for compressive strength, absorption and moisture content.
 - b. Units will be sampled and tested in accordance with ASTM C426 for linear drying shrinkage.
 - 2. The material testing laboratory shall receive concrete masonry unit specimens for testing from masonry unit manufacturer. Number of specimens shall be as indicated in referenced ASTM standard tests. Testing laboratory will perform and send test results to the ARCHITECT and Project Inspector.
- C. Portland Cement: Submit certification from the cement manufacturer that the cement proposed for use on the project has been manufactured in accordance with ASTM C150. Certification shall include test results made on cement samples during production.
- D. Mortar and Grout Tests: Prior to the beginning of masonry work, mortar and grout will be tested, unless prism tests will be performed as indicated below.
 - 1. Mortar: Shall conform to ASTM C270 Table 2 for Type S mortar.
 - a. Provide qualifications of mortar as meeting ASTM C270 at the beginning of the job and whenever mix design is changed.
 - b. Mortars will be evaluated during preconstruction and tested during construction for proportioning or compressive strength in accordance to ASTM C780.
 - 2. Grout: Shall conform to ASTM C476, and will be tested in accordance with ASTM C1019. Compressive strength shall equal or exceed specified compressive strength ($f'm$) at 28 days, but not less than 2,000 psi.
 - a. Ready-Mix Grout: Grout manufacturer shall furnish batch ticket information in accordance to ASTM C94.



- E. Prism Test: The compressive strength of concrete masonry will be determined by the prism test method prior to the start of construction and during construction.
- F. Masonry Core Testing: Core testing will be performed in accordance with CBC, Section 2105A.4.
- G. Inspection During Installation: A special inspector will continuously observe the installation of reinforced masonry. The Project Inspector shall be responsible for monitoring the work of the special inspector and testing laboratories to ensure that the testing program is satisfactorily completed.
- H. OWNER will be responsible for the costs of original tests and inspection.

1.06 DELIVERY, STORAGE AND HANDLING

- A. Store units above grade on level platforms or pallets, in a dry location.
- B. Store cementitious materials and aggregates in such a manner as to prevent deterioration or intrusion of foreign matter or moisture.
- C. Handle units on pallets or flat bed barrows. Free discharge from conveyor units or transportation in mortar trays is not permitted.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Concrete Unit Masonry: Modular normal weight conforming to ASTM C90, hollow load-bearing concrete unit masonry. Masonry units shall meet the minimum compressive strength requirements of ASTM C90, or as indicated on project drawings, whichever is greater.
 - 1. Concrete masonry unit sizes, types, texture and finishes shall be as indicated on the drawings.
 - 2. Provide open-end units at walls to be fully grouted.
 - 3. Provide closed-end units at walls and at openings where ends will be exposed in finish Work; provide bond beam blocks where horizontal reinforcement is indicated.
 - 4. Provide special shapes and accessory units at locations indicated on Drawings.
 - 5. Provide units in colors and textures as indicated in the drawings.
 - 6. Masonry unit shall have been cured for a minimum of 28 days.
 - 7. Masonry unit shall have maximum liner shrinkage of 0.065 percent from saturated to oven dry.
- B. Portland Cement: ASTM C150, Type II, from one source.
- C. Hydrated Lime: ASTM C207, Type S.
- D. Aggregates: ASTM C144 for mortar and ASTM C404 for grout.



- E. Mortar: ASTM C270, Type S, conforming to the property specifications of CBC Table 2103A.8 (2).
- F. Grout: ASTM C476.
- G. Admixture for Grout: Grout Aid, as manufactured by Sika Chemical Corp., or equal.
- H. Water: Clean, potable, free from substances deleterious to mortar, grout or reinforcement.
- I. Reinforcing Steel: Provide and install reinforcing steel in accordance with Section 03 2000 - Concrete Reinforcing.
- J. Cleaning Materials: Sure Klean No. 600 detergent by ProSoCo.
- K. Miscellaneous Materials: As required to complete the Work.
- L. Anchor Bolts: Shall be hex headed bolts conforming to ASTM A307 Grade A with the dimensions of the hex head conforming to ANSI/ASME B18.2.1.

2.02 LEED REQUIREMENTS

- A. IW/PS EDP: Products specified under this section must have a Type III Product Specific EPD or the company must be listed in the industry group responsible for the Industry Wide Externally Verified EPD.
- B. PS EPD: Products specified under this section must have a Type III Product Specific EPD.
- C. HPDs: Products specified under this section must have one of the following unexpired material ingredient reports compliant with LEEDv4.1 requirements and declared to 1000 ppm or less: Declare label, Health Product Declaration (HPD), Cradle to Cradle Certification, Cradle to Cradle Health Product Certificate, or UL Product Lens Certification.
- D. Interior Wet Applied Products: All wet-applied on-site paints, coatings, adhesives, and sealants products provided under Part 2 of this specification section must be compliant with the VOC limits outlined under IEQc2: Low Emitting Materials in 01 81 13 Sustainable Design Requirements. In addition, all paints and coatings must be compliant with CDPH Standard Method v1.2-2017 emissions testing with proper unexpired CDPH testing certificates or acceptable third-party certification.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Discard units with cracks or other defects not complying with requirements of ASTM C 90.

3.02 CONSTRUCTION

- A. Construct per applicable provisions of CBC and TMS 602.
- B. Conform to TMS 602 for hot and cold weather masonry construction.



3.03 MORTAR AND GROUT MIXING

- A. Mortar: Shall provide a minimum strength of 1,800 psi.
- B. Grout: Shall provide a minimum strength of 2,000 psi or as indicated in the drawings, whichever is higher. Grout space requirements for coarse and fine grouts shall be per Table 7 of TMS 602. Add Sika Chemical Corp. Grout Aid per manufacturer's instructions.
- C. Measurements: Measure in calibrated devices that can be checked at any time.
 - 1. Add water for workable consistency.
 - 2. Shovel measurements are not permitted.
- D. Mixing: Mix in accordance to TMS 602.
 - 1. Mortar: Mix cementitious materials and aggregates between three and five minutes in a mechanically operated mixer. Mix dry ingredients with a sufficient amount of water to provide a workable mix. Batches of less than one sack of cement, and fractional sack batches are not permitted.
 - 2. Factory Blended Mortar: Mix in accordance with manufacturer's recommendations.
 - 3. Grout: Add sufficient water for a workable mix that will flow into all voids of the masonry without separation or segregation. Grout slump shall be between 8 and 11 inches.
- E. Re-tempering Time Limit: Use mortar within 2 ½ hours after mixing. Discard any mortar that has been mixed longer or that has begun to set. If necessary re-temper within this time limit, by replacing only water lost due to evaporation and by thoroughly remixing.

3.04 INSTALLATION OF MASONRY UNITS

- A. Workmanship: Install masonry plumb and true to line with straight level joints of uniform thickness. Comply with TMS 602 tolerances. Maintain masonry clean during and after installation.
 - 1. Lay-out and incorporate embedded hardware items.
 - 2. Assist other trades with built-in items, which require cutting and fitting of masonry.
 - 3. Cut block units with a diamond saw or carborundum wheel. Trowel or chisel cutting is not permitted.
 - 4. Keep cavities clear of droppings and debris. Remove droppings prior to grouting.
- B. Reinforcing Steel: Install as indicated on Drawings. Except as otherwise indicated, install reinforcement in accordance with standards of Concrete Reinforcing Steel



Institute and to requirements specified in Section 03 2000 - Concrete Reinforcing. Do not splice vertical reinforcement except where indicated on the Drawings.

- C. Shoring: Provide temporary shoring for lintels with sufficient strength to carry load without deflecting. Remove temporary shoring not less than 28 days after masonry has been installed.
- D. Block Installation: Clean dirt and dust from surfaces before installation. Do not wet masonry units.
 - 1. Foundation preparation: Clean top surface of concrete foundation of dirt, projections and laitance before starting masonry construction. Wet saw cutting of units immediately prior to laying is permitted.
 - 2. Install masonry with mortar to required joint thickness. Install blocks with 3/8-inch mortar bed. Fill head joints solid, install tightly to adjoining units. Provide 3/8-inch joint thickness.
 - a. Hold racking to a minimum.
 - b. No toothing is permitted.
 - c. If it becomes necessary to move a unit after it has been installed, remove the unit, discard the mortar, and install the unit in fresh mortar.
 - 3. Anchor Bolts: Provide 1/2-inch minimum grout space between bolts and masonry.
 - 4. Bond: Unless otherwise indicated, install units in common running bond.
 - 5. Finish Joint Treatment: Unless otherwise indicated, cut both interior and exterior joints flush, and tool slightly concave to a dense, uniform surface.
 - 6. Grouting: Unless noted otherwise on Drawings, completely fill cells with grout.
- E. Steel Door Frames:
 - 1. Locate door frames accurately, install plumb, Set frames to floor with powder driven or expansion anchors to floor surface and brace in position before start of masonry installation.
 - a. Frames are specified to be furnished with adjustable anchors.
 - b. Fill interior of frames solid with mortar or grout as walls are constructed.
 - 2. Provide temporary wood spreaders from jamb to jamb and from head to floor to ensure that jambs do not bow-in, distort from a straight line, or deflect from superimposed loads during construction.

3.05 GROUTING

- A. Prior to grouting all cells shall be cleaned so that all spaces to be filled with grout do not contain mortar projections greater than 1/4 inch, loose mortar or foreign material.



- B. Grout materials and water contents shall be controlled to provide adequate fluidity for placement without segregation of the constituents, and shall be mixed thoroughly. Reinforcement shall be properly positioned and solidly embedded in the grout.
- C. The grouting of any section of wall shall be completed in one day with no interruptions greater than one hour.
- D. Between grout pours, a horizontal control joint shall be formed by stopping all wythes at the same elevation and with the grout stopping at 1 ½ inches below a mortar joint, except at the top of the wall. Where bond beams occur, the grout pour shall be stopped a minimum of ½ inch below the top of the masonry.

3.06 LOW-LIFT GROUTING FOR HOLLOW MASONRY UNITS

- A. Grouting shall meet the requirements of CBC Section 2104A.1.3.
- B. After mortar joints have set, cells are cleaned of mortar and debris, and reinforcement is installed and inspected, grout cells in 4-foot maximum lifts. Horizontal and vertical reinforcement shall be held in place within permitted tolerances by suitable devices.
- C. Grout may be installed by pump, tremie or bucket, using hoppers to avoid spilling on exposed surfaces.
- D. All grout shall be consolidated and reconsolidated with a mechanical vibrator after placing so as to completely fill all voids and to consolidate the grout. Grouted walls shall be solid and without voids.

3.07 HIGH-LIFT GROUTING OPTION FOR HOLLOW MASONRY UNITS

- A. Grouting shall meet the requirements of CBC Section 2104A.1.3.
- B. High-lift grouting shall apply only to cell sizes available with 8 inch and wider block units.
- C. Provide bond beam units, inverted for start course, and omit alternate blocks or remove entire face shell of every other unit to allow access to all cells on bottom course for cleanouts.
- D. Plug each cleanout by setting a face shell in mortar into opening and securely bracing it in place to prevent displacement. If masonry is not exposed in finish Work, cleanouts may be formed.
- E. Grouting: Grouting shall be done in a continuous pour in lifts not exceeding 5-foot in height. The grouting of any section of a wall between control barriers shall be completed in one day, with no interruptions greater than one hour.
- F. Consolidating: Grout shall be consolidated by mechanical vibration only, and shall be reconsolidated after excess moisture has been absorbed, but before plasticity is lost. Vibrating of reinforcing steel is not permitted.

3.08 CURING

- A. Remove efflorescence, stains, debris, excess grout, and foreign matter.



- B. During curing, or for any other purpose, do not saturate masonry with water.

3.09 PARGE COAT

- A. Apply parge coat to the earth side of surfaces that are to receive waterproofing.
- B. A Portland cement and sand mix (1:3.5 by volume) or Type S mortar may be used for the parge coat.
- C. Parging should be applied to damp (not saturated) concrete masonry in two 1/4 inch thick layers. The first coat should be roughened when partially set, hardened for 24 hours, and then moistened before second coat is applied. The second coat should be trowelled to a smooth, dense surface.
- D. The parge coat should be beveled at the top to form a wash, and thickened at the bottom to form a cove between the base of the wall and the top of footing.

3.10 CLEANING

- A. At completion of masonry Work, remove misplaced mortar, grout or other foreign substances, and clean surfaces which will be exposed in finish Work with specified cleaner, or with clean water and stiff fiber brushes.
- B. Remove rubbish, debris, and waste materials and legally dispose of off the Project site.

3.11 PROTECTION

- A. Protect the Work of this section until Substantial Completion.

END OF SECTION



SECTION 04 73 00

MANUFACTURED MASONRY VENEER

PART 1 - GENERAL

1.01 SUMMARY

- A. Section Includes: Providing labor, materials, tools and equipment to furnish and install cultured stone veneer, subbase preparation, and mortar bed installation.

1.02 RELATED DOCUMENTS

- A. Related Sections:

1. 05 41 00 - Cold Formed Framing.
2. 07 60 00 – Flashing and Sheet Metal.
3. 07 92 00 – Joint Sealants.
4. 09 24 00 – Portland Cement Plastering.

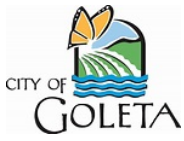
1.03 REFERENCES

- A. The specifications and recommended practices of the American Concrete Institute (ACI), American Society for Testing and Materials (ASTM), the California Department of Transportation (CalTrans) Standard Specifications, the Construction Specification Institute (CSI), the Standard Specifications for Public Works (Greenbook), and the California Building Code (CBC) referred to in this Specification with their individual designations are to be considered part of this Specification. The latest revision of each recommended practice or specification shall apply.

1.04 SUBMITTALS

- A. Reference - Submittal Procedures; submit following items:

1. Product Data.
2. Samples:
 - a. Standard sample board consisting of small-scale pieces of veneer units showing full range of textures and colors.
 - b. Full range of mortar colors.
3. Verification Samples: Following initial sample selection submit “laid-up” sample board using the selected stone and mortar materials and showing the full range of colors expected in the finished Work; minimum sample size: 3 by 3 feet (1 by 1 m).
4. Quality Assurance/Control Submittals:
 - a. Qualifications:



- 1) Proof of manufacturer qualifications.
- 2) Proof of installer qualifications.
- b. Regulatory Requirements: Evaluation reports.
- c. Veneer manufacturer's installation instructions.
- d. Installation instructions for other materials.

B. Closeout Submittals: Reference Section 01 78 00-Closeout Submittals; submit following items:

1. Maintenance Instructions.
2. Special Warranties.

1.05 QUALITY ASSURANCE

A. Qualifications:

1. Manufacturer Qualifications: Eldorado Stone, LLC.
2. Installer Qualifications: Experienced mason familiar with installation procedures and related local, state and federal codes masonry.

B. Certifications:

1. ICC Evaluation Service - Evaluation Report ESR-1215
2. ASTM C1670
3. UL - Classification listing in Building Materials Directory: UL 546T (F8002)

C. Field Sample:

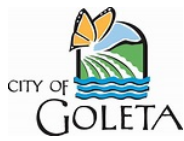
1. Prepare 4 by 4 foot sample at a location on the structure as selected by the Architect. Use approved selection sample materials and colors.
2. Obtain Architect's approval.
3. Protect and retain sample as a basis for approval of completed manufactured stone work. Approved sample may be incorporated into completed work.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Reference - Product Storage and Handling Requirements.
- B. Follow manufacturer's instructions.

1.07 PROJECT/SITE CONDITIONS

- A. Environmental Requirements: When air temperature is 40 degrees F (4.5 degrees C)



or below, consult local building code for Cold-Weather Construction requirements.

1.08 WARRANTY

Special Warranty: Manufacturer's standard warranty coverage against defects in materials when installed in accordance with manufacturer's installation instructions.

PART 2 - PRODUCTS

2.01 MANUFACTURER

- A. Basis of Design: Eldorado Stone, LLC
1370 Grand Ave., Bldg. B
San Marcos, CA 92069
- Tel: (800) 925-1491
Fax: (760) 736-3840
E-Mail: customerservice@eldoradostone.com
Website: www.eldoradostone.com

- B. Product: Veneer types as shown on Drawings

2.02 MATERIALS

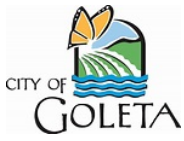
A. Stone Veneer:

1. Profile: As indicated in drawings. Include matching corner pieces.
2. Stone Accents: As indicated in drawings.
 - a. Color: As shown on Drawings.
 - b. Texture: As indicated in drawings.

B. Veneer Unit properties: Precast veneer units consisting of portland cement, lightweight aggregates, and mineral oxide pigments.

1. Compressive Strength: ASTM C 192 and ASTM C 39, 5 sample average: greater than 1,800 psi (12.4MPa).
2. Shear Bond: ASTM C 482: 50 psi (345kPa), minimum.
3. Freeze-Thaw Test: ASTM C 67: Less than 3 percent weight loss and no disintegration.
4. Thermal Resistance: ASTM C 177: 0.473 at 1.387 inches thick
5. Weight per square foot: 2012 IBC and 2012 IRC, ASTM C1670, 15 pounds, saturated.

C. Weather Barrier: [ASTM D 226, Type 1, No. 15, non-perforated asphalt-saturated felt paper] [UBC Standard 14-1, kraft waterproof building paper] or [UBC Standard No.



14-1, Kraft Waterproof Building Paper] or [ICC AC-38, synthetic house wrap]

D. Reinforcing: [ASTM C 847, 2.5lb/yd² (1.4kg/m²) galvanized expanded metal lath]
[ASTM C 847, 3.4lb (1.8 kg/m²) galvanized 3/8" rib lath] [ASTM C 1032, 17
gauge (1.3 mm) woven wire mesh] [ASTM C933 Welded Wire Lath] complying
with code agency requirements for the type of substrate over which stone veneer is
installed.

E. Mortar:

1. Cement: Portland cement complying with ASTM C 1329.
2. Lime: ASTM C 207.
3. Sand: ASTM C 144, natural or manufactured sand.
4. Color Pigment: ASTM C 979, mineral oxide pigments.
5. Water: Potable.
6. Pre-Packaged Latex-Portland Cement Mortar: ANSI A118.4.

F. Bonding Agent: Exterior integral bonding agent meeting [ASTM C 932] [ASTM C 1059 Type
II]

G. Water Repellent: Water based silane or siloxane masonry water repellent

2.03 MORTAR MIXES

A. Standard Installation (Grouted Joints):

1. Mix mortar in accordance with ASTM C 270,
2. Polymer modified mortar complying with ANSI A118.4
 - a. Add color pigment in grout joint mortar in accordance with pigment
manufacturer's instructions not to exceed 10% by weight of cement.

B. Jointless/Dry-Stacked Installation:

1. Polymer modified mortar complying with ANSI A118.4
2. Mortar prepared to comply with ASTM C270. Type S mortar.
 - a. Add color pigment in accordance with pigment manufacturer's instructions

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine substrates upon which work will be installed.



B. Coordinate with responsible entity to perform corrective work on unsatisfactory substrates.

C. Commencement of work by installer is acceptance of substrate.

3.02 PREPARATION

A. Protection: Protect adjacent work from contact with mortar.

B. Surface Preparation: Prepare substrate in accordance with manufacturer's installation instructions for the type of substrate being covered.

3.03 INSTALLATION

A. Install and clean stone in accordance with manufacturer's installation instructions for Standard Installation (Grouted Joint) or Jointless/Dry-Stacked installation as specified above.

B. Apply repellent in accordance with repellent manufacturer's application instructions.

3.04 CLEANING

A. Reference Section 01 74 00 □ Cleaning and Waste Management.

B. Remove protective coverings from adjacent work.

C. Cleaning Veneer Units:

1. Wash with soft bristle brush and water/granulated detergent solution
2. Rinse immediately with clean water

D. Removing Efflorescence:

1. Allow veneer to dry thoroughly
2. Scrub with soft bristle brush and clean water
3. Rinse immediately with clean water; allow to dry
4. If efflorescence is still visible, contact ES Customer Service for assistance

END OF SECTION



SECTION 05 05 13

HOT-DIP GALVANIZING

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

1. Hot-dip galvanizing of structural steel articles.
2. Hot-dip galvanizing of fabricated steel assemblies.
3. Preparation of galvanized steel assemblies for painting.

B. Related Sections:

1. Division 01 - General Requirements.
2. Section 05 12 00: Structural Steel Framing.
3. Section 05 50 00: Metal Fabrications.
4. Section 05 51 00: Metal Stairs and Railings.
5. Section 09 90 00: Painting and Coating.

1.02 REFERENCES

A. American Galvanizers Association (AGA):

1. Inspection of Products Hot-dip Galvanized after Fabrication.
2. The Design of Products to be Hot-dip Galvanized after Fabrication.
3. Recommended Details of Galvanized Structures.

B. ASTM International (ASTM):

1. ASTM A123 – Standard Specification for Zinc (Hot-Dipped Galvanized) Coatings on Iron and Steel Products.
2. ASTM A143 – Standard Practice for Safeguarding Against Embrittlement of Hot-Dip Galvanized Structural Steel Products and Procedure for Detecting Embrittlement.



3. ASTM A153 – Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
4. ASTM A384 – Standard Practice for Safeguarding Against Warpage and Distortion during Hot-Dip Galvanizing of Steel Assemblies.
5. ASTM A385 – Standard Practice for Providing High-Quality Zinc Coatings (Hot-Dip).
6. ASTM A780 – Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings.
7. ASTM B6 – Standard Specification for Zinc.
8. ASTM D6386 – Standard Practice for Preparation of Zinc (Hot-Dip Galvanized) Coated Iron and Steel Product and Hardware Surfaces for Painting.
9. ASTM D7803 - Standard Practice for Preparation of Zinc (Hot-Dip Galvanized) Coated Iron and Steel Product and Hardware Surfaces for Powder Coating.
10. ASTM E376 - Measuring Coating Thickness by Magnetic-Field or Eddy-Current (Electromagnetic) Test Methods.

C. The Society for Protective Coatings (SSPC):

1. SSPC-SP1 – Solvent Cleaning.
2. SSPC-SP2 – Hand Tool Cleaning.
3. SSPC-SP3 – Power Tool Cleaning.
4. SSPC-SP5 – White Metal Blast Cleaning.
5. SSPC-SP7 – Brush-Off Blast Cleaning.
6. SSPC-SP10 – Near White Blast Cleaning.
7. SSPC-SP11 – Power Tool Cleaning to Bare Metal.
8. SSPC-SP16 - Brush-Off Blast Cleaning of Coated and Uncoated Galvanized Steel, Stainless Steels, and Non-Ferrous Metals.

1.03 COORDINATION WITH STEEL FABRICATOR

- A. Prior to fabrication, steel fabricators shall submit approved fabrication shop drawings to the galvanizer. The Galvanizer shall review fabricator shop drawings for suitability of materials for galvanizing and coatings and coordinate any required fabrication modifications.



- B. Steel Fabricator shall notify the galvanizer of steel fabrications that exceed the ASTM A385 recommended percentages for carbon, phosphorus, manganese and silicon, so special galvanizing processing techniques are used.
- C. Coordinate with steel fabricator appropriate marking and masking materials.

1.04 QUALITY ASSURANCE

- A. Coating Applicator: Company specializing in hot-dip galvanizing after fabrication following the procedures in the Quality Assurance Manual of the American Galvanizers Association.
- B. Galvanizer shall have an in-plant inspection program designed to maintain the coating thickness, finish, and appearance within the requirements of this Section.

1.05 SUBMITTALS

- A. Galvanizing Certificate of Compliance: Provide notarized Certificate of Compliance with ASTM standards and specifications herein listed. The Certificate shall be signed by the galvanizer and contain a detailed description of the material processed. The Certificate shall include information as to the ASTM standard used for the coating.

1.06 DELIVERY, STORAGE AND HANDLING

- A. Package and handle galvanized material in a manner which will avoid damage to the zinc coating.
- B. Store in dry, well-ventilated conditions until shipping.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Steel for Galvanizing: As specified in Sections:
 - 1. Section 05 12 00: Structural Steel Framing.
 - 2. Section 05 50 00: Metal Fabrications.
 - 3. Section 05 51 00: Metal Stairs and Railings.
- B. Zinc for Galvanizing: Conform to ASTM B6, as specified in ASTM A123.

PART 3 – EXECUTION

3.01 PREPARATION



- A. Remove welding slag, splatter, anti-splatter compounds and burrs remaining in steel articles.
- B. Provide drainage and venting holes in tubular assemblies. In thicker material drill holes in place of punching. Holes shall have a relatively uniform circumference. Punched holes or burned holes with a plasma torch shall be treated with a drill to even the diameter to appropriate size.
- C. Masking installed by steel fabricator shall remain in place through galvanizing process completion.
- D. Provide lifting lugs to allow for handling during galvanizing. Avoid the use of chains or wires directly connected to steel articles.
- E. Safeguard against warpage or distortion of steel members in accordance with ASTM A384.
- F. Pre-clean steel work in accordance with accepted methods to produce an acceptable surface for quality hot-dip galvanizing. Remove surface contaminants and coatings that are not removable by the normal chemical cleaning process in the galvanizing operation by grit-blasting, sand-blasting, or other mechanical means.
- G. Follow the degreasing, pickling and fluxing steps to remove remaining oxides and to deposit a protective layer on the steel to prevent any further oxides from forming on the surface prior to immersion in the molten zinc.

3.02 COATING APPLICATION

- A. Galvanize steel articles, fabrications and assemblies by the hot-dip process in accordance with ASTM A123. The bath chemistry shall be as specified by ASTM B6, and requires at least 98% pure zinc maintained at approximately 840 F.
- B. Galvanize bolts, nuts, washers and iron and steel hardware components in accordance with ASTM A153.
- C. Safeguard products against steel embrittlement in conformance with ASTM A143.
- D. Once the fabricated items' coating growth is complete, withdraw slowly from the galvanizing bath, and remove the excess zinc by draining, vibrating, and/or centrifuging.
- E. Prepare galvanized products for powder coating in accordance to ASTM D7803. Prepare galvanized products for painting in accordance to ASTM D6386.
- F. Handle articles to be galvanized in such a manner as to avoid mechanical damage and to minimize distortion.
- G. Apply a chromate passivation treatment to fabrications that will not be painted after galvanizing to minimize the wet storage staining which may occur on articles unable to be stored in dry, well-ventilated conditions.



3.03 COATING REQUIREMENTS

- A. Conform to paragraph 6.1 of ASTM A123, or Table 1 of ASTM A153, as applicable.
- B. Surface Finish: Continuous, adherent, as smooth and evenly distributed as possible and free from any defect detrimental to the stated end use of the coated article
- C. Adhesion: Withstand normal handling consistent with the nature and thickness of the coating and normal use of the article.

3.04 TESTS

- A. Inspection and testing of hot-dip galvanized coatings shall be done under the guidelines provided in the AGA publication Inspection of Products Hot-dip Galvanized after Fabrication. Tests and inspections shall be performed immediately after the coating is applied and has cooled to ambient temperature, and before it leaves the galvanizing facility.
- B. Include visual examination and test methods in accordance with ASTM A123, or A153, as applicable, to determine the thickness of the zinc coating on the metal surface.
- C. During the visual inspection, if adhesion concerns are suspected, such as peeling or flaking of the galvanized coating, then adhesion testing using the stout knife method shall be conducted. Embrittlement testing is required when there is evidence of embrittlement and shall be conducted per the requirements of ASTM A143.
- D. Upon completion of tests furnish notarized Certificate of Compliance with ASTM standards and specifications herein listed.

3.05 REPAIR OF DAMAGED COATINGS

- A. Smooth out rough surfaces, bumpy or high spots and icicles by hand filing or power sanding the area without removing any more zinc coating than necessary. Repair damaged galvanized surface with a zinc rich coating.
- B. Repair areas damaged during galvanizing process or handling by one of the approved methods in accordance with ASTM A780 whenever damage exceeds 3/16" in width. Minimum thickness requirements for the repair shall be per ASTM A123, Section 6.2.
- C. Remove lifting lugs and repair coating with a zinc rich coating.
- D. Surface preparation for application of zinc rich coating shall be in accordance to ASTM A780.
 - 1. Clean areas in accordance to SSPC-SP2.



2. Prepare surface for zinc spray in accordance to SSPC-SP5, or zinc rich paint repair in accordance to SSPC-SP10.

3.06 PREPARATION FOR TOP COATING

- A. Galvanized fabrications indicated on the drawings to be painted shall be prepared in accordance to ASTM D6836.
 1. Surface cleaning prior to surface preparation in accordance to SSPC-SP1.
 2. Removal of zinc high spots and cleaning of light deposits of zinc reaction products in accordance to SSPC-SP2 or SSPC-SP3.
 3. Profile surface in accordance to SSPC-SP7 or SSPC-SP11.
- B. Galvanized fabrications indicated on the drawings to be powder coated shall be prepared in accordance to ASTM D7803.
 1. Surface cleaning and removal of oil and grease in accordance to SSPC-1.
 2. Surface smoothing and removal of loose particles in accordance to SSPC-SP-2 or SSPC-SP3.
 3. Sweep blasting and surface profiling in accordance to SSPC-SP16.

END OF SECTION



SECTION 05 05 22

METAL WELDING

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

1. Welding Rod/Electrodes
2. Stud Shear Connectors
3. Shop and Field Welding
4. Inspections and Tests by the Contractor
5. Inspections and Tests by the Engineer

B. Related Requirements:

1. Section 05 05 13 – Hot-Dip Galvanizing.
2. Section 05 10 00 – Metal Stairs and Railings.
3. Section 05 30 00 - Metal Decking.
4. Section 05 50 00 - Metal Fabrications..
5. Section 09 90 00 - Paints and Coatings.

1.02 REFERENCES

A. CBC Chapter 22A.

B. American Institute of Steel Construction (AISC):

1. AISC – Steel Construction Manual:
 - a. AISC 360 Specifications for Structural Steel Buildings.
 - b. AISC Code of Standard Practice for Steel Buildings and Bridges.
2. AISC 341 - Seismic Provisions for Structural Steel Buildings.
3. AISC 358 - Prequalified Connections for Special and Intermediate Steel Moment Frames for Seismic Applications.
4. American Society for Nondestructive Testing (ASNT): SNT-TC-1A Recommended Practice: Personnel Qualification and Certification in Nondestructive Testing.

C. ASTM International (ASTM):

1. ASTM E94/E94M Standard Guide for Radiographic Examination Using Industrial Radiographic Film



2. ASTM E164 Standard Practice for Contact Ultrasonic Testing of Weldments
3. ASTM E165/E165M Standard Practice for Liquid Penetrant Testing for General Industry
4. ASTM E709 Standard Guide for Magnetic Particle Testing
5. ASTM E1032 Standard Practice for Radiographic Examination of Weldments Using Industrial X-Ray Film

D. American Welding Society (AWS):

1. AWS D1.1 – Structural Welding Code - Steel.
2. AWS D1.3 Structural Welding Code – Sheet Steel
3. AWS D1.4 Structural Welding Code –Steel Reinforcing Bars
4. AWS D1.8 – Structural Welding Code – Seismic Supplement.
5. AWS D9.1M Sheet Metal Welding Code
6. AWS D10.4 Recommended Practices for Welding Austenitic Chromium-Nickel Stainless Steel Piping and Tubing
7. AWS A2.4 – Standard Symbols for Welding, Brazing, and Nondestructive Examination.
8. AWS B2.1 – Base Metal Grouping for Welding Procedure and Performance Qualification.
9. AWS QC1 Specification for AWS Certification of Welding Inspectors

E. SSPC – Steel Structures Painting Council:

1. SSPC-SP2 - Hand Tool Cleaning.
2. SSPC-PA-1 - Shop, Field and Maintenance Coating of Metals.

1.03 REGULATORY REQUIREMENTS

A. In addition to the foregoing referenced standards, the regulatory requirements that govern the work of this Section include the following code:

1. SSPC-SP2 - Hand Tool Cleaning. California Code of Regulations, Title 24, Part 2, California Building Code
2. California Occupational Safety and Health Administration (Cal/OSHA)

1.04 SUBMITTALS

A. General: Refer to Submittal Procedures, and for Shop Drawings, Product Data, and Samples, for submittal requirements and procedures. For Shop Drawings and other submittals, employ the standard welding symbols of AWS A2.4 and the standard welding terms of AWS A3.0M/A3.0.

B. Welder Qualifications: Submit copies of qualification test records for each welder, welding operator, and tack welder to be employed in the work. Comply with



requirements of AWS D1.1/D1.1M. For bridgework, comply with requirements of AWS D1.5M/D1.5. For seismic provisions, comply with requirement of AWS D1.8/D1.8M. For aluminum welders, comply with AWS D1.2/D1.2M. For pipe and tube, comply with requirements of AWS B2.1/B2.1M.

1. Submit welders identification marks (I.D.) for each welder along with qualifications.
- C. Welding Procedure Specifications (WPS): Prior to commencement of welding, submit the procedure specifications that will be used for welding. The WPS shall contain all data indicated in AWS D1.1/D1.1M Annex P, and any other information necessary to produce welded joints in compliance with this specification. For procedures other than those prequalified in accordance with AWS D1.1/D1.1M, D1.2/D1.2M, D1.5M/D1.5, and D1.8/D1.8M, submit a copy of procedure qualification test records in accordance with the qualification requirements of AWS D1.1/D1.1M, AWS D1.2/D1.2M, AWS D1.5M/D1.5, and AWS D1.8/D1.8M as applicable. WPS shall also include the mitigation of corrosion of welds, including heat treatment and chemical compatibility, as applicable.
- D. Welding Records and Data:
1. Submit all radiographs upon completion of fabrication.
 2. Submit certifications that magnetic particle and dye-penetrant inspections have been satisfactorily completed.
 3. Submit records of ultrasonic testing upon completion.
 4. If field welding is permitted, submit descriptive data for field welding equipment.
- E. Mill Certificates: Submit mill certificates and certified copy of reports for analyses and tests required by referenced ASTM and AWS specifications

1.05 QUALITY ASSURANCE

- A. Qualification of Welders and Welding Procedures: Welders, welding operators, tack welders, and welding procedures shall be prequalified or qualified in accordance with the following AWS Welding Codes and Standards:
1. Structural Steel: AWS D1.1/D1.1M, Section 4, Qualification. Includes steel for miscellaneous metalwork, steel stairs, and railings.
 2. Stud Welding: AWS D1.1/D1.1M, Section 7.6, Stud Application Qualification Requirements.
 3. Structural Aluminum: AWS D1.2/D1.2M, Section 3, Qualification.
 4. Sheet Steel (Structural): AWS D1.3/D1.3M, Section 4, Qualification. Prequalification is not applicable to sheet steel.
 5. Concrete Reinforcing Steel: AWS D1.4/D1.4M, Section 4, Qualification.
 6. Seismic Supplement: AWS D1.8/D1.8M, Section 5, Welder Qualification.



7. Sheet Metal:
 - a. Welders: AWS D9.1M/D9.1, Section 6, Qualification of Arc Welders and Arc Welding Operators, and Section 11, Qualification of Braze Welders and Braze Welding Operators.
 - b. Welding Procedures: AWS D9.1M/D9.1, Section 5, Arc Welding Procedure Qualification, and Section 10, Braze Welding Procedure Qualification.
8. Pipe and Tube: AWS B2.1/B2.1M
- B. Qualification of Welding Inspector: Welds to be inspected by the Contractor shall be inspected and certified by a Contractor-employed AWS Certified Welding Inspector (CWI), certified in accordance with AWS QC1.
- C. Qualification of Personnel Performing Nondestructive Testing: Personnel performing nondestructive testing, who are Contractor-employed, shall be qualified and certified in accordance with SNT-TC-1A. Only persons certified for NDT Level I and working under a NDT Level II or III person or persons certified for NDT Level II or III may perform nondestructive testing.
- D. Weldability of Steel: For structural steel requiring impact test qualification and for corrosion-resistant structural steel, the weldability of the steel and the procedures for welding it shall be established by qualification in accordance with AWS D1.1/D1.1M, Section 4.
- E. Qualification of Stud-Connector Manufacturer: Stud shear connector manufacturer shall be qualified in accordance with AWS D1.1/D1.1M, Section 7.9, Manufacturers Stud Base Qualification Requirements.
- F. Stud Welding Standards: For stud welding, comply with applicable requirements of AWS C5.4 for steel and stainless steel, and AWS D1.2/D1.2M, Section 6, for aluminum.
- G. Moment-Resisting Frames: Welding of beam-to-column joint connections in moment-resisting frames shall conform with ANSI/AISC 341, ANSI/AISC 360, and AWS D1.8/D1.8M.
- H. Iron Contamination of Stainless Steel: Iron contamination of stainless steel will not be accepted. Welds shall be ground smooth and polished at the factory to blend in with the surrounding finish surfaces. Refer also to Section 05 70 00, Decorative Metal, for requirements..

PART 2 - PRODUCTS

2.01 WELDING ROD/ELECTRODES

- A. Electrodes for structural plate, shapes, pipe, tubes, and bars shall conform with AWS A5 Series Standards and shall be coated rods or wire of size and classification number as recommended by their manufacturers for the positions and other conditions of actual use.



Matching filler metal requirements shall conform with AWS D1.1/D1.1M, AWS D1.5M/D1.5 and AWS D1.8/D1.8M, as applicable.

- B. Electrodes for sheet steel shall conform with AWS A5 Series Standards and shall be coated rods or wire of size and classification number as recommended by their manufacturers for the positions and other conditions of actual use. Matching filler metal requirements shall conform with AWS D1.3/D1.3M.
- C. Welding electrodes and welding rods for stainless steel shall conform with AWS A5.4 and AWS A5.9 as recommended by their manufacturers for the positions and other conditions of actual use. Matching filler metals shall be compatible with the Type 316 or Type 304 stainless steel, as applicable.
- D. Electrodes for aluminum shall conform with AWS A5.10 and AWS A5 Series Standards and shall be coated rods or wire of size and classification number as recommended by their manufacturers for the positions and other conditions of actual use. Matching filler metal requirements shall conform with AWS D1.2/D1.2M.

2.02 STUD SHEAR CONNECTORS

- A. Only products of manufacturers qualified in accordance with AWS D1.1/D1.1M, will be accepted for this work.

2.03 SHOP WELDING

- A. Perform shop welding as indicated in accordance with the California Building Code, AWS D1.1/D1.1M, AWS D1.2/D1.2M, AWS D1.3/D1.3M, AWS D1.5M/D1.5, AWS D1.8/D1.8M and AWS D9.1M/D9.1, as applicable to the work.
- B. Welders shall mark adjacent to completed welds their welder I.D., using metal stamp, metal engraving, keel, paint stick, or other appropriate marking material.
- C. Welding of stud shear connectors shall conform with AWS D1.1/D1.1M, Section 7, Stud Welding, AWS C5.4, Practices for stud welding and the stud manufacturer's instructions.
- D. Welding of stainless steel pipe and tube shall conform with applicable requirements of AWS D10.4. E. All groove welds shall be complete penetration welds unless otherwise indicated.

2.04 INSPECTIONS AND TESTS BY THE CONTRACTOR

- A. Testing and Inspection: Testing and Inspection of welds shall proceed 24 hours after the completion of welding unless the Engineer has approved for a later time.
- B. B. Visual Inspection: All welds shall be visibly examined in accordance with AWS D1.1/D1.1M, AWS D1.5M/D1.5, and AWS D1.8/D1.8M, as applicable. Quality of welds and standards of acceptance shall be in accordance with AWS D1.1/D1.1M and AWS D1.5M/D1.5.
- C. C. Nondestructive Testing: Nondestructive testing shall conform with AWS B1.10M/B1.10.



- D. D. Radiographic Testing: Radiographic testing of welds shall conform with AWS D1.1/D1.1M, AWS D1.5M/D1.5 and ASTM E94, and ASTM E1032, as applicable. Complete joint penetration groove welds shall be tested as follows: 1. 10 percent with thickness equal to or less than 3/4 inch. 2. 50 percent with thickness greater than 3/4 inch and equal to or less than 1-1/2 inches. 3. 100 percent for thickness greater than 1-1/2 inches.
- E. E. Ultrasonic Testing: Ultrasonic testing of welds shall conform with AWS D1.1/D1.1M, AWS D1.5M/D1.5 and ASTM E164, as applicable. Complete joint penetration groove welds not accessible for radiographic testing shall, with Engineer's approval, be subjected to ultrasonic testing.
- F. F. Magnetic Particle Inspection: Magnetic particle inspection of welds shall conform with ASTM E709. Complete and partial joint penetration groove welds and fillet welds shall be inspected as follows: 1. 20 percent of complete joint penetration groove welds of tee and corner joints. 2. 10 percent of partial joint penetration groove welds and fillet welds.
- G. G. Liquid Penetrant Inspection: Liquid dye penetrant inspection of welds shall conform with ASTM E165/E165M. Liquid penetrant inspection shall be used for detecting discontinuities that are open to the surface.
- H. H. Test Results: Test result information shall be forwarded to the Engineer immediately after test results are available, stating the acceptance or rejection of fabricated components, so that repairs and reinspection or testing may be performed as soon as possible.
- I. I. Testing for Unacceptable Welds: If the herein specified testing or inspection indicated any failure weld or resulted in any unacceptable weld, the Contractor has to perform the same testing or inspection on a separate batch of welds other than the batches that were tested. This process shall be repeated until all welds in the same batch have passed the testing or inspection and are acceptable by the Engineer.
- J. J. Repairs: Unacceptable welds shall be repaired in accordance with AWS D1.1/D1.1M, AWS D1.5M/D1.5, and AWS D1.8/D1.8M, as applicable. Repaired or corrected welds shall be reinspected or retested as specified for the original weld.

2.05 INSPECTIONS AND TESTS BY THE ENGINEER

- A. All welds are subject to inspections and tests by the Engineer as specified herein. Welds to be inspected and tested by the Engineer will be selected at random.
- B. The Engineer will make test results available to the Contractor.

PART 3 - EXECUTION

3.01 FIELD WELDING



- A. Field welding, where indicated or permitted by the Engineer, shall be performed as herein specified for shop welding and comply with CAL/OSHA requirements. The Contractor shall identify a risk for fire damage and maintain a fire watch during the work as approved by the Engineer.

3.02 INSPECTIONS AND TESTS

- A. The Contractor shall perform inspections and tests of field welds as herein specified for shop welds.
- B. The Engineer reserves the right to perform inspections and tests of field welds as herein specified for shop welds.

3.03 CLEANING

- A. Welds shall be cleaned in accordance with AWS D1.1/D1.1M.
- B. Welds of stainless steel shall be cleaned in accordance with Section 05 70 00, Decorative Metal, Article 3.02, Cleaning of Stainless Steel, and shall be protected from damage and corrosion at the factory, during shipping, and at the jobsite until acceptance of the work by the Engineer.

END OF SECTION



SECTION 05 12 00

STRUCTURAL STEEL FRAMING

PART 1 – GENERAL

1.01 SUMMARY

A. Section Includes:

1. Structural steel.

B. Related Requirements:

1. Division 01 - General Requirements.
2. Section 01 45 23 - Testing and Inspection.
3. Section 03 30 00 - Cast-In-Place Concrete.
4. Section 04 22 00 - Concrete Unit Masonry.
5. Section 05 05 13 – Hot-Dip Galvanizing.
6. Section 05 10 00 – Metal Stairs and Railings.
7. Section 05 30 00 - Metal Decking.
8. Section 05 50 00 - Metal Fabrications.
9. Section 09 90 00 - Paints and Coatings.

1.02 REFERENCES

A. CBC Chapter 22A.

B. American Institute of Steel Construction (AISC):

1. AISC – Steel Construction Manual:
 - a. AISC 360 Specifications for Structural Steel Buildings.
 - b. AISC Code of Standard Practice for Steel Buildings and Bridges.
 - c. RCSC Specification for Structural Joints Using High Strength Bolts.
2. AISC 341 - Seismic Provisions for Structural Steel Buildings.
3. AISC 358 - Prequalified Connections for Special and Intermediate Steel Moment Frames for Seismic Applications.

C. ASTM International (ASTM):

1. ASTM A36 – Standard Specification for Carbon Structural Steel.



2. ASTM A53 – Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.
3. ASTM A108 – Standard Specification for Steel Bar, Carbon and Alloy, Cold-Finished.
4. ASTM A123 – Standard Specification for Zinc (Hot-Dipped Galvanized) Coatings on Iron and Steel Products.
5. ASTM A153 – Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
6. ASTM A307 – Standard Specification for Carbon Steel Bolts and Studs, and Threaded Rod 60000 PSI Tensile Strength.
7. ASTM A435 - Standard Specification for Straight-Beam Ultrasonic Examination of Steel Plates.
8. ASTM A500 – Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Round and Shapes.
9. ASTM A501 - Standard Specification for Hot-Formed Welded and Seamless Carbon Steel Structural Tubing.
10. ASTM A572 – Standard Specification for High-Strength Low-Alloy Columbium-Vanadium Structural Steel.
11. ASTM A653 – Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
12. ASTM A673 - Standard Specification for Sampling Procedure for Impact Testing of Structural Steel.
13. ASTM A992 – Standard Specification for Structural Steel Shapes.
14. ASTM C1107 – Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink).
15. ASTM E23 - Standard Test Methods for Notched Bar Impact Testing of Metallic Materials.
16. ASTM E112 - Standard Test Methods for Determining Average Grain Size.
17. ASTM F3125 - Standard Specification for High Strength Structural Bolts, Steel and Alloy Steel, Heat Treated, 120 ksi (830 MPa) and 150 ksi (1040 MPa) Minimum Tensile Strength, Inch and Metric Dimensions.
18. ASTM F436 – Standard Specification for Hardened Steel Washers Inch and Metric Dimensions.
19. ASTM F959 - Standard Specification for Compressible-Washer-Type Direct Tension Indicators for Use with Structural Fasteners, Inch and Metric Series.



20. ASTM F1554 – Standard Specification for Anchor Bolts, Steel, 36, 55 and 105-Ksi Yield Strength.
 21. ASTM F1852 – Standard Specification for Twist Off Type Tension Control Structural Bolt/Nut/Washer Assemblies, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength.
- D. American Welding Society (AWS):
1. AWS D1.1 – Structural Welding Code - Steel.
 2. AWS D1.8 – Structural Welding Code – Seismic Supplement.
 3. AWS A2.4 – Standard Symbols for Welding, Brazing, and Nondestructive Examination.
 4. AWS B2.1 – Base Metal Grouping for Welding Procedure and Performance Qualification.
- E. SSPC – Steel Structures Painting Council:
1. SSPC-SP2 - Hand Tool Cleaning.
 2. SSPC-PA-1 - Shop, Field and Maintenance Coating of Metals.
- 1.03 REGULATORY REQUIREMENTS
- A. Structural steel shall conform to CBC requirements, except that steel manufactured by acid Bessemer process is not permitted for structural purposes.
 - B. Sheet and strip steel other than those listed in CBC, if provided for structural purpose, shall comply with the code requirements.
- 1.04 SUBMITTALS
- A. Shop Drawings: Submit Shop Drawings, including complete details and schedules for fabrication and shop assembly of members, and details, schedules, procedures and diagrams showing the sequence of erection. Fully detail minor connections and fastenings not shown or specified in the Contract Documents to meet required conditions using similar detailing as shown in the Contract Documents. Include a fully detailed, well controlled sequence and technique plan for shop and field welding that minimizes locked in stresses and distortion; submit sequence and technique plan for review by the ARCHITECT.
 1. Include details of cuts, connections, camber, and holes in accordance with Figure 4.5 of AWS D1.1 or AISC Chapter J, weld position plan and other pertinent data. Indicate welds by standard AWS symbols, and show size, length and type of each weld.
 2. Provide setting drawings, templates, and directions for installation of anchor bolts and other anchorages to be installed for Work specified in other sections.



3. Erection and Bracing Plan and Erection Procedure: Submit an erection and framing plan, including columns, beams, and girders, signed and sealed by a Structural or Civil Engineer registered in the State of California in accordance with Title 8 California Code of Regulations, Section 1710, Structural Steel Erection. Maintain a copy at the Project site as required by the California Division of Industrial Safety.
 4. Submit a list of steel items to be galvanized.
 5. Include identification and details of Architecturally Exposed Structural Steel (AESS) members, if applicable.
- B. Product Data: Submit copies of fabricator's specifications and installation instructions for the following products. Include laboratory test reports and other data required demonstrating compliance with these Specifications:
1. Structural steel, each type; including certified copies of mill reports covering chemical and physical properties.
 2. Welding electrodes.
 3. Welding gas.
 4. Unfinished bolts and nuts.
 5. Structural steel primer paint.
 6. High-strength bolts, including nuts and washers.
- C. Manufacturer's Mill Certificate: Submit, certifying that products meet or exceed specified requirements.
- D. Mill Test Reports: Submit manufacturer's certificates, indicating structural yield and tensile strength, destructive and non-destructive test analysis.
- E. Charpy-V-Notch (CVN) Impact Test: Submit certified copies of Charpy-V-Notch (CVN) Impact Test by the manufacturer for applicable steel members and components.
1. Charpy-V-Notch (CVN) Impact Test for Base Metal: Moment frame columns and girders subjected to Charpy-V-Notch impact test in accordance with "Seismic Provisions for Structural Steel Buildings", Part I, Section 6.3, as modified by Supplement 1.
 2. Charpy-V-Notch test shall be performed by the manufacturer employing Test Frequency (P) in accordance with ASTM A673 and utilizing standard specimen sizes shown in Figure 6 of ASTM E23.
- F. Submit certified copies of tests by manufacturer for fine grain practice. Structural steel base material, as described above, shall be manufactured to be fully killed and fine grained having grain size number 5 or better as determined by ASTM E112.
- G. Welding Procedure Specifications (WPS): Submit weld procedures for all welding on project to OWNER's testing laboratory for approval. After approval by testing



laboratory, submit to ARCHITECT for Record. Weld procedures shall be qualified as described in AWS D1.5, AISC 341 and AISC 358, as applicable. Weld procedures shall indicate joints details and tolerances, preheat and interpass temperature, post-heat treatment, single or multiple stringer passes, peening of stringer passes for groove welds except for the first and the last pass, electrode type and size, welding current, polarity and amperes and root treatment. The welding variables for each stringer pass shall be recorded and averaged; from these averages the weld heat input shall be calculated. Submit the manufacturer's product data sheet for all welding material used.

- H. Welder's Certificates: Field welders shall be Project certified in accordance with AWS D1.1. Shop welders shall be Project certified for FCAW in accordance with AWS D1.1.
- I. Test Reports: Submit reports of tests conducted on shop and field welded and bolted connections. Include data on type of test conducted and test results.
- J. Welding Material Certification: Provide certificate that welding material complies with specifications. Submit to OWNER's testing laboratory.

1.05 QUALITY ASSURANCE

- A. Comply with the following as a minimum requirement, except as otherwise indicated:
 - 1. American Institute of Steel Construction (AISC) "Code of Standard Practice for Steel Buildings and Bridges, modified as follows:
 - a. Replace "Structural Design Drawings" with "Contract Documents" throughout the document.
 - b. Paragraph 3.2 is hereby modified in its entirety as follows: "Contract Documents including but not limited to architectural, mechanical, plumbing, electrical, civil and kitchen design drawings and specifications shall be used as supplement to the structural plans to define configurations and construction information."
 - c. Delete Paragraph 3.3.
 - d. In Paragraph 4.4, delete the following sentence: "These drawings shall be returned to the Fabricator within 14 calendar days."
 - e. Delete Paragraph 4.4.1.(a) in its entirety.
 - f. Paragraph 4.4.2 is hereby modified in its entirety as follows: "No review action, implicit or explicit, shall be interpreted to authorize changes in the Contract Documents."
 - 2. Perform welding in accordance with AWS Standards, AWS D1.1, and California Building Code Section 2204A.1 and approved Weld Procedure Specifications (WPS).



3. Welding for moment frames shall be in compliance with AISC 341 and AISC 358.

B. Shop fabrication shall be inspected in accordance with CBC.

C. Erect mock-up panel of fabricated structural steel meeting Architecturally Exposed Structural Steel (AESS) tolerances for exposed areas. Approval by ARCHITECT is required. Mock-up to remain for comparison but may not be left as part of the work.

1.06 DELIVERY, STORAGE AND HANDLING

A. Store structural steel above grade on platforms, skids or other supports.

B. Protect steel from corrosion.

C. Store welding electrodes in accordance with AWS D 12.1.

D. Store other materials in a weather-tight and dry place until installed into the Work.

PART 2 - PRODUCTS

2.01 GENERAL

A. Stock Materials: Provide exact materials, sections, shapes, thickness, sizes, weights, and details of construction indicated on Drawings. Changes because of material stock or shop practices will be considered if net area of shape or section is not reduced thereby, if material and structural properties are at least equivalent, and if overall dimensions are not exceeded.

B. Shapes, bars, plates, tubes and pipes shall be made of materials with at least 16 percent recycled content if produced from Basic Oxygen Furnace (BOF) or at least 67 percent recycled content if produced from Electric Arc Furnace (EAF).

2.02 MATERIALS

A. Structural Steel: Wide flange shapes shall conform to ASTM A992 grade 50. Other steel shall conform to ASTM A36.

B. Unfinished Threaded Fasteners: ASTM A307, Grade A, regular low carbon bolts and nuts.

C. High-Strength Threaded Fasteners: ASTM F3125 or ASTM F959 quenched and tempered, steel bolts, nuts and washers.

D. Primers: Lead-free metal primer:

1. SSPC-Paint 20, Zinc-Rich Coating Inorganic and Organic.

2. SSPC-Paint 23, Latex Primer for Steel Surfaces.



- E. Steel Pipe: ASTM A53, Type E or S, Grade B.
- F. Structural Tubing:
 - 1. Hot-formed, ASTM A501.
 - 2. Cold-formed, ASTM A500, Grade B.
- G. Galvanizing: ASTM A123.
- H. Welding Electrodes: Provide electrodes recommended by manufacturer for seismic connections. Comply with AISC 341.
- I. Shear stud connectors: ASTM A108, Grade 1015 forged steel, headed, uncoated, granular flux filled shear connector or anchor studs by Nelson Stud Welding Division, or equal.
- J. Grout: ASTM C1107, non-shrink type, pre-mixed compound consisting of non-metallic aggregate, cement, water reducing and plasticizing additives, capable of developing a minimum compressive strength of 7,000 psi at seven days; of consistency suitable for application and a 30 minute working time.

2.03 FABRICATION

- A. Fabricate in accordance to AISC Code of Standard Practice for Steel Buildings and Bridges and AISC 360.
- B. Cleaning and Straightening Materials: Materials being fabricated shall be thoroughly cleaned of scale and rust, and straightened before fabrication. Cleaning and straightening methods shall not damage material. After punching or fabrication of component parts of a member, twists or bends shall be removed before parts are assembled.
- C. Cutting, Punching, Drilling and Tapping: Unless otherwise indicated or specified, structural steel fabricator shall perform the cutting, punching, drilling and tapping of Work so that Work of other trades will properly connect to steel Work.
- D. Milling: Compression joints depending on contact bearing shall be furnished with bearing surfaces prepared to a common plane by milling.
- E. Use of Burning Torch: Oxygen cutting of members shall be performed by machine. Gouges greater than 3/16 inch that remain from cutting shall be removed by grinding. Reentrant corners shall be shaped notch free to a radius of at least 1/2 inch. Gas cutting of holes for bolts or rivets is not permitted.
- F. Galvanizing: After fabrication, items indicated or specified to be galvanized shall be galvanized per Section 05 50 13, Hot-Dip Galvanizing.
- G. Welding:
 - 1. Type of steel furnished in welded structures shall provide chemical properties suitable for welding as determined by chemical analysis. Welds shall conform



- to the verification and inspection requirements of CBC Chapter 17A. Conform to AWS D1.1, and CBC Chapter 22A.
2. Materials and workmanship shall conform to the requirements specified herein and to CBC requirements, modified as follows:
 - a. No welded splices shall be permitted except those indicated on Drawings unless specifically reviewed by the ARCHITECT.
 - b. Drawings will designate joints in which it is important that welding sequence and technique be controlled to minimize shrinkage stresses and distortion.
 3. Welding shall be performed in accordance with requirements of the AWS Structural Welding Code.
 - a. Welded Joint Details: Comply with AISC 341, AISC 358 and drawing details.
 4. Architecturally Exposed Structural Steel: Verify that weld sizes, fabrication sequence, and equipment used for Architecturally Exposed Structural Steel will limit distortions to allowable tolerances. Prevent surface bleeding of back-side welding on exposed steel surfaces. Grind smooth exposed fillet welds ½ inch and larger. Grind flush butt welds. Dress exposed welds.
 5. Remove erection bolts on welded, Architecturally Exposed Structural Steel; fill holes with plug welds; and grind smooth at exposed surfaces.
- H. Shop Finish:
1. Notify the Project Inspector when Work is ready to receive shop prime coat. Work shall be inspected by the Project Inspector before installation of primer.
 2. Structural steel and fittings shall receive a coat of primer, except:
 - a. Surfaces that will be galvanized.
 - b. Surfaces that will be fireproofed.
 - c. Surfaces that will be field welded.
 - d. Surfaces in contact with concrete.
 - e. Surfaces high strength bolted.
 3. The primer specified shall be spray applied, filling joints and corners and covering surfaces with a smooth unbroken film. The minimum dry film thickness of the primer shall be 2.0 mils.
- I. Comply with fabrication tolerance limits of AISC’s “Code of Standard Practice for Steel Buildings and Bridges” for structural steel.
- J. Fabricate Architecturally Exposed Structural Steel with exposed surfaces smooth, square, and free of surfaces blemishes, including pitting, rust and scale seam marks, roller marks, rolled trade names, and roughness.



1. Remove blemishes by filling, grinding, or by welding and grinding, prior to cleaning, treating and shop priming.
 2. Comply with fabrication requirements, including tolerance limits of AISC's "Code of Standard Practice for Steel Buildings and Bridges" for Architecturally Exposed Structural Steel.
- K. Architecturally Exposed Structural Steel: use special care in unloading, handling and erecting the steel to avoid marking or distorting the steel members. Minimize damage to any shop paint when temporary braces or erection clips are used. Avoid unsightly surfaces upon removal. Grind smooth tack welds and holes filled with weld metal or body solder. Plan and execute all operations in such a manner that the close fit and neat appearance of the structure will not be impaired.
- L. Reduced Beam Sections (RBS's): Fabrication of RBS's as defined in AISC 341 and AISC 358.

2.04 SHOP AND FIELD QUALITY CONTROL

- A. A special inspector, approved by the city to inspect the Work of this section, shall inspect high-strength bolted connections. OWNER will provide an approved independent testing laboratory to perform tests and prepare test reports in accordance with CBC 1704A. The Project Inspector shall be responsible for monitoring the work of the special inspector and testing laboratories to ensure that the testing program is satisfactorily completed.
- B. An AWS certified welding inspector (CWI), approved by the city to inspect the Work of this section, shall inspect welded connections in accordance with CBC 1705A.2.5. The OWNER will provide an approved independent testing laboratory to perform tests and prepare test reports. The Project Inspector shall be responsible for monitoring the work of the special inspector and testing laboratories to ensure that the testing program is satisfactorily completed.
- C. The independent testing laboratory shall conduct and interpret test and state in each report whether test specimens comply with requirements, and specifically state any deviations there from.
- D. Provide access to all places where structural steel Work is being fabricated or produced so required inspection and testing can be performed.
- E. The independent testing laboratory may inspect or test structural steel at plant before shipment; however, ARCHITECT reserves the right at any time before Contract Completion to deem materials not in compliance with the specified requirements as defective Work.
- F. Correct defects in structural Work when inspections and laboratory test reports indicate noncompliance with specified requirements. Perform additional tests as may be required to reconfirm noncompliance of original Work, and as may be required to show demonstrate compliance of corrected Work.



- G. Inspection of Structural Tube Steel/Hollow Structural Sections (HSS): Structural tube steel members (round, square, rectangular), disregarding steel origin, will be inspected during shop fabrication. Inspector will perform a visual examination of the seam weld area for visible discontinuities. When defects are suspected, non-destructive testing will be considered.
- H. Welding: Inspect and test during fabrication and erection of structural steel assemblies as follows:
1. Certify welders and conduct inspections and tests as required. Record types and locations of defects found in the Work. Record Work required and performed to correct deficiencies.
 2. Inspect welds. Welds shall be visually inspected before performing any non-destructive testing. Groove weld shall be inspected by ultrasonic or other approved non-destructive test methods. Testing shall be performed to AWS D1.1 Table 6.3 cyclically loaded non-tubular connections.
 3. Ultrasonic testing shall be performed by a specially trained and qualified technician who shall operate the equipment, examine welds, and maintain a record of welds examined, defects found, and disposition of each defect. Repair and test defective welds.
 4. Rate of Testing: Completed welds contained in joints and splices shall be tested 100 percent either by ultrasonic testing or by radiography.
 5. Welds, when installed in column splices, shall be tested by either ultrasonic testing or radiography.
 6. Base metal thicker than 1 ½-inch, when subjected to through-thickness weld shrinkage strains, shall be ultrasonically inspected by shear wave methods for discontinuities directly behind such welds. Tests shall be performed at least 48 hours after completed joint has cooled down to ambient air temperature.
 7. Material discontinuities shall be reviewed based on the defect rating in accordance with the criteria of AWS D1.1 table 6.3 by the ARCHITECT.
 8. Other method of non-destructive testing and inspection, for example, liquid dye penetrate testing, magnetic particle inspection or radiographic inspection may be performed on weld if required.
 9. Lamellar Tearing: Lamellar-tearing resulting from welding is a crack (with zero tolerance) and shall be repaired in accordance with AWS D1.1.
 10. Lamination: The rejection criteria shall be based on ASTM A435.
 11. Where testing reveals lamination or conditions of lamellar tearing in base metal, the steel fabricator shall submit a proposed method of repair for review by the ARCHITECT. Test repaired areas as required.
 12. Magnetic Particle Testing: Magnetic particle testing when required shall be provided in accordance with AWS D1.1 for procedure and technique. The



standards of acceptance shall be in accordance with AWS D1.1 – Qualification.

- I. Lamellar Tearing: Prior to welding plates 1 to 1-½ inch thick and greater and rolled shapes within the distance from 6 inches above the top of the joint to 6 inches below the bottom of the joint shall be checked by ultrasonic testing for laminations in base metal which may interfere with the inspection of the completed joint. Should these defects occur, members will be reviewed by the ARCHITECT. Welding procedure specifications in paragraph 1.04.G specify welding practices to minimize lamellar tearing.
- J. Prior Testing of Base Material: Test material before fabrication.
- K. Lines and levels of erected steel shall be certified by a State of California licensed surveyor as set forth in related Division 01 section.
- L. Welded studs shall be tested and inspected by the special inspector in accordance with requirements of AWS D1.1 – Stud Welding.
- M. Record Drawings: After steel has been erected, correct or revise Shop Drawings and erection diagrams to correspond with reviewed changes performed in the field.

PART 3 - EXECUTION

3.01 PREPARATION

- A. Verify governing dimensions and conditions of the Work before commencing erection Work.
 - 1. Report discrepancies between drawings and field dimensions to ARCHITECT before commencing work.
 - 2. Beginning of installation means erector accepts existing conditions and surfaces underlying or adjacent to work of this section.
- B. Provide temporary shoring and bracing, and other support during performance of the Work. Remove after steel is in place and connected, and after cast-in-place concrete has reached its design strength.
- C. Coordinate prime coat repair and application with requirements of Section 09 9000.

3.02 ERECTION

- A. Install structural steel accurately in locations, to elevations indicated, and according to AISC specifications and CBC requirements.
- B. Clean surfaces of base plates and bearing plates.
 - 1. Install base and bearing plates for structural members on wedges, shims, or setting nuts as required.



2. Tighten anchor bolts after supported members have been positioned and plumbed. Do not remove wedges or shims; cut off flush with edge of base or bearing plate before packing with grout.
- C. Maintain erection tolerances of structural steel within AISC Code of Standard Practice for Steel Buildings and Bridges.
1. Architecturally Exposed Structural Steel members and components, plumbed, leveled and aligned to a tolerance not to exceed one-half the amount permitted for structural steel. CONTRACTOR to provide adjustable connections between Architecturally Exposed Structural Steel and the structural steel frame or the masonry or concrete supports, in order to provide the erector with means for adjustment.
- D. Align and adjust various members forming part of complete frame or structure before permanently fastening. Before assembly, clean bearing surfaces and other surfaces that will be in permanent contact after assembly. Perform necessary adjustments to compensate for discrepancies in elevations and alignment.
1. Level and plumb individual members of structure.
- E. Do not permit thermal cutting during erection of structural steel.
- F. Where indicated for field connections, provide standard bolts complying with ASTM A307.
- G. Install high strength steel bolts at locations indicated. Assembly and installation shall be in accordance with CBC requirements and AISC specifications.
1. Allowable hole sizes: 1/16 inch larger than bolt size.
 2. Use friction type connection with standard hardened steel circular, square or rectangular washer under bolt nut.
 3. Thoroughly clean area under bolt head, nut and washer. Remove all paint, lacquer, oil or other coatings except organic zinc-rich paints in accordance with SSPC, SP-2.
 4. Tighten bolts by power torque wrench or hand wrench until twist-off.
- H. CONTRACTOR shall be responsible for correcting detailing and fabrication errors and for correct fitting of all members and components.
- I. Erect structural steel plumb and level and to proper tolerances as set forth in the AISC Manual. Provide temporary bracing, supports or connections required for complete safety of structure until final permanent connections are installed.
- J. Install column bases within a tolerance of 1/8 inch of detailed centerlines, level at proper elevations. Support bases on double nuts and solidly fill spaces under bases with cement grout.



- K. Provide anchor bolts with templates and diagrams. CONTRACTOR shall be responsible for proper location and installation of bolts. Correct deficiencies and errors.

3.03 FITTING

- A. Closely fit members, finished true to line and in precise position required to allow accurate erection and proper joining in the field.
- B. Drilling to enlarge unfair holes will not be allowed. Allow only enough drifting during assembly to bring parts into position, but not enough to enlarge holes or distort the metal. Do not heat rolled sections, unless approved by ARCHITECT.

3.04 PUNCHING AND DRILLING

- A. Punch material 1/16 inch larger than nominal diameter of bolt, wherever thickness of metal is equal to or less than the diameter of the bolt plus 1/8 inch.
- B. Drill or sub-punch and ream where metal is equal to or more than the diameter of the bolt plus 1/8 inch. Make diameter for sub-punched and sub-drilled holes 1/16 inch larger than nominal diameter of bolt.
- C. Precisely locate holes to ensure passage of bolt through assembled materials without drifting. Enlarge holes when necessary to receive bolts by reaming; flame cutting to enlarge holes is not acceptable. Structural Steel members with poorly matched holes will be rejected.

3.05 FINISHING

- A. After erection, spots or surfaces where paint has been removed, damaged, or burned off, and field rivets, bolts, and other field connections shall be cleaned of dirt, oil, grease, and burned paint and furnished with a spot coat of the same primer installed during shop priming.
- B. Touchup:
 - 1. Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint. Install paint to exposed areas with the same material installed during shop painting. Install by brush or spray to provide a minimum dry film thickness of 1.5 mils.
 - 2. Galvanized Surfaces: Clean field welds, connections and damaged areas. Apply two coats of Carbomastic 15, by Carboline or equal approved product. Brush or roll to a 4 to 6 mil thickness.

3.06 FIELD QUALITY CONTROL



- A. OWNER will provide a special inspector and independent testing laboratory to perform field inspections and tests and to prepare test reports.
- B. Correct deficiencies in or remove and replace structural steel that inspections and test reports indicate do not comply with specified requirements.

3.07 CLEAN UP

- A. Remove rubbish, debris and waste materials and legally dispose of off the Project Site.

3.08 PROTECTION

- A. Protect the Work of this section until Substantial Completion.

3.09 HANDLING

- A. Both in shop and in the field, transport, handle and erect to prevent damage or overstressing of any component.

END OF SECTION



SECTION 05 12 13

ARCHITECTURALLY EXPOSED STEEL FRAMING

PART 1 – GENERAL

1.01 SUMMARY

- A. Description: This section includes the Work for architecturally exposed steel framing and exposed steel elements, inside and outside of the building. It also includes fabrication, shop connection, galvanizing and shop priming.
- B. Section includes:
 - 1. Examination
 - 2. Preparation
 - 3. Erection
 - 4. Field Connections
 - 5. Field Quality Control
 - 6. Repairs and Protection
- C. Related requirements:
 - 1. Section 05 12 00 – Structural Steel Framing (for additional requirements applicable to AESS).
 - 2. Section 05 50 01 – Metal Fabrications (for miscellaneous steel fabrications and other metal items not defined as structural steel).
 - 3. Section 09 91 00 – Painting (for steel coatings with surface preparation and priming requirements).
 - 4. Section 09 96 23 – Graffiti-resistant Coatings.
- D. Definitions
 - 1. AESS: Structural steel designated as "architecturally exposed structural steel" or "AESS" in the Contract Documents.
 - 2. Category 1 AESS: AESS that is within 96 inches vertically and 36 inches horizontally of a walking surface and that is visible to a person standing on that walking surface or is designated as "Category 1 architecturally exposed structural steel" or "AESS-1" in the Contract Documents.



3. Category 2 AESS: AESS that is within 20 feet vertically and horizontally of a walking surface and that is visible to a person standing on that walking surface or is designated as "Category 2 architecturally exposed structural steel" or "AESS-2" in the Contract Documents.
4. Category 3 AESS: AESS that is not defined as Category 1 or Category 2 or that is designated as "Category 3 architecturally exposed structural steel" or "AESS-3" in the Contract Documents.

1.02 REFERENCES

A. ASTM International (ASTM)

1. ASTM A123/A123M Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
2. ASTM A780/A780M Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings

B. American Institute of Steel Construction (AISC)

1. AISC 303 2010 Code of Standard Practice for Structural Steel Buildings and Bridges

C. American Welding Society (AWS)

1. AWS D1.1/D1.1M Structural Welding Code - Steel

D. The Society for Protective Coatings (SSPC)

1. SSPC-PA 1 Shop, Field, and Maintenance Painting of Steel
2. SSPC-Paint 23 Latex Primer for Steel Surfaces
3. SSPC-Paint 25 Zinc Oxide, Alkyd, Linseed Oil Primer for Use Over Hand Cleaned Steel
4. SSPC-SP 2 Hand Tool Cleaning
5. SSPC-QP 3 Standard Procedure for Evaluating Qualifications of Shop Painting Applicators
6. SSPC-SP 6/NACE No. 3 Commercial Blast Cleaning

1.03 SUBMITTALS

- A. Shop Drawings: Show fabrication of AESS components. Shop Drawings for structural steel may be used for AESS provided items of AESS are specifically identified and requirements below are met for AESS.
 1. Include details of cuts, connections, splices, camber, holes, and other pertinent data.
 2. Include embedment Drawings.



3. Indicate welds by standard AWS symbols, distinguishing between shop and field welds, and show size, length, and type of each weld. Show backing bars that are to be removed and supplemental fillet welds where backing bars are to remain. Indicate grinding, finish, and profile of welds.
 4. Indicate type, size, and length of bolts, distinguishing between shop and field bolts. Identify pretensioned and slip-critical, high-strength bolted connections.
 5. Indicate exposed surfaces and edges and surface preparation being used.
 6. Indicate special tolerances and erection requirements.
- B. Samples: Submit Samples of AESS to set quality standards for exposed welds for Category 1 AESS.
1. Two steel plates, 3/8 by 8 by 4 inches, with long edges joined by a groove weld and with weld ground smooth.
 2. Steel plate, 3/8 by 8 by 8 inches, with one end of a short length of rectangular steel tube, 4 by 6 by 3/8 inches, welded to plate with a continuous fillet weld and with weld ground smooth and blended.

1.04 QUALITY ASSURANCE

- A. Fabricator qualifications: A qualified fabricator that participates in the AISC Quality Certification Program and is designated an AISC-Certified Plant, Category STD, or is accredited by the IAS Fabricator Inspection Program for Structural Steel (AC 172).
- B. Installer qualifications: A qualified installer who participates in the AISC Quality Certification Program and is designated an AISC-Certified Erector, Category ACSE or Category CSE.
- C. Shop-painting applicators: Qualified according to SSPC-QP 3, "Standard Procedure for Evaluating Qualifications of Shop Painting Applicators."

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Use special care in handling to prevent twisting, warping, nicking, and other damage. Store materials to permit easy access for inspection and identification. Keep steel members off ground and spaced by using pallets, dunnage, or other supports and spacers. Protect steel members and packaged materials from corrosion and deterioration.
 1. Do not store materials on structure in a manner that might cause distortion, damage, or overload to members or supporting structures. Repair or replace damaged materials or structures as directed.

1.06 PROJECT CONDITIONS

- A. Field measurements: Where AESS is indicated to fit against other construction, verify actual dimensions by field measurements before fabrication.



1.07 COORDINATION

- A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with Technical Specification 09 91 00, Painting.

PART 2 – PRODUCTS

2.01 FILLER

- A. Filler: Polyester filler intended for use in repairing dents.

2.02 PRIMER

- A. A prime in accordance with 09 91 00 Painting.

2.03 FABRICATION

- A. Shop fabricate and assemble AESS to the maximum extent possible. Locate field joints at concealed locations if possible. Detail assemblies to minimize handling and to expedite erection.
- B. In addition to special care used to handle and fabricate AESS, comply with the following:
 - 1. Fabricate with exposed surfaces smooth, square, and free of surface blemishes including pitting, rust, scale, and roughness.
 - 2. Grind sheared, punched, and flame-cut edges of Category 1 AESS to remove burrs and provide smooth surfaces and edges.
 - 3. Fabricate Category 1 AESS with exposed surfaces free of mill marks, including rolled trade names and stamped or raised identification.
 - 4. Fabricate Category 1 and Category 2 AESS with exposed surfaces free of seams to maximum extent possible.
 - 5. Remove blemishes by filling or grinding or by welding and grinding, before cleaning, treating, and shop priming.
 - 6. Fabricate with piece marks fully hidden in the completed structure or made with media that permits full removal after erection.
 - 7. Fabricate Category 1 AESS to the tolerances specified in AISC 303 for steel that is designated AESS.
 - 8. Fabricate Category 2 and Category 3 AESS to the tolerances specified in AISC 303 for steel that is not designated AESS.
 - 9. Seal-weld open ends of hollow structural sections with 3/8-inch closure plates for Category 1 AESS.
- C. Coping, blocking, and joint gaps: Maintain uniform gaps of 1/8 inch with a tolerance of 1/32 inch for Category 1 AESS.
- D. Bolt holes: Cut, drill, or punch standard bolt holes perpendicular to metal surfaces.



- E. Cleaning corrosion-resisting structural steel: Clean and prepare steel surfaces that are to remain unpainted according to SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
- F. Holes: Provide holes required for securing other work to structural steel and for other work to pass through steel members.
 - 1. Cut, drill, or punch holes perpendicular to steel surfaces. Do not thermally cut bolt holes or enlarge holes by burning. Do not enlarge holes unless indicated.
 - 2. Baseplate holes: Cut, drill, mechanically thermal cut, or punch holes perpendicular to steel surfaces.
 - 3. Weld threaded nuts to framing and other specialty items indicated to receive other work.

2.04 SHOP CONNECTIONS

- A. Weld connections: Comply with AWS D1.1/D1.1M for tolerances, appearances, welding procedure specifications, weld quality, and methods used in correcting welding work, and comply with the following:
 - 1. Assemble and weld built-up sections by methods that will maintain true alignment of axes without exceeding specified tolerances.
 - 2. Use weld sizes, fabrication sequence, and equipment for AESS that limit distortions to allowable tolerances.
 - 3. Provide continuous, sealed welds at angle to gusset-plate connections and similar locations where Category 1 AESS is exposed to weather.
 - 4. Provide continuous welds of uniform size and profile where Category 1 AESS is welded.
 - 5. Grind butt and groove welds flush to adjacent surfaces within tolerance of plus 1/16 inch, minus zero inch for Category 1 and Category 2 AESS.
 - 6. Remove backing bars or runoff tabs; back-gouge and grind steel smooth for Category 1 and Category 2 AESS.
 - 7. At locations where welding on the far side of an exposed connection of Category 1 and Category 2 AESS occurs, grind distortions and marking of the steel to a smooth profile aligned with adjacent material.
 - 8. Make fillet welds for Category 1 and Category 2 AESS oversize and grind to uniform profile with smooth face and transition.

2.05 GALVANIZING

- A. Galvanize exposed steel located at exterior of building/s.
- B. Hot-dip galvanized finish: Apply zinc coating by the hot-dip process to all structural steel according to ASTM A123/A123M.



1. Do not quench or apply post-galvanizing treatments that might interfere with paint adhesion.
2. Fill vent and drain holes that are exposed in the finished work, unless indicated to remain as weep holes, by plugging with zinc solder and filing off smooth.

2.06 SHOP PRIMING

- A. Shop prime steel surfaces except the following:
 1. Surfaces embedded in concrete or mortar. Extend priming of partially embedded members to a depth of 2 inches.
 2. Surfaces to be field welded.
- B. Preparing galvanized steel for shop priming: After galvanizing, thoroughly clean steel of grease, dirt, oil, flux, and other foreign matter, and treat in accordance with 09 91 00 Priming.
- C. Priming: Immediately after surface preparation, apply primer according to manufacturer's written instructions and at rate recommended by SSPC to provide a minimum dry film thickness of 1.5 mils. Use priming methods that result in full coverage of joints, corners, edges, and exposed surfaces.
 1. Stripe paint corners, crevices, bolts, welds, and sharp edges.
 2. Apply two coats of shop paint to surfaces that are inaccessible after assembly or erection. Change color of second coat to distinguish it from first.

PART 3 – EXECUTION

3.01 EXAMINATION

- A. Verify, with steel erector present, elevations of concrete- and masonry-bearing surfaces and locations of anchor rods, bearing plates, and other embedments for compliance with requirements.
 1. Prepare a certified survey of bearing surfaces, anchor rods, bearing plates, and other embedments showing dimensions, locations, angles, and elevations.
- B. Examine AECS for twists, kinks, warping, gouges, and other imperfections before erecting.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

- A. Provide temporary shores, guys, braces, and other supports during erection to keep AECS secure, plumb, and in alignment against temporary construction or erection loads and loads equal in intensity to design loads. Remove temporary supports when permanent structure and its connections are in place unless otherwise indicated.
 1. If possible, locate welded tabs for attaching temporary bracing and safety cabling where they will be concealed from view in the completed Work.



2. Do not remove temporary shoring supporting composite deck construction until cast-in-place concrete has attained its design compressive strength.

3.03 ERECTION

- A. Set AESS accurately in locations and to elevations indicated and according to AISC 303 and AISC 360.
 1. Erect Category 1 AESS to the tolerances specified in AISC 303 for steel that is designated AESS. This includes tolerances due to rotation.
 2. Erect Category 2 and Category 3 AESS to the tolerances specified in AISC 303 for steel that is not designated AESS.
- B. Do not use thermal cutting during erection.

3.04 FIELD CONNECTIONS

- A. Weld connections: Comply with requirements in "Weld Connections" Paragraph in "Shop Connections" Article.
 1. Remove backing bars or runoff tabs; back-gouge and grind steel smooth for Category 1 and Category 2 AESS.
 2. Remove erection bolts in Category 1 and Category 2 AESS, fill holes, and grind smooth.
 3. Fill weld access holes in Category 1 and Category 2 AESS and grind smooth.

3.05 FIELD QUALITY CONTROL

- A. Testing agency: The Contractor shall engage a qualified independent testing and inspecting agency to inspect AESS as specified in Section 05 12 00 – Structural Steel Framing. The testing agency is not responsible for enforcing requirements relating to aesthetic effect.
- B. OWNER will observe AESS in place to determine acceptability relating to aesthetic effect.

3.06 REPAIRS AND PROTECTION

- A. Welded tabs shall not be used for attaching temporary bracing or safety cabling.
- B. Galvanized surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A780/A780M.
- C. Touchup painting: Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with the same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.
 1. Clean and prepare surfaces by SSPC-SP 2 hand-tool cleaning or SSPC-SP 3 power-tool cleaning.



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- D. Touchup painting: Cleaning and touchup painting are specified in Section 09 91 13 – Exterior Painting.
- E. Touchup priming: Cleaning and touchup priming are specified in Section 09 96 00 – High-Performance Coatings.

END OF SECTION



SECTION 05 30 00
METAL DECKING

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

1. Floor and roof metal decking.
2. Edge strips, closure strips and decking accessories.

B. Related Requirements:

1. Division 01 - General Requirements.
2. Section 01 45 23 - Testing and Inspection.
3. Section 03 30 00 – Cast-In-Place Concrete.
4. Section 05 12 00 - Structural Steel Framing.
5. Section 07 60 00 - Flashing and Sheet Metal.

1.02 REFERENCES

A. ASTM International (ASTM):

1. ASTM A108 – Standard Specification for Steel Bar, Carbon and Alloy, Cold-Finished.
2. ASTM A653 - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
3. ASTM A780 – Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings.
4. ASTM D746 - Standard Test Method for Brittleness Temperature of Plastics and Elastomers by Impact.
5. ASTM D1056 - Standard Specification for Flexible Cellular Materials—Sponge or Expanded Rubber.

B. American Welding Society (AWS):

1. AWS D1.1 - Structural Welding Code Sheet – Steel.
2. AWS D1.3 – Structural Welding Code Sheet – Sheet Steel.

C. American Iron and Steel Construction (AISI):

1. AISI – Specifications for the Design of Cold-Formed Steel Structural Members.



- D. Underwriters Laboratory (UL):
 - 1. UL – Fire Resistance Directory.

1.03 PERFORMANCE REQUIREMENTS

- A. Compute properties of deck sections on basis of effective design width as limited by provisions of the AISI specifications. Provide no less than deck section properties specified, including section modulus and moment of inertia per foot of width.
- B. Regulatory Requirements:
 - 1. Decking installed as part of a fire rated assembly shall meet the requirements of the applicable UL Fire Resistance Directory design number.
 - 2. Work of this section shall be in accordance with CBC.

1.04 SUBMITTALS

- A. Shop Drawings: Drawings, sections and details indicate type of decking, location, finish, gage of metal, arrangement of sheets, necessary fabrication to incorporate decking into the Work, and relationship to openings and flashing.
- B. Product Data: For each type of decking specified, including structural properties, dimensions, profiles and finishes.
- C. Welder Certificates: Signed by CONTRACTOR certifying that welders comply with the requirements specified under Article “Quality Assurance”.

1.05 QUALITY ASSURANCE

- A. General: Metal decking steel shall conform to requirements of strengths and properties of standards specified.
- B. Qualifications of Welders: Properly certified for the type of Work involved in compliance with CBC requirements.
- C. Continuous inspection of welding will be performed by a special inspector, approved by the city to inspect the Work of this section. Refer to Section 01 45 23 - Testing and Inspection. The Project Inspector will be responsible for monitoring the work of the special inspector to ensure that the inspection program is satisfactorily completed.
- D. Identification of metal decking steel shall conform to the standards specified in this section and the Drawings.
 - 1. Fabricator shall furnish sufficient evidence to the ARCHITECT attesting compliance with specified requirements.
 - 2. Conform to CBC requirements. Unclassified or unidentified decking is not permitted. Furnish deck manufacturer's certified mill analyses and test reports for each heat covering decking having a minimum F_y of 33 Ksi. In addition, for decking having F_y greater than 33 Ksi, testing laboratory shall perform one tension and elongation test and one bend or flattening test for each gage.



- E. Unidentifiable Steel: Steel which is not readily identifiable as to grade from markings and test records is not permitted to be provided as part of the Work of this section.
- F. Manufacturers shall be members of Steel Deck Institute (SDI).

1.06 DELIVERY, STORAGE AND HANDLING

- A. Protect steel deck from corrosion, deformation and other damage during delivery, storage and handling.
- B. Deck bundles shall be stored off the ground, with one end elevated to provide drainage. Bundles shall be protected against condensation with a ventilated waterproof covering.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. ASC Steel Deck.
- B. Verco Manufacturing Co.
- C. Epic Metals Corporation.
- D. Equal.

2.02 MATERIALS

- A. Metal Decking:
 - 1. Roll-formed sheets conforming to ASTM A653, with G90 zinc coating.
 - 2. Section properties conforming to applicable provisions of latest edition of AISI - Specification for the Design of Cold-Formed Steel Structural Members.
- B. Flexible Closure Strips for Deck: Vulcanized, closed-cell, expanded chloroprene elastomer, complying with ASTM D1056, Grade SCE #41.
 - 1. Brittleness Temperature: Minus 40 degrees F, ASTM D746.
 - 2. Flammability Resistance: Self-extinguishing,
- C. Decking Accessories: Metal cover plates, sheet metal edging, metal closure strips, valley and ridge strips, seat angles, sump pans, flashings: 22 gage minimum, with ASTM A653, G90 zinc coating.
- D. Shear Connectors: Headed stud type, ASTM A108 Grade 1015, cold-finished carbon steel complying with AISC specifications.
- E. Galvanizing Repair Paint: Mil. Spec. MIL-P-21035B.

2.03 FABRICATION

- A. Corrugated sheets or sections shall be designed to support required live load between supporting members.



- B. Provide decking in lengths to span over three or more supports.
- C. Except as detailed otherwise, provide decking with interlocking side laps, 2 ½-inch minimum end bearing, and 1 ½-inch minimum side bearing.
- D. Welding: Provide materials and methods in accordance with recommendations of steel decking manufacturer and reviewed submittals. Hold decking tight to the supporting elements with screws or other means for proper welding or crimping of the decking edges. Conform to AWS D1.3, and to the patterns and weld types indicated, with welds free from sharp edges and protrusions. Field coat welds and abraded surfaces at completion with an anodic type galvanizing repair paint. Omit the field paint coating where welds or abrasions are covered by concrete fill or sprayed fireproofing.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Verify supporting structure and existing conditions prior to starting work.
- B. Remove oil, dirt, paint, and rust from steel surfaces to which metal decking will be welded.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 OPENINGS

- A. Cut and reinforce units to provide openings which are located and dimensioned on the structural and mechanical Drawings.
- B. Provide openings, or other Work not indicated on the Drawings.

3.03 INSTALLATION

- A. Install metal decking in accordance with decking manufacturers' recommendations, requirements of Drawings, Shop Drawings, and Specifications.
- B. Install metal decking on supporting steel framework and adjust to final position before permanently fastening in place.
 - 1. Install each unit to proper bearing on supports.
 - 2. Install units in straight alignment for entire length of run of cells with close registration of cells of one unit with those of abutting unit.
- C. Fasten decking to steel framework at ends of units and at intermediate supports. Welding shall be as indicated on Drawings.
- D. Fasten side laps between supports as indicated on Drawings.
- E. Perform field cutting parallel with cells in area between cells, leaving sufficient horizontal material to permit welding to support steel.



- F. Weld shear connectors to supports thru decking units as required by Drawings. Weld only on clean, dry surfaces. Do not weld shear connectors thru two layers of decking units.
- 3.04 METAL FLASHINGS AND CLOSURES
- A. Furnish, install, and weld in position, sheet metal closure flashing, closure angles, closure plates, profile plates, and shear plates.
 - B. Close open ends of cell runs at columns, openings, walls, similar interruptions and termination.
- 3.05 FIELD QUALITY CONTROL
- A. Install steel decking under continuous inspection according to CBC Section 1704A.
 - B. Welding inspection for steel deck diaphragms shall conform to CBC Section 2204A.1.
- 3.06 CLEAN UP
- A. Remove rubbish, debris, and waste materials and legally dispose of off the Project site.
- 3.07 PROTECTION
- A. Protect the Work of this section until Substantial Completion.

END OF SECTION



SECTION 05 31 13

ROOF DECK CEILING SYSTEM

PART 1 - GENERAL

1.01 SUMMARY

- A. The requirements of this specification section include all materials, equipment, and labor necessary to furnish and install a Roof Deck Ceiling System.
- B. Related Requirements:
 - 1. Section 05 12 00 - Structural Steel Framing.
 - 2. Section 09 90 00 - Painting.

1.02 SUBMITTALS

- A. Product Data: Submit manufacturer's specifications, section properties, load tables, dimensions, finishes, fire rating and acoustic coefficients if applicable.
- B. Erection drawings for Roof Deck Ceiling system and related accessory items showing profiles and material thicknesses, layout, anchorage, openings as dimensioned on the structural drawings and shoring requirements.
- C. LEED Submittals: Complete the LEED Material Buyout Form (MBoF) with all materials provided to the project. A complete submittal includes providing all material costs in the MBoF and all of the supporting documentation for the following credits:
 - 1. MRc2 - Environmental Product Declarations (EPD): Provide Industry-Wide or Product-Specific EPD.
 - 2. MRc3 - Sourcing of Raw Materials - Recycled Content: Provide product data for pre- and post- consumer recycled content.
 - 3. MRc4 - Material Ingredients: Provide manufacturers Declare label, Health Product Declaration (HPD), Cradle to Cradle Certification, or Cradle to Cradle Health Product Certificate.
 - 4. IEQc2 - Low-Emitting Materials – Interior Wet Applied Products: For paints, coatings, adhesives and sealants applied on site or used for laminating off-site, include product data indicating the VOC content (g/L) and testing certificates or third party certification demonstrating compliance with California Department of Public Health (CDPH) v1.2-2017 emissions testing.

1.03 REFERENCE STANDARDS

- A. Section Properties: Shall be computed in accordance with the American Iron and Steel Institute (AISI) Specification for Design of Cold-Formed Steel Structural Members.



- B. Composite Slabs load capacities shall be computed in accordance with the ANSI/SDI Standard for Composite Steel Floor Deck-Slabs and shall be verified by full scale testing.
- C. Welding: Shall comply with applicable provisions of the American Welding Society (AWS) D1.3 Structural Welding Code—Sheet Steel.
- D. Fire Resistance Classification: Shall be acceptable for use in Underwriters Laboratories Fire Resistance Index. All panels used in rated fire resistance designs shall bear the appropriate U.L. Classification marking.
- E. Noise Reduction Coefficients: Shall be verified by the results of sound absorption tests conducted in accordance with ASTM C423 and E795.
- F. Manufacturer shall have been regularly engaged in the production of the specified roof deck ceiling systems for a period of at least ten years.

1.05 DELIVERY, STORAGE AND HANDLING

- A. Panels shall be protected from damage during delivery, storage, and handling.
- B. If storage at the jobsite is required, panels shall be elevated above the ground, sloped to provide drainage, and protected from weather with a ventilated covering.

1.06 COORDINATION

- A. Coordinate length of fasteners for roofing and thermal insulation to avoid penetrating the finished bottom surface of the panels.
- B. Coordinate location and size of shop-cut access openings in bottom of panels with affected trades.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Basis of Design: In accordance with the requirements of this specification section, provide products manufactured by EPIC Metals, Rankin, PA.
- B. Or approved equal.

2.02 MATERIALS

- A. Basis of Design: Envista "FA" Roof Deck Ceiling system; panels shall be cold-formed from steel coils conforming to ASTM A653, Structural Quality, Grade 40 with minimum yield strength of 40 ksi..
- B. Thickness and section properties: As indicated in Structural drawings.



- C. Before forming, the steel coils shall have received a hot-dip protective coating of zinc conforming to ASTM A924, Class G60 or G90, as defined in ASTM A653.
- D. The minimum uncoated thickness of materials furnished shall be within 5% of the design thickness.
- E. Finish: Natacoat over prime paint.

2.03 FABRICATION

- A. Panels shall be cold-formed by the continuous roll forming process and attached together to form an integral cellular panel.
- B. Panels shall have interlocking type sidelaps suitable for screw or weld fastening.
- C. Envista panels shall have roll-formed embossments located between the longitudinal stiffening ribs in the top flanges.
- D. For Acoustic Roof Deck Ceiling panels with flat sections, these areas shall be perforated for enhanced acoustic performance. Acoustical elements shall be factory installed in the cells of the panels in a manner that prevents them from being dislocated, or blown out of the cells during shipping, erection and until the finished roofing is installed. Acoustic insulation batts shall be provided. These shall be field-installed by the roofing contractor. The acoustical elements shall be supported above the perforated surface to avoid plugging the holes during field painting. An NRC of 1.00 shall be provided.

2.03 ACCESSORIES

- A. Where panels continue from the interior of the building through to the exterior of the building (for example as a cantilever canopy): the panels will be perforated on the interior and not perforated on the exterior, air dams will be provided to block the movement of conditioned air from the interior of the building to the exterior.
- B. Manufacturer's standard ridge plates, valley plates, transition plates, and closures shall be provided as indicated on the structural drawings.
- C. Openings and reinforcement for openings in the structural element noted specifically by the deck manufacturer on the structural drawings shall be provided.

PART 3 - EXECUTION

3.01 PREPARATION

- A. Panels and accessories shall be installed in strict accordance with the manufacturer's instructions, approved erection drawings and all applicable safety regulations.

3.02 EXAMINATION



- A. The supporting frame or other related work shall be inspected and accepted by the deck erector before the start of installation.
- B. The need for temporary shoring shall be investigated. Shoring tables furnished by the manufacturer and shown on the approved erection drawings shall be consulted. Allowable unshored spans shall be reduced if greater construction loads are anticipated or if less deflection is allowable.
- C. Temporary shoring, if required, shall be in-place prior to installation of Roof Deck Ceiling system panels and shall remain in-place until the concrete attains the required strength and stiffness.

3.03 PREPARATION

- A. Bundles of materials shall be located on the supporting frame in such a manner that overloading of any of the individual members or panels does not occur. Panels shall not be placed on concrete supporting members until after the members have adequately cured or properly designed formwork is in place.

3.04 INSTALLATION

- A. Panels and related accessories shall be installed in accordance with manufacturer's approved erection drawings, SDI Manual of Construction with Steel Deck and all federal and state regulations
- B. Before being permanently fastened, panels shall be placed on the supporting frame and adjusted to final position with ends accurately aligned and adequately bearing on the supporting frame. Consistent coverage shall be maintained so that panels located in adjacent bays will be properly aligned.
- C. Cutting of panels to suit jobsite conditions shall be performed in a neat and professional manner. Only those openings indicated on the structural drawings shall be cut. Other openings shall be cut and reinforced by those requiring the opening as approved by the structural engineer.
- D. Panels shall be fastened to all supporting members with two $\frac{3}{4}$ " diameter puddle welds per 18" or 16" wide panel or as indicated on the manufacturer's erection drawings.
- E. The sidelaps of panels shall be fastened together with #12 x $\frac{3}{4}$ " maximum length screws at a maximum of 36" on center or less as indicated on the manufacturer's erection drawings. Sides of the panels located at perimeter edges of the building shall be fastened to supporting members at a spacing of 36" on center or less as indicated on the manufacturer's erection drawings.
- F. Construction loads shall not be applied to panels until after panels are permanently fastened to supporting members and sidelaps have been attached and shall not exceed the load carrying capacity of the panels.



- G. Items such as light fixtures, conduit, pipe, and ductwork shall not be suspended from Envista panels without specific approval of the structural engineer.

3.05 AFTER INSTALLATION

- A. Construction loads that could damage the Roof Deck Ceiling system such as heavy concentrated loads and impact loads shall be avoided. Planking shall be used in all high traffic areas.
- B. Galvanized coatings that are significantly damaged shall be repaired. Appropriate galvanized repair paint shall be used and the paint manufacturer's application instructions shall be followed.

END OF SECTION



SECTION 05 41 00

COLD FORMED METAL FRAMING

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

1. Load-bearing metal stud systems.

B. Related Requirements:

1. Division 01 - General Requirements.
2. Section 01 45 23 - Testing and Inspection.
3. Section 05 12 00 - Structural Steel Framing.
4. Section 09 22 16 - Non-Structural Metal Framing.

1.02 SUBMITTALS

- A. Shop Drawings: Submit drawings showing framing, connection details, accessories and anchorage. Indicate location of assemblies, size and spacing of framing components.
- B. Product Data: Submit manufacturer's catalog data for each item proposed for installation.
- C. Certificates: Furnish manufacturer's certification that materials meet or exceed Specification requirements.

1.03 QUALITY ASSURANCE

A. Comply with following as a minimum requirement:

1. AISI - Specifications for Design of Cold Formed Steel Structural Members.
2. Welds shall be performed by AWS certified welders. Welding shall be performed in accordance with requirements of American Welding Society (AWS) Structural Welding Code-Steel D1.1 and D1.3. Structural welding Code-Sheet Steel.
3. Welding shall be inspected by a special inspector, approved by the city to inspect Work of this section. The Project Inspector shall be responsible for



monitoring work of special inspector to ensure that inspection program is satisfactorily completed.

4. ASTM A653 – Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy Coated (Galvannealed) by Hot Dip Process.
5. ASTM A924 – Standard Specification for General Requirements for Steel Sheet Metallic-Coated by Hot-Dip Process.
6. ASTM A1003 – Standard Specification for Steel Sheet, Carbon, Metallic- and Nonmetallic-Coated for Cold-Formed Framing Members.
7. ASTM A1008 – Standard Specification for Steel Sheet and Strip, Hot-Rolled, Carbon, Structural High-Strength Low-Alloy, and High-Strength Low-Alloy with Improved Formability.
8. ASTM C954 – Standard Specification for Load-Bearing (Transverse and Axial) Steel Studs, Runners (Tracks) and Bracing or Bridging for Screw Application of Gypsum Panel Products and Plaster Bases.
9. ASTM C955 – Standard Specification for Load-Bearing (Transverse and Axial) Steel Studs, Runners (Tracks), and Bracing or Bridging for Screw Application of Gypsum Panel Products and Metal Plaster Bases.
10. ASTM C1007 – Standard Specification for Installation of Structural (Axial and Transverse) Steel Framing Members and Accessories.
11. ASTM E488 – Standard Test Methods of Strength Anchors in Concrete and Masonry.
12. ASTM E1190 – Standard Test Methods for Strength of Power-Actuated Fasteners Installed in Structural Members.
13. Manufacturer shall be a member of the Steel Stud Manufacturers Association (SSMA).

- B. Tolerances: Install walls and partitions on straight lines, plumb, free of twists or other defects, and contacting a 10-foot straight edge for its entire length at any location within a 1/8 inch tolerance. Install horizontal framing level within a tolerance of 1/8 inch in 12 feet in any direction.

1.04 DELIVERY, STORAGE AND HANDLING

- A. Materials shall be delivered in their original unopened packages and stored protected from damage. Do not store material directly on grade. Provide adequate support to prevent bowing of material prior to installation.
- B. Store welding electrodes in accordance with AWS D12.1.

PART 2 - PRODUCTS



2.01 MANUFACTURERS

- A. Provide studs, tracks, joists, header, and accessories manufactured by one of following:
 - 1. ClarkWestern Building Systems.
 - 2. Dietrich Industries, Inc.
 - 3. Marino/WARE.
 - 4. Cemco.
 - 5. Equal.
- B. Special Connection Accessories: Products manufactured by The Steel Network, Inc., or equal.

2.02 MATERIALS

- A. Light Gage Metal Framing:
 - 1. Metal framing shall be formed from corrosion resistant-steel conforming to requirements of ASTM A653, 50 ksi minimum.
 - 2. Metal framing shall be zinc coated in conformance to requirements of ASTM A926, G60.
 - 3. Metal framing shall be manufactured in conformance to ASTM C955.
 - 4. Install metal framing per ASTM C1007, Standard Specification for Installation of Load-Bearing (Transverse and Axial) Steel Studs and Related Accessories.
- B. Gages and properties of studs shall be as indicated on Drawings.
- C. Mechanical anchors to concrete and masonry shall be metal cinch at least 3/8 inch in diameter threaded bolt head type. Anchor bolts to be installed in concrete shall be hook type 1/2 inch diameter or more. Unless otherwise indicated.
- D. Mechanical anchors to metal framing shall be No. 10 self-tapping and self-drilling wafer-head screws.
- E. Accessories: Special top tracks, angles, fasteners, and strips of gypsum wallboard, as required for fire rating assembly required at each condition.
- F. Mineral Wool Safing Insulation: 4.0 pcf density. Thermafiber, Fibrex, or equal.

PART 3 - EXECUTION

3.01 INSTALLATION



- A. Install plumb and true. Install necessary accessories for proper installation.
- B. Anchor top and bottom runner track to ceiling or roof structure overhead and to floor structure below.
- C. Install studs squarely in top and bottom runner track with firm abutment against track webs.
- D. Align and plumb studs, and fasten to flanges of both top and bottom runner tracks.
- E. Provide three studs minimum at corners of stud walls. Locate so as to provide surfaces for attachment of interior and exterior facing materials.
- F. Members not indicated to be welded together shall be attached with manufacturer recommended screws with minimum one screw at each flange of stud to top and bottom track. Wire tying of framing members is not permitted.
- G. Provide lateral bracing and bridging in accordance with manufacturer's written recommendations or as required by CBC.
- H. Intersecting walls and partitions, whether load-bearing or not, shall be connected.
- I. Splices in axially loaded studs are not permitted.
- J. Splice or butt weld butt joints in runner tracks. No splices are permitted in tracks over lintels, diaphragm sheathing, or diagonal bracing.
- K. Weld connections by fillet welds or plug welds in accordance with AWS recommended procedures and practices.
- L. Touch-up field abrasions and welds with galvanizing touch-up material.
- M. Studs that frame door openings shall be clipped to floor with 14 gage angle clips. Each clip to have two fasteners into studs and two fasteners into floor.
- N. Provide additional joists or blocking adjacent to exterior and interior walls, openings and elsewhere as required to provide support for indicated ceiling construction.
- O. Provide an additional joist under parallel partitions where partition length exceeds $\frac{1}{2}$ joist span and around floor and roof openings which interrupt one or more spanning members.

3.02 CONNECTIONS TO METAL DECKING

- A. Provide premolded neoprene filler strips matching flute profile for non-fire-rated walls and partitions covered on one or both sides up to metal decking.
- B. Top runner track of fire-rated partitions shall be a minimum of 36 mils (20 gage), unless noted otherwise, and attached to metal deck with required fasteners at spacing required for fire rating, but in no case over 16 inches on center. Areas above runner shall be friction fit with a minimum depth of $2\frac{1}{2}$ inches of 4 pounds per cubic foot



density mineral wool insulation. A minimum of ½ inch of firestopping compound shall be installed to each side of mineral wool insulation for a one-hour system, and one inch of firestopping for a two-hour system. Install required special tracks, angles, fasteners and strips of gypsum wallboard to provide required fire resistance rating.

- C. Fire-rated top tracks shall be installed in accordance with manufacturer's recommendations and fire rating approval requirements.

3.03 QUALITY CONTROL

A. Welding Inspection:

1. Inspection of field welding operations shall be performed by special inspector.
2. The special inspector shall inspect material, equipment, procedures, welds, and welder qualifications.

3.04 CLEAN UP

- A. Remove rubbish, debris, and waste materials and legally dispose of off Project site.

3.05 PROTECTION

- A. Protect Work of this section until Substantial Completion.

END OF SECTION



SECTION 05 50 00

MISCELLANEOUS METALWORK

PART 1 – GENERAL

1.01 REQUIREMENTS

- A. The Contractor shall provide miscellaneous metalwork and appurtenances, complete and in place, in accordance with the Standards & Specifications, and Contract Documents.

1.02 RELATED WORK SPECIFIED ELSEWHERE

- A. Section 09 90 00 – Protective Coatings

1.03 SPECIFICATIONS, CODES AND STANDARDS

- A. ASTM International (ASTM)
 1. ASTM A 123 Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
 2. ASTM A 153 Zinc Coating (Hot-Dip) on Iron and Steel Hardware
 3. ASTM A 193 Alloy Steel and Stainless Steel Bolting for High Temperature or D. High Pressure Service and Other Special Purpose Applications
 4. ASTM A 194 Carbon Steel, Alloy Steel, and Stainless Steel Nuts for Bolts High Pressure or High Temperature Service, or Both
 5. ASTM A 307 Carbon Steel Bolts, Studs, and Threaded Rod 60,000 psi Tensile Strength
 6. ASTM A 325 Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength

1.04 CONTRACTOR SUBMITTALS

- A. General: Furnish submittals in accordance with Section 013300 - Contractor Submittals.
- B. Product Information: An ICBO report listing the ultimate load capacity in tension and shear for each size and type of concrete anchor. Contractor shall submit manufacturer's recommended installation instructions, and procedures for adhesive anchors. Upon review, these instructions shall be followed specifically.



1.05 QUALITY ASSURANCE

- A. No substitution for the indicated adhesive anchors will be considered unless accompanied with ICBO (International Council of Building Officials) report verifying strength and material equivalency, including temperature at which load capacity is reduced to 90 percent of that determined at 75 degrees F.

PART 2 – PRODUCTS

2.01 BOLTS AND ANCHORS

- A. Bolt, Nut and Washer Requirements: Unless otherwise indicated, bolts, anchor bolts, washers, and nuts shall be steel as indicated herein. All bolts and cap screws shall have hexagon heads and nuts shall be Heavy Hexagon Series. The bolt and nut material shall be free-cutting steel. The nuts shall be capable of developing the full strength of the bolts. Threads shall be Coarse Thread Series conforming to the requirements of the Unified Thread Standard (UTS). Where galvanized bolts are specified, threads on galvanized bolts and nuts shall be formed with suitable taps and dies such that they retain their normal clearance after hot-dip galvanizing.
1. Except as otherwise indicated, steel for bolt material, anchor bolts and cap screws shall be in accordance with the following:
 - a. Structural Connections: ASTM A 307 - Carbon Steel Bolts, Studs, and Threaded Rod 60,000 psi Tensile Strength Grade A or B, hot-dip galvanized.
 - b. Anchor Bolts: ASTM A 307, Grade A or B, or ASTM A 36, hot-dip galvanized.
 - c. High Strength Bolts (where indicated): ASTM A 325 - Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength.
 - d. Pipe and Equipment Flange Bolts: ASTM A 193 - Alloy Steel and Stainless Steel Bolting Materials for High Temperature or High Pressure Service and Other Special Purpose Applications, Grade B-7.
 2. Washers shall be installed wherever bolts are used to fasten plastic items, or wherever the corrosion protection coating of an item may be damaged when the bolt is tightened. Washers shall be fabricated of material matching the bolts, except that hardened washers for high strength bolts shall conform to the requirements of the AISC Specification. Lock washers and Nylock bolts shall be installed where indicated and shall be fabricated of material matching the bolts.



3. The length of each bolt shall be such that after the joint is made up, the bolt extends a minimum of 1/8-inch beyond the nut, but in no case more than 5/8-inch beyond the nut.
- B. Standard and Above Ground Service (Non-Corrosive Service): All bolts, nuts, and washers in standard/above ground service on factory assembled items shall be stainless steel or in accordance with the manufacturers recommendations for such exposure. All field installed bolts, nuts, and washers in standard/above ground service shall be Cadmium or Zinc coated unless specified otherwise. Where exposed to moisture or other corrosive conditions, bolts shall be epoxy coated after installation in accordance with Section 099000- Protective Coatings, or as otherwise specified.
- C. Buried Service (Corrosive Service): All bolts, nuts, and washers in buried service on factory assembled items shall be stainless steel unless specified otherwise. All field installed bolts, nuts, and washers in buried service shall be Cadmium or Zinc coated unless specified otherwise. Buried bolts shall be coated/wrapped with #1 Wax-Tape by Trenton Corporation, Ann Arbor, MI 48103.
- D. Vault and Submerged Service (Corrosive Service): Bolts shall be epoxy coated after installation in accordance with Section 09 90 00- Painting and Coatings. All bolts, nuts, and washers in the locations listed below shall be stainless steel unless specified otherwise.
1. Inside vaults, manholes, and buried structures.
 2. Submerged locations.
 3. Locations subject to seasonal or occasional flooding.
 4. Inside hydraulic structures below the top of the structure.
 5. Chemical handling areas.
 6. Locations indicated by the Contract Documents, the GWD Standards & Specifications, or designated by the City to be provided with stainless steel bolts.
- E. Stainless Steel Bolts: Unless otherwise indicated, stainless steel bolts, anchor bolts, nuts, and washers shall be Type 316 stainless steel, class 2. Bolts shall conform to ASTM A 193. Nuts shall conform to ASTM A 194 - Carbon Steel, Alloy Steel, and Stainless Steel Nuts for Bolts for High Pressure or High Temperature Service or Both. All bolt threads shall be protected with an antiseize lubricant suitable for submerged service conforming to government specification MIL-A-907E - Antiseize Thread Compound, High Temperature. Antiseize lubricant shall be NSF-61 approved for use with potable water. Antiseize lubricant shall be "PURE WHITE" by Anti-Seize Technology, Franklin Park, IL, 60131, AS-470 by Dixon Ticonderoga Company, Lakehurst, NJ, 08733 or equal.



- F. Adhesive Anchors: Unless otherwise indicated, drilled, concrete, and masonry anchors shall be epoxy adhesive anchors. Epoxy anchor grout shall comply with Section 03 61 11 – Non-Shrink Grout. No substitutions will be considered unless accompanied with ICBO report verifying strength and material equivalency.
1. Where exposed to weather, in submerged, wet, splash, overhead, and corrosive conditions, and for anchoring handrails, pumps, mechanical equipment, and reinforcing bars, threaded rod shall be stainless steel Type 316.
 2. Where indicated, in locations not included above, galvanized steel threaded rod and glass capsule, polyester resin adhesive anchors will be permitted and shall be Hilti HVA or Cobra Anchors.
- G. Expanding-Type Anchors: Expanding-type anchors, if indicated or permitted, shall be steel expansion type ITW Ramset/Redhead "Trubolt" anchors; Hilti "Kwik-Bolt;" or equal. Lead caulking anchors will not be permitted. Size shall be as indicated. Expansion type anchors which are to be embedded in grout may be steel. Non-embedded buried or submerged anchors shall be stainless steel.
- H. Impact Anchors: Impact anchors shall be an expansion type anchor in which a nail type pin is driven to produce the expansive force. The pin shall have a zinc sleeve with a mushroom style head and stainless steel nail pin. Anchors shall be Metal Hit Anchors by Hilti, Inc., Zamac Nailing by Powers Fasteners; or equal.

PART 3 – EXECUTION

3.01 FABRICATION AND INSTALLATION REQUIREMENTS

- A. Fabrication and Erection: Except as otherwise indicated, the fabrication and erection of structural steel shall conform to the requirements of the AISC "Steel Construction Manual."
- B. Aluminum Railings: Aluminum railing fabrication and installation shall be performed by craftsmen experienced in the fabrication of architectural metalwork. Exposed surfaces shall be free from defects or other surface blemishes. Dimensions and conditions shall be verified in the field. All joints, junctions, miters and butting sections shall be precision fitted with no gaps occurring between sections, and with all surfaces flush and aligned. Electrolysis protection of materials shall be provided.
- C. Access Hatches: Unless otherwise indicated, the Contractor shall provide a 1/2-inch drain line to the nearest floor drain for all floor hatches.

3.02 WELDING



- A. Method: Welding shall be by the metal-arc method or gas-shielded arc method as described in the American Welding Society's "Welding Handbook" as supplemented by other pertinent standards of the AWS. Qualification of welders shall be in accordance with the AWS Standards governing same.
- B. Quality: In assembly and during welding, the component parts shall be adequately clamped, supported, and restrained to minimize distortion and for control of dimensions. Weld reinforcement shall be as indicated by the AWS Code. Upon completion of welding, weld splatter, flux, slag, and burrs left by attachments shall be removed. Welds shall be repaired to produce a workmanlike appearance, with uniform weld contours and dimensions. All sharp corners of material which is to be painted or coated shall be ground to a minimum of 1/32 inch on the flat.

3.03 GALVANIZING

- A. Structural steel plates shapes, bars, and fabricated assemblies required to be galvanized shall, after the steel has been thoroughly cleaned of rust and scale, be galvanized in accordance with the requirements of ASTM A 123. Any galvanized part that becomes warped during the galvanizing operation shall be straightened. Bolts, anchor bolts, nuts, and similar threaded fasteners, after being properly cleaned, shall be galvanized in accordance with the requirements of ASTM A 153. Field repairs to galvanizing shall be made using "Galvinox," "GalvoWeld," or equal.

3.04 DRILLED ANCHORS

- A. Drilled anchors and reinforcing bars shall be installed in strict accordance with the manufacturer's instructions. Holes shall be roughened with a brush on a power drill, cleaned and dry. Drilled anchors shall not be installed until the concrete has reached the required 28-day compressive strength. Adhesive anchors shall not be loaded until the adhesive has reached its indicated strength in accordance with the manufacturer's instructions.

END OF SECTION



SECTION 05 50 13 METAL FABRICATIONS

PART 1 - GENERAL

1.01 SUMMARY

- A. Section Includes: Metal fabrications:
1. Steel ladders
 2. Steel framing and supports for mechanical and electrical equipment.
 3. Gratings, frames and covers.
 4. Embedded edge angles in concrete.
 5. Miscellaneous steel framing, supporting angles, plates, brackets, clips, anchors and bolts for equipment, and other work which is not specifically included in Section 05 12 00, Structural Steel Framing.
 6. Miscellaneous metal fabrications, as indicated on the Drawings.
- B. Related Requirements:
1. Division 01 - General Requirements.
 2. Section 05 50 13: Hot-Dip Galvanizing.
 3. Section 05 12 00: Structural Steel Framing.

1.02 REFERENCES

- A. ASTM International (ASTM):
1. ASTM A27 – Standard Specification for Steel Castings, Carbon, for General Application.
 2. ASTM A36 – Standard Specification for Carbon Structural Steel.
 3. ASTM A47 - Standard Specification for Ferritic Malleable Iron Castings.
 4. ASTM A53 - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.
 5. ASTM A123 - Standard Specification for Zinc (Hot-Dipped Galvanized) Coatings on Iron and Steel Products.
 6. ASTM A153 - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
 7. ASTM A283 - Standard Specification for Low and Intermediate Tensile Strength Carbon Steel Plates.
 8. ASTM A307 - Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60 000 PSI Tensile Strength.
 9. ASTM A500 - Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes.



10. ASTM A501 - Standard Specification for Hot-Formed Welded and Seamless Carbon Steel Structural Tubing.
 11. ASTM A563 - Standard Specification for Carbon and Alloy Steel Nuts.
 12. ASTM A653 - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
 13. ASTM C1107 - Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink).
 14. ASTM D1187 - Standard Specification for Asphalt-Base Emulsions for Use as Protective Coatings for Metal.
 15. ASTM F1554 - Standard Specification for Anchor Bolts, Steel, 36, 55, and 105-ksi Yield Strength.
 16. ASTM F2329 - Standard Specification for Zinc Coating, Hot-Dip, Requirements for Application to Carbon and Alloy Steel Bolts, Screws, Washers, Nuts, and Special Threaded Fasteners.
- B. American Welding Society (AWS):
1. AWS D1.1 Structural Welding Code - Steel.
 2. AWS D1.3 Structural Welding Code - Sheet Steel.
 3. AWS D-19.0 Welding Zinc Coated Steel.

1.03 COORDINATION

- A. Coordination between Steel Fabricator and Galvanizer:
1. Prior to fabrication, submit approved fabrication shop drawings to the galvanizer.
 2. Notify galvanizer of steel fabrications that exceed the ASTM A385 recommended percentages for carbon, phosphorus, manganese and silicon, so special galvanizing processing techniques are used.
- B. Coordinate installation of metal fabrications that are anchored to concrete or masonry, or that receive work specified by other Sections. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry.
- C. Field Measurements: Field verify dimensions prior to fabrication.
- D. Coordinate selection of shop primers with galvanizing, and with paintings to be applied over them. Comply with paint and coating manufacturers' written recommendations to ensure that shop primers and paintings are compatible with one another.

1.04 SUBMITTALS

- A. Shop Drawings: Submit Shop Drawings indicating provided materials, dimensions, anchoring detail, and details of termination or connection to adjacent construction. Indicate items that are purchased from a manufacturer and items that are shop fabricated. Indicate component parts requiring Project site fabrication or assembly.



- B. Product Data: Submit Product Data for manufactured items. Submit Product Data for primers and finishes.
- C. Material Samples: Submit Samples of primers and finishes on fabricated items.
- D. Fabricator qualifications per Article “Quality Assurance”.
- E. Welding:
 - 1. Welder’s Certificates: Field welders shall be Project certified in accordance with AWS D1.1.
 - 2. Welding Material Certification: Provide certificate that welding material complies with specifications.
- F. Research/Evaluation Reports: ICC-ES for post-installed anchors.
 - 1. LEED Submittals: Complete the LEED Material Buyout Form (MBoF) with all materials provided to the project. A complete submittal includes providing all material costs in the MBoF and all of the supporting documentation for the following credits:
 - a. MRc2 - Environmental Product Declarations (EPD): Provide Industry-Wide or Product-Specific EPD.
 - b. MRc3 - Sourcing of Raw Materials - Recycled Content: Provide product data for pre- and post- consumer recycled content.
 - c. MRc4 - Material Ingredients: Provide manufacturers Declare label, Health Product Declaration (HPD), Cradle to Cradle Certification, or Cradle to Cradle Health Product Certificate.
 - d. IEQc2 - Low-Emitting Materials – Interior Wet Applied Products: For paints, coatings, adhesives and sealants applied on site or used for laminating off-site, include product data indicating the VOC content (g/L) and testing certificates or third-party certification demonstrating compliance with California Department of Public Health (CDPH) v1.2-2017 emissions testing.

1.05 QUALITY ASSURANCE

- A. Fabricator Qualifications: Firm with a minimum five year experience in successfully producing metal fabrications similar to that shown on the drawings.
- B. Welding Qualifications: Qualify procedures and personnel according to the following:
 - 1. AWS D-1.1– Structural Welding Code – Steel.
 - 2. AWS D1.3 - Structural Welding Code - Sheet Steel.
- C. Inspection of Welding: Refer to Section 01 4523: Testing and Inspection.
- D. Field applied primers, paintings, sealers and adhesives shall be approved by the OWNER.
- E. Preassemble items in shop to greatest extent possible to minimize field welding. Mark units for reassembly and coordination of installation. Use marking method compatible with galvanizing.



1.06 DELIVERY, STORAGE AND HANDLING

- A. Store miscellaneous metal items above grade on platforms, skids, or other required supports.
- B. Protect from damage and from corrosion, dirt, grease and other foreign matter.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Structural Steel Shapes: ASTM A36.
- B. Rolled Steel Plates: ASTM A36. Plates to be bent or cold-formed shall conform to ASTM A283, Grade C.
- C. Round HSS: ASTM A500 Grade B or C.
- D. Square and Rectangular HSS: ASTM A500 Grade B or C.
- E. Steel Pipe: ASTM A53 Type E or S, Grade B, standard weight (Schedule 40), unless otherwise noted. Black finish.
- F. Steel Sheet: ASTM A1008 or ASTM A1011.
- G. Steel Bolts: ASTM A307, Grade A, or F3125 with hex steel nuts per ASTM A563 and washers. Galvanized in accordance with ASTM A153 for exterior locations.
- H. Steel Bars: Conforming to ASTM A108 or ASTM A575.
- I. Concrete Inserts: Threaded or wedge type; galvanized ferrous castings, either malleable iron, ASTM A47, or cast steel, ASTM A27. Provide bolts, washers, and shims, hot-dip galvanized per ASTM A153.
- J. Nonshrink, Nonmetallic Grout: Factory-packaged, non-staining, noncorrosive, nongaseous grout complying with ASTM C1107. Provide grout specifically recommended by manufacturer for interior and exterior applications.

2.02 FABRICATION

- A. General:
 - 1. Preassemble items in the shop to greatest extent possible. Use connections that maintain structural value of joined pieces. Mark units for reassembly and installation.
 - 2. Cut, drill, and punch metals cleanly and accurately. Ease exposed edges to a radius of approximately 1/32 inch, unless otherwise indicated or specified. Remove sharp and rough areas on exposed surfaces. Form exposed work with accurate angles and surfaces and straight edges. Form exposed connections with hairline joints, flush and smooth. Locate joints where least conspicuous.
- B. Welding:
 - 1. Weld connections unless otherwise indicated.



2. Weld corners and seams continuously and in accordance with requirements of AWS D1.1 Structural Welding Code. Welds shall be inspected as required in Section 05 12 00: Structural Steel Framing.
3. Grind exposed welds smooth and flush to match and blend with adjoining surfaces.

2.03 PREPARATION FOR GALVANIZING

- A. Fabricate to the largest size possible and whenever possible use slip joints to minimize field welding.
- B. Fabricate structural steel in accordance with Class I, II, III guidelines as described in AGA's Recommended Details for Galvanized Structures, to facilitate galvanizing process. Corners of gussets, stiffeners, and bracing shall be cropped to allow free flow of zinc during galvanizing process.
- C. Remove welding slag, splatter, anti-splatter compounds and burrs prior to delivery for galvanizing.
- D. Marking for Identification: Avoid unsuitable marking paints for identification, such as oil based paints and markers and crayon markers. Use water soluble paints or markers acceptable to galvanizer or steel tags wired to the work.
- E. Masking: Use masking materials recommended by the American Galvanizers Association (AGA) to produce ungalvanized areas for field welding and at slip critical bolts.
- F. Galvanize fabrications per Section 05 5013, Hot-Dip Galvanizing, in accordance with ASTM A123 and ASTM A153.

2.04 SHOP FINISH

- A. Metal fabrications shall be provided with a coat of primer, except those indicated to be hot-dip galvanized.
- B. Primers:
 1. Universal Shop Primer: Fast-curing, lead- and chromate-free, universal modified-alkyd primer complying with MPI#79 and compatible with topcoat. Use primer containing pigments that make it easily distinguishable from zinc-rich primer.
 2. Epoxy Zinc-Rich Primer: Complying with MPI#20 and compatible with topcoat.
 3. Minimum dry film thickness of primer shall be 2.0 mils.
- C. Preparation for Primer Painting: Miscellaneous ferrous metal, except items specified galvanized, shall be thoroughly cleaned and prepared for painting, including removal of shipping oils or protective coatings, mill scale, grease, dirt and rust. Prepare in accordance with SSPC recommendations. Deliver to Project site primed or galvanized as indicated, and ready to receive Project site applied finishes.

PART 3 - EXECUTION

3.01 EXAMINATION



- A. Examine the areas where metal fabrications are to be installed. Notify the OAR in writing of unsatisfactory conditions. Do not proceed with the work until unsatisfactory conditions have been corrected.

3.02 INSTALLATION

- A. Provide anchorage devices and fasteners as indicated in the drawings and where necessary for securing miscellaneous metal fabrications to in-place construction.
- B. Cut, drill, and fit as required for installation of miscellaneous metal fabrications. Set metal fabrication accurately in location, alignment, and elevation; with edges and surfaces level, plumb, true, and free of rack; and measured from established lines and levels.
- C. Fit exposed connections accurately together to form hairline joints. Weld connections that are not to be left as exposed joints but cannot be shop-welded because of shipping size limitations. Do not weld, cut, or abrade the surfaces of hot-dip galvanized fabrications intended for bolted or screwed field connections.
- D. Alignment: Verify alignment of items with adjacent construction. Coordinate related work.
- E. Grout: Follow manufacturer's recommendations for substrate preparation and application.
- F. Corrosion Protection: Coat concealed surfaces of metals that will come into contact with grout, concrete, masonry, or wood, with a heavy coat of bituminous paint or zinc chromate primer. Protect dissimilar metals from galvanic corrosion by pressure tapes, coating, or isolators.

3.03 FIELD WELDING

- A. Preparation of Weld Area of Galvanized Fabrications: Remove masking from fabrications. Remove remaining zinc coating between one inch and four inches from both sides of members to be welded, by grinding back the zinc coating, burning the zinc away or pushing back the molten zinc from the weld area.
- B. Welding: Comply with AWS Code for procedures of manual shielded metal-arch welding, appearance and quality of welds made, methods used in correcting welding work.
 - 1. Weld in accordance to AWS D-1.1.
 - 2. Weld galvanized fabrications in accordance to AWS D-19.0.
- C. Remove welding flux immediately. At exposed connections, finish exposed welds and surfaces smooth and blended so that no roughness shows after finishing and contour of welded surfaces matches those adjacent.
- D. Upon completion of welding plug vent, drainage and lifting holes of galvanized fabrications with appropriate diameter zinc plugs. Push in about half way by hand, and hammer to a tight fit. With a hand file or an abrasive tool, file away excess material. Repair scratches with a zinc rich coating.
 - 1. Plug railing holes.
 - 2. Plug visible holes of HSS members.



- 3.04 ADJUSTING AND CLEANING
- A. Touch Up Damaged Surfaces:
1. Shop Painted Finishes: Comply with SSPC-PA-1 for touch-up; apply with brush to produce a minimum 2.0 mil dry film thickness.
2. Galvanized Surfaces: Clean field welds, connections and damaged areas. Apply two coats of Carbomastic 15, by Carboline or equal product. Brush or roll to a 4 to 6 mil thickness.
- 3.05 CLEAN UP
- A. Remove rubbish, debris, and waste materials and legally dispose of off the Project site.
- 3.06 PROTECTION
- A. Protect the Work of this section until Substantial Completion.

END OF SECTION



SECTION 05 51 50

ALUMINUM FABRICATIONS

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

1. Access ladders
2. Ships ladder
3. Crossovers

B. Related Requirements:

1. Division 01 - General Requirements.
2. Section 05 50 00: Metal Fabrications.
3. Section 05 12 00: Structural Steel Framing.

1.02 REFERENCES

A. AA – Aluminum Association.

B. ASTM International (ASTM):

1. ASTM B 209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.
2. ASTM B 221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.

C. Occupational Safety and Health Administration (OSHA):

1. OSHA 1910.27 – Fixed Ladders.

1.03 COORDINATION

A. Coordinate installation of metal fabrications that are anchored to concrete or masonry, or that receive work specified by other Sections. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry.

B. Field Measurements: Field verify dimensions prior to fabrication.



- C. Coordinate selection of shop primers with paintings to be applied over them. Comply with paint and coating manufacturers' written recommendations to ensure that shop primers and paintings are compatible with one another.

1.04 SUBMITTALS

- A. Shop Drawings: Submit Shop Drawings indicating provided materials, dimensions, anchoring detail, and details of termination or connection to adjacent construction. Indicate items that are purchased from a manufacturer and items that are shop fabricated. Indicate component parts requiring Project site fabrication or assembly.
- B. Product Data: Submit Product Data for manufactured items. Submit Product Data for primers and finishes.
- C. Material Samples: Submit Samples of finishes on fabricated items.
- D. Fabricator qualifications per Article "Quality Assurance".
- E. Material Samples: Submit Samples of finishes on fabricated items. For each finish specified, two samples, minimum size 6 inches (150 mm) square, represent actual product color.
- F. Provide templates for anchors and bolts specified for installation under other Sections.
- G. Provide reaction loads for each hanger and bracket.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: A firm experienced in producing aluminum metal fabrications similar to those indicated for this Project.
 - 1. Record of successful in-service performance.
 - 2. Sufficient production capacity to produce required units.
 - 3. Professional engineering competent in design and structural analysis to fabricate aluminum in compliance with industry standards and local codes.
- B. Installer Qualifications: Competent and experienced firm capable of selecting fasteners and installing to attain designed operational and structural performance.
- C. Product Qualification: Product design shall comply with OSHA 1910.27 minimum standards for ladders.

1.06 DELIVERY, STORAGE AND HANDLING

- A. Store products in manufacturer's unopened packaging until ready for installation.
- B. Protect from damage and from corrosion, dirt, grease and other foreign matter.



1.07 DELIVERY, STORAGE AND HANDLING

- A. Field Measurements: Verify dimensions by field measurement before fabrication.
 - 1. Established Dimensions: Where field measurements cannot be made without delaying the Work, indicate established dimensions on shop drawing submittal and proceed with fabrication.

1.08 DELIVERY, STORAGE AND HANDLING

- A. Manufacturer has responsibility for an extended Corrective Period for work of this Section for a period of 5 years commencing on the shipment date of the product against all the conditions indicated below, and when notified in writing from Owner, manufacturer shall promptly and without inconvenience and cost to Owner correct said deficiencies.
 - 1. Defects in materials and workmanship.
 - 2. Deterioration of material and surface performance below minimum OSHA standards as certified by independent third party testing laboratory. Ordinary wear and tear, unusual abuse or neglect exempted.
 - 3. Within the warranty period, the manufacturer shall, at its option, repair, replace, or refund the purchase price of defective ladder.
- B. Manufacturer shall be notified immediately of defective products, and be given a reasonable opportunity to inspect the goods prior to return.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Access Ladder, Ships' Ladder and Crossover:
 - 1. Basis of Design: O'Keeffe's Inc., 100 N Hill Drive, Suite 12, Brisbane, CA 94005. Toll Free Tel: (888) 653-3333. Tel: (415) 824-4900. Fax: (415) 824-5900. Email: info@okeeffes.com. Web: <http://www.okeeffes.com>.
 - 2. Erectastep
 - 3. Platforms and Ladders
 - 4. Equal

2.02 ACCESS LADDER



- A. Siderails: Continuous extruded-aluminum channels with spacing as indicated in drawings
- B. Rungs: Extruded-serrated aluminum as indicated in drawings. Fit rungs in centerline of siderails; fasten by welding or with stainless steel fasteners or brackets and aluminum rivets.
- C. Materials:
 - 1. Aluminum Extrusions: Alloy 6063-T6 to comply with ASTM B221.
 - 2. Alloy 5005-H34 to comply with ASTM B209.
- D. Aluminum Safety Post: As manufactured by Babcock-Davis, 9300 73rd Ave N, Brooklyn Park, MN 55428, PH: 888-412-3726. Web: www.Babcock-Davis.com. Or Equal
 - 1. Performance Requirements: Fabricate safety post to comply with OSHA 1910.27 for fixed ladders. Must support 200 pound load.
 - 2. Post: 1 1/2" x 1 1/2" square tubing- high strength. A pull up loop shall be provided at the upper end of the post to facilitate raising the post.
 - 3. Finish: Mill finish
 - 4. Spring assist: Stainless steel balancing spring mechanism shall be provided to provide smooth, easy, controlled operation when raising and lowering the safety post.
 - 5. Hardware: All mounting hardware shall be stainless steel.
 - 6. Acceptable Product Model: SPA as manufactured by Babcock Davis or Equal.

2.03 SHIPS' LADDER AND CROSSOVER

- A. Provide ships' ladders and pipe crossovers where indicated. Fabricate of open type construction with channel or plate stringers and pipe and tube railings unless otherwise indicated. Provide brackets and fittings for installation.
 - 1. Incline: As indicated in drawings.
 - 2. Tread: Dimensions as indicated in drawings.
 - 3. Riser height: As indicated in drawings.
 - 4. Fabricate ships' ladders and crossovers, including railings from aluminum.
 - 5. Fabricate treads and platforms from extruded-aluminum plank grating. Limit



openings in gratings to no more than 1/2 inch in least dimension.

6. Fabricate treads and platforms from rolled-aluminum-alloy.

B. Materials:

1. Aluminum Extrusions: Alloy 6063-T6 to comply with ASTM B221.
2. Alloy 5005-H34 to comply with ASTM B209.

2.04 FINISHES

A. As-Fabricated finish, AA-M12

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine the areas where metal fabrications are to be installed. Notify the OAR in writing of unsatisfactory conditions. Do not proceed with the work until unsatisfactory conditions have been corrected.
- B. Coordinate anchorages. Furnish setting drawings, templates, and anchorage structural loads for fastener resistance.
- C. Do not begin installation until supporting structure is complete and ladder installation will not interfere with supporting structure work.
- D. If supporting structure is the responsibility of another installer, notify Architect of unsatisfactory supporting work before proceeding.

3.02 INSTALLATION

- A. Provide anchorage devices and fasteners as indicated in the drawings and where necessary for securing fabrications to in-place construction.
- B. Cut, drill, and fit as required for installation of fabrications. Set fabrication accurately in location, alignment, and elevation; with edges and surfaces level, plumb, true, and free of rack; and measured from established lines and levels.
- C. Alignment: Verify alignment of items with adjacent construction. Coordinate related work.
- D. Install in accordance with manufacturer's instructions and in proper relationship with adjacent construction.



- E. Corrosion Protection: Coat concealed surfaces of metals that will come into contact with grout, concrete, masonry, or dissimilar material, with a heavy coat of bituminous paint or zinc chromate primer. Protect dissimilar metals from galvanic corrosion by pressure tapes, coating, or isolators.

3.03 INSTALLATION OF ACCESS LADDERS

- A. Secure ladders to adjacent construction with the clip angles attached to the stringer.
- B. Install brackets as required for securing of ladder welded or bolted to structural steel or built into other surfaces.

3.04 INSTALLATION OF SHIPS' LADDER AND CROSSOVER

- A. Secure top and bottom of ships' ladders to construction to comply with manufacturer's written instructions.
- B. Secure pipe crossovers to construction to comply with manufacturer's written instructions.

3.05 CLEAN UP

- A. Remove rubbish, debris, and waste materials and legally dispose of off the Project site.

3.06 PROTECTION

- A. Protect the Work of this section until Substantial Completion.
- B. Protect installed products until completion of project.
- C. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION



SECTION 05 75 19

DECORATIVE ALUMINUM SCREENING

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

1. Prefabricated perforated aluminum screen and gate
2. Mounting components and accessories
3. Mechanical fasteners

B. Related Requirements:

1. Division 01
2. Section 01 33 00 - Submittal Procedures
3. Section 01 77 00 - Closeout Procedures
4. Section 07 64 25 – Fully Adhered TPO Roofing
5. Section 09 90 00 - Painting and Coating

1.02 REFERENCES

A. Reference Standards and Codes:

1. The Aluminum Association, Inc. (AA):
 - a. AA DAF-45, 2003(2009), Designation System for Aluminum Finishes
2. American Architectural Manufacturers Association (AAMA):
 - a. AAMA 611-14, Voluntary Specification for Anodized Architectural Aluminum
 - b. AAMA 2605-17, Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing High Performance Organic Coatings on Aluminum Extrusions and Panels
3. ASTM International (ASTM):



- a. ASTM B209-14, Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate
 - b. ASTM B221-14, Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes
 - c. ASTM B429/B429M-10e1, Standard Specification for Aluminum-Alloy Extruded Structural Pipe and Tube
 - d. ASTM B483/B483M-13e1, Standard Specification for Aluminum and Aluminum-Alloy Drawn Tube and Drawn Pipe for General Purpose Applications
4. American Welding Society (AWS):
- a. AWS D1.2/D1.2M-2014, Structural Welding Code - Aluminum
5. California Building Code (CBC), 2019 Edition.
6. The Society for Protective Coatings (SSPC):
- a. SSPC-Paint 15, Steel Joist Shop Primer/Metal Building Primer
 - b. SSPC-Paint 20, Zinc-Rich Coating (Type I - Inorganic, and Type II - Organic)

1.03 ADMINISTRATIVE REQUIREMENTS

- A. Coordination: Coordinate installation of anchorages for screen. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete. Deliver such items to Project site in time for installation.

1.04 ACTION SUBMITTALS

- A. Submit in accordance with Section 01 33 00:
 1. Product Data: Material description and installation instructions for manufactured products.
 2. Shop Drawings:
 - a. Include plans, elevations, sections, details, attachments, anchors, and size and type of fasteners, and accessories.
 - b. Indicate welded connections and details of welds.
 3. Furnish setting drawings, diagrams, templates, instructions, and directions for installation of anchorages, such as concrete inserts, anchor bolts and miscellaneous



items having integral anchors, which are to be embedded in concrete construction. Coordinate delivery of such items to Project site.

4. Samples for Initial Selection: For products involving selection of color, texture, or design.

1.05 QUALITY ASSURANCE

- A. Comply with Standards and Codes listed in Article 1.02 REFERENCES.
- B. Welding Qualifications: Qualify procedures and personnel according to the following:
 1. AWS D1.2/D1.2M, for aluminum.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store and handle fence components in a manner that will prevent distortion or damage.
- B. Store clear of the ground and protect from moisture and the elements.
- C. Deliver items required to be built into concrete promptly to the site so they may be built in as the work progresses.
- D. Do not install damaged and otherwise unsuitable material.

1.07 FIELD CONDITIONS

- A. Field Measurements: Verify actual locations of walls and other construction contiguous with metal fabrications by field measurements before fabrication.
 1. Indicate field measurements on final shop drawings.
 2. Where field measurements cannot be made without delaying the Work, guarantee dimensions and proceed with fabrication of products without field measurements.
 3. Coordinate construction with work of other trades to ensure that actual dimensions correspond to guaranteed dimensions.

1.08 WARRANTY

- A. Special Finish Warranty (High-Performance Organic Coatings): Applicator's standard form in which applicator agrees to repair or replace components on which finishes do not comply with requirements or that fail in materials or workmanship within specified warranty period. Warranty does not include normal weathering.
 1. Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS



2.01 ACCEPTABLE MANUFACTURER

- A. Basis of Design:
1. Astro Metal Craft
11059 Lamont Avenue NE
Hanover, MN 55341
(763)777-8087
www.astrometalcraft.com

- B. Or approved equal.

2.02 PERFORMANCE CRITERIA

- A. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes acting on exterior metal fabrications by preventing buckling, opening of joints, overstressing of components, failure of connections, and other detrimental effects.
1. Temperature Change: 120 degrees F, ambient; 180 degrees F, material surfaces.
- B. Control of Corrosion: Prevent galvanic action and other forms of corrosion by insulating metals and other materials from direct contact with incompatible materials.

2.03 MATERIALS

- A. General:
1. Metal Surfaces: Provide materials with smooth surfaces, without seam marks, roller marks, rolled trade names, stains, discolorations, or blemishes.
 2. Aluminum: Provide alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated, and with strength and durability properties for each aluminum form required not less than that of alloy and temper specified below.
 3. Component Sizes: Unless otherwise specified herein, sizes are indicated on Drawings.
- B. Perforated Screen and Gate Panels:
1. Aluminum Plate: ASTM B209, 5052 alloy; anodizing quality aluminum plate, 0.188-inch thick.
 2. Panel Dimensions:
 - a. Height: As indicated in drawings.
 - b. Length: As indicated in drawings.
 3. Perforations:



- a. Shape: Round holes, with 3/8-inch solid gaps between holes and 3/8-inch solid edges.
 - b. Size:
 - 1) Round Perforations: 1-inch diameter.
 - 2) Hole Centers: 1.375-inch c-c for 1-inch perforations.
 - a. Pattern: Straight pattern.
- C. Aluminum Tube Supports, vertical and horizontal: ASTM B221, 6061-T6 alloy, extruded tubing, 0.250-inch wall thickness.
- D. Aluminum Tube Support Caps: ASTM B209, 5052 alloy; aluminum plate, 0.190-inch thick.
- E. Exposed Fasteners: Flush countersunk screws or bolts, consistent with design of fence.
- F. Welding Electrodes: Comply with AWS requirements in D1.1 and D1.2.
1. For aluminum, provide type and alloy as recommended by producer of metal to be welded and as required for color match, strength, and compatibility in fabricated items.
- G. Fasteners, Anchors and Inserts:
1. Aluminum Component Fasteners: Type 304 stainless-steel fasteners.
 2. Fasteners for Anchoring Support Posts to Concrete: Select fasteners of type, grade, and class required to produce connections suitable for anchoring posts to concrete as indicated on Drawings and capable of withstanding design loads.
 3. Inserts: Furnish inserts to be set or otherwise secured to supporting Work.
 - a. For anchorage to concrete, provide inserts to be cast into concrete, for bolting anchors
- H. Gate Hardware
1. 2 qty Hinges: Heavy Duty Round Self-Closing Hinges model TruClose TCHDRND as manufactured by D&D.
 2. 1 each Keyed Latch/Lockset: Magnetic Gate Lock model LokkLatch LLMKABT as manufactured by D&D.
- 2.04 FABRICATION
- A. General:
1. Fabricate fence components to comply with requirements indicated for design, dimensions, member sizes and spacing, details, finish, and anchorage, but not less than that required to support structural loads.



- B. Joinery and Terminations:
 - 1. Fabricate components to produce joints tightly fitted and secured.
 - 2. Form curved sections, if any, by rolling to produce uniform curvature indicated without buckling, twisting, or otherwise deforming exposed surfaces of fence panels.
 - 3. Close exposed ends of tube supports by welding cover plate in place or by use of prefabricated fittings.

- C. Accurately form components to suit specific project conditions and for proper connection to other construction.
 - 1. Panels:
 - a. Perforations: Punch metals cleanly and accurately. Remove burrs.
 - b. Exposed Edges: Ease exposed edges to a radius of approximately 1/32 inch unless otherwise indicated.
 - c. Corners: Form bent-metal corners by scoring back of aluminum plate at bends as necessary to achieve the smallest radius possible without causing grain separation or otherwise impairing the work.
 - 1) Corner Notches: Refer to subparagraph 2 below.
 - d. Apply anodized finish specified, after bending.

- D. Dissimilar Metals: Provide nylon or other manufacturer suggested gaskets at mounting flanges, and other areas where fence panels or posts are scheduled to attach to dissimilar metals or concrete. Cut gaskets to match profile of mounting flange.

2.05 FINISHES

- A. Screen Posts and Panels:
 - 1. High-Performance Organic Finish: Two-coat fluoropolymer finish complying with AAMA 2605 and containing not less than 70 percent PVDF resin by weight in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
 - a. Color and Gloss: As selected by Architect from manufacturer's full range.

- B. Protect shop-applied finishes on surfaces exposed to view in the finished Work from damage, by applying a temporary protective covering or by other methods recommended by the coating applicator before shipment.

PART 3 - EXECUTION



3.01 EXAMINATION

- A. Examine substrates, areas, and conditions, with installer present where indicated, for compliance with requirements for installation tolerances and other conditions affecting performance. Notify the Owner's representative of conditions detrimental to performance of the Work and recommended corrections. Where the installation and its completion may be delayed due to existing conditions, follow notification immediately with a written report. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

- A. Coordinate post setting drawings, diagrams, templates, instructions, and directions for installation of anchorages, such as sleeves, concrete inserts, anchor bolts, and miscellaneous items having integral anchors, that are to be embedded in concrete construction. Coordinate delivery of such items to project site.
- B. Apply one coat of bituminous paint to concealed aluminum, steel and stainless-steel surfaces that will be in contact with cementitious or dissimilar materials.

3.03 INSTALLATION

- A. General:
 - 1. Install in accordance with manufacturer's instructions anchored securely to supporting construction.
 - 2. Fit panels together to form tight, hairline joints, free from distortion and other defects.
 - 3. Perform cutting, drilling, and fitting required for installing fence panels. Set panels accurately in location, alignment, and elevation; measured from established lines and levels and free of rack.
 - a. Do not weld, cut, or abrade surfaces of fence components that have been coated or finished after fabrication and that are intended for field connection by mechanical or other means without further cutting or fitting.
 - 4. Align panel tops so variations from level for horizontal members do not exceed 1/4 inch in 12 feet unless otherwise shown on the Drawings.
 - 5. Corrosion Protection: Coat concealed surfaces of aluminum that will be in contact with concrete or dissimilar metals, with a heavy coat of bituminous paint.
 - 6. Conceal anchor bolts and screws whenever possible; where not concealed, use flush countersunk fastenings.
- B. Screen Posts and Panels:
 - 1. Posts: Space posts at spacing indicated on final shop drawings. Plumb posts in each direction.



2. Panels: Set panels in proper location. Adjust panels prior to anchoring to ensure matching alignment of abutting joints and continuity of patterns, if any.

3.04 INSTALLATION TOLERANCES

- A. Maximum Variation from Plumb: 1/4 inch per floor level, noncumulative.
- B. Maximum Offset from True Alignment: 1/4 inch.
- C. Maximum Out-of-Position: 1/4 inch.
- D. Posts: 1/16 inch in 3 feet.

3.05 ADJUSTING

- A. Restore finishes damaged during installation and construction period so that no evidence remains of correction work. Return items which cannot be refinished in the field to the shop. Make required alterations and refinish affected area so that it is indistinguishable from adjacent undamaged areas. Provide new components where finishes cannot be restored to undamaged condition.

3.06 PROTECTION

- A. Protect finishes of fence components from damage during construction period with temporary protective coverings approved by fence manufacturer. Remove protective coverings at time of Substantial Completion.

END OF SECTION



SECTION 06 10 00

ROUGH CARPENTRY

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

1. Rough carpentry Work.

B. Related Requirements:

1. Division 01 - General Requirements.
2. Section 03 10 00: Concrete Forming and Accessories.
3. Section 03 30 00: Cast-In-Place Concrete.
4. Section 06 20 00: Finish Carpentry.
5. Section 09 29 00: Gypsum Board.

1.02 SYSTEM DESCRIPTION

A. Regulatory Requirements:

1. Work of this Section shall comply with CBC Chapter 23.

1.03 SUBMITTALS

A. LEED Submittals: Complete the LEED Material Buyout Form (MBoF) with all materials provided to the project. A complete submittal includes providing all material costs in the MBoF and all of the supporting documentation for the following credits:

1. MRc2 - Environmental Product Declarations (EPD): Provide Industry-Wide or Product-Specific EPD.
2. MRc3 - Sourcing of Raw Materials - Recycled Content: Provide product data for pre- and post- consumer recycled content.
3. MRc3 - Sourcing of Raw Materials – Forestry Stewardship Council (FSC) Certified Wood: For all wood products designated in this specification as “FSC certified,” provide vendor invoices with the vendor’s Chain-of-Custody (COC) number and identify each FSC certified product on a line-item basis. If FSC



wood products are modified off-site by an architectural woodworker or millworker, the woodworker must have an FSC COC number.

4. MRc3 - Local/ Regional Material: Provide product data confirming product manufactured and extracted within 100 miles of the project site. Only applicable for products that also contain recycled content or FSC certified wood.
5. MRc4 - Material Ingredients: Provide manufacturers Declare label, Health Product Declaration (HPD), Cradle to Cradle Certification, or Cradle to Cradle Health Product Certificate.
6. IEQc2 - Low-Emitting Materials – Interior Wet Applied Products: For paints, coatings, adhesives and sealants applied on site or used for laminating off-site, include product data indicating the VOC content (g/L) and testing certificates or third-party certification demonstrating compliance with California Department of Public Health (CDPH) v1.2-2017 emissions testing.

1.04 QUALITY ASSURANCE

A. Comply with the following as a minimum requirement:

1. Redwood structural and framing lumber shall be graded in accordance with Standard Specifications for Grades of California Redwood Lumber of the Redwood Inspection Service.
 2. Douglas fir, larch or hemlock structural and framing lumber shall be graded in accordance with the Standard Grading Rules of the West Coast Lumber Inspection Bureau (WCLIB) or the Western Lumber Grading Rules of the Western Wood Products Association (WWPA).
 3. Plywood shall conform to requirements of Product Standard PS 1, and shall be grade marked by a recognized grading agency (APA and PTL).
- B. Lumber shall bear official grade mark of the association under whose rules it was graded or official grade mark of another recognized grading agency.
- C. Structural and framing members 2-inch thick (nominal) and larger shall be air-dried to moisture content not to exceed 19 percent before installation.
- D. Each piece of preservative treated lumber shall be identified by the Quality Mark of an approved inspection agency in accordance with CBC Chapter 23; refer to Section 01 45 23: Testing and Inspection.

1.05 STORAGE, HANDLING AND PROTECTION

- A. The materials supplied as part of the Work of this section shall be protected from exposure to inclement weather before being covered by other Work.



PART 2 - PRODUCTS

2.01 MATERIALS

- A. Lumber: Structural and framing lumber shall be of following species and grades:

<u>INSTALLATION</u>	<u>SPECIES</u>	<u>GRADE</u>
---------------------	----------------	--------------

- | | | |
|---|-------------------------------|---------|
| 1. Miscellaneous nailing strips and blocks embedded in concrete or masonry. | Douglas fir and Larch treated | Grade 1 |
|---|-------------------------------|---------|

- B. Plywood: Plywood furnished for structural purposes, when exposed outdoors, shall be exterior type plywood. Other plywood furnished for structural purposes shall be exterior type, or Exposure 1.

- C. OSB Board or Panels:

1. Oriented strand board or panels shall not be furnished as part of the Work of this section.

- D. Preservative Treated Wood:

1. Wood and plywood specified; as treated wood shall be pressure treated wood in accordance with CBC requirements.
2. Seasoning: Treated lumber shall be air seasoned after treatment, for a minimum of two weeks before installation. Moisture content shall be 15 percent maximum.
3. Creosote or arsenic is not permitted for treating wood.
4. When treated wood member have been notched, dapped, drilled, or cut, such newly cut surfaces shall be painted with a heavy coat of the same preservative material originally provided for treatment of wood member.

- E. Fire Retardant Protection: Wood and plywood specified as fire retardant protected wood shall be treated by approved methods and materials and shall be dried following treatment to maximum moisture content as follows:

1. Solid sawn lumber 2-inch thick or less: 19 percent.
2. Plywood: 15 percent.



2.02 LEED REQUIREMENTS

- A. IW/PS EPD: Products specified under this section must have either a Type III Product Specific EPD or the company must be listed in the industry group responsible for the Industry Wide Externally Verified EPD.
- B. PS EDP: Products specified under this section must have a Type III Product Specific EPD.
- C. HPDs: Products specified under this section must have one of the following unexpired material ingredient reports compliant with LEEDv4.1 requirements and declared to 1000 ppm or less: Declare label, Health Product Declaration (HPD), Cradle to Cradle Certification, Cradle to Cradle Health Product Certificate, or UL Product Lens Certification.
- D. FSC Certified Wood Products: Wood products shall be certified as "FSC 100%" or "FSC Mix Credit" or "FSC Recycled" according to FSC STD 40-004 v3-0 with proper chain of custody.
- E. Interior Wet Applied Products: All wet-applied on-site paints, coatings, adhesives, and sealants products provided under Part 2 of this specification section must be compliant with the VOC limits outlined under IEQc2: Low Emitting Materials in 01 81 13 Sustainable Design Requirements. In addition, all paints and coatings must be compliant with CDPH Standard Method v1.2-2017 emissions testing with proper unexpired CDPH testing certificates or acceptable third-party certification.

PART 3 - EXECUTION

3.01 FASTENINGS

- A. Nails and Spikes:
 - 1. Furnish only common wire nails or spikes whenever indicated, specified or required.
 - 2. Whenever necessary to prevent splitting, holes shall be pre-drilled for nails and spikes.
 - 3. Nails in plywood shall not be overdriven.
 - 4. Machine Applied Nailing: Machine nailing is not permitted for 5/16 inch plywood. Do not permit nail heads to penetrate outer ply. Maintain minimum allowable edge distances when installing nails.
- B. Lag Screws:



1. When installing lag screws in a wood member, pre-drill hole as required by the CBC.
 2. Lag screws, which bear on wood, shall be fitted with standard steel plate washers under head. Lag screws shall be screwed and not driven into place.
- C. Bolts:
1. Lumber and timber to be fastened together with bolts shall be clamped together with holes for bolts bored true to line.
 2. Bolts shall be fitted with steel plates or standard cut washers under heads and nuts. Bolts shall be tightened when installed and again before completion of the Work of this section.
- D. Wood Screws: When installing wood screws, pre-drill holes as required by the CBC.
- E. Metal Framing Devices: Framing anchors, joist hangers, ties, and other mechanical fastenings shall be galvanized or furnished with a rust inhibitive coating. Nails and fastenings shall be of the type recommended by manufacturer.
- F. Powder Driven Fasteners:
1. Loads shall not exceed 75 pounds unless indicated on the Drawings or when reviewed by the Architect.
 2. The operator, tool, and fastener shall perform the following as observed by the Inspector.
 - a. Observe installation of first 10 fasteners.
 - b. Test the first 10 fasteners by performing a pullout test. Load shall be at least twice the design load, or 150 pounds, whichever is greater.
 - c. Random testing:
 - 1) Load less than 75 pounds - approximately 1 in 10 pins.
 - 2) Load 75 pounds or greater - 1/2 of the pins.
 3. Failure of any test will result in testing of all installed pins.
 4. Nail heads shall not break the outer skin of sheathing.
 5. Non-compliant pins shall be replaced.

3.02 INSTALLATION



- A. Furring: Where metal furring is not indicated or specified, provide wood furring at points indicated and required for concealing conduit, piping, structural framing or other unfinished materials. Wood furring shall be 2-by studs of required width. Vertical members contacting concrete or masonry shall be attached as specified for anchoring interior wood stud partitions.
- B. Grounds:
1. Provide and set wood grounds at points where wood trim occurs and work is to be plastered. Grounds at 3/4 inch metal lath shall be 5/8 inch thick, net, 1 1/2-inch wide Douglas Fir, S1S. Grounds shall be doubled where trim member exceeds 5-inch width, or wherever indicated. Grounds shall be applied after lath has been installed set plumb, level and true to line.
 2. Apply grounds over wood framed surfaces and lath and securely nail to wood backing at each stud or bearing. Grounds applied over steel channel studs and lath shall be securely nailed at each stud or bearing to nail-blocks provided and installed in metal studs.
 3. Grounds applied to concrete surfaces shall be securely nailed to woodblocks provided and built into concrete.
- C. Nailing Strips and Plates:
1. Provide wood nailing strips, plates and blocking indicated or required. Nailing strips in connection with metal work shall be bolted to metal. Wood nailing blocks for securing grounds shall be built into concrete, or masonry.
 2. Nailing schedule shall comply with CBC requirements.
 3. Treated wood nailing strips for lightweight insulated concrete roof decks at eaves, ridges, rakes, base of curbs and wherever else indicated, shall be provided and installed. Strips shall be treated Douglas fir, 4 inches (nominal) width by thickness of insulated concrete.
- D. Wood Backing: Provide wood backing as indicated and as required to receive plumbing, electrical fixtures and equipment, cabinets, door stop plates and other fixed equipment.

3.03 CLEAN UP

- A. Remove rubbish, debris and waste materials and legally dispose of off the Project site.

3.04 PROTECTION

- A. Protect the Work of this section until Substantial Completion.



Department of Neighborhood Services and Public Safety
GOLETA TRAIN DEPOT PROJECT

END OF SECTION



SECTION 06 20 00

FINISH CARPENTRY

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

1. Finish carpentry.

B. Related Requirements:

1. Division 01 - General Requirements.
2. Section 06 10 00: Rough Carpentry
3. Section 08 51 13: Aluminum Windows
4. Section 09 29 00: Gypsum Board.

1.02 SUBMITTALS

A. Shop Drawings: Submit Shop Drawings of each item of finish carpentry and millwork, indicating materials, dimensions, construction, and anchorage details.

B. LEED Submittals: Complete the LEED Material Buyout Form (MBoF) with all materials provided to the project. A complete submittal includes providing all material costs in the MBoF and all of the supporting documentation for the following credits:

1. MRc2 - Environmental Product Declarations (EPD): Provide Industry-Wide or Product-Specific EPD.
2. MRc3 - Sourcing of Raw Materials - Recycled Content: Provide product data for pre- and post- consumer recycled content.
3. MRc3 - Sourcing of Raw Materials – Forestry Stewardship Council (FSC) Certified Wood: For all wood products designated in this specification as “FSC certified,” provide vendor invoices with the vendor’s Chain-of-Custody (COC) number and identify each FSC certified product on a line-item basis. If FSC wood products are modified off-site by an architectural woodworker or millworker, the woodworker must have an FSC COC number.
4. MRc3 - Local/ Regional Material: Provide product data confirming product manufactured and extracted within 100 miles of the project site. Only applicable for products that also contain recycled content or FSC certified wood.



5. MRc4 - Material Ingredients: Provide manufacturers Declare label, Health Product Declaration (HPD), Cradle to Cradle Certification, or Cradle to Cradle Health Product Certificate.
6. IEQc2 - Low-Emitting Materials – Interior Wet Applied Products: For paints, coatings, adhesives and sealants applied on site or used for laminating off-site, include product data indicating the VOC content (g/L) and testing certificates or third-party certification demonstrating compliance with California Department of Public Health (CDPH) v1.2-2017 emissions testing.

1.03 QUALITY ASSURANCE

A. Comply with the following as a minimum requirement:

1. Douglas fir finish lumber shall be manufactured and graded in accordance with WCLIB - Standard Grading and Dressing Rule No. 17.
2. Solid wood finish lumber shall be manufactured and graded in accordance with NHLA - Rules for the Measurement and Inspection of Hardwood.
3. Softwood Plywood: Plywood shall comply with APA - Product Standard PS 1. Plywood shall be grade marked by APA.
4. Products and installation shall comply with the North American Architectural Woodwork Standards (NAAWS) for the Grade or Grades specified.

B. Finish lumber shall be kiln-dried according to recognized methods for the thickness and species. Lumber one inch thick or less shall be dried to an average moisture content of not more than 13 percent. Lumber 1-1/4 inches to 2 inches in thickness shall be dried to an average moisture content of not more than 15 percent.

1.04 DELIVERY, STORAGE AND HANDLING

- A. Materials shall be delivered to the Project site in undamaged condition, stored in fully covered, well ventilated areas, and protected from extreme changes in temperature and humidity.
- B. Interior millwork and finish carpentry shall not be installed unless interior building temperature and humidity levels are within the ranges recommended by the manufacturer and/or recognized standards.

PART 2 - PRODUCTS

2.01 MATERIALS



- A. Douglas Fir: Paintable interior trims, solid lumber shelves, partitions, door frames and other concealed members of interior finish; NAAWS Economy Grade.
- B. Solid Hardwood: Wood trims, window trims, with polyurethane finish. White Oak, unless noted otherwise.
 - 1. Birch: NAAWS Custom Grade.
- C. Softwood Plywood: Except where otherwise specified, AWI Custom Grade, Douglas fir unless otherwise indicated.
- D. Hardwood Plywood: NAAWS Premium Grade, species as indicated.
- E. White Oak: Exterior millwork, except framing lumber, shall be clear heartwood white oak. Where installed in direct contact with earth or provided for exterior, install Foundation Grade.
- F. Interior Solid Wood Shiplap Boards:
 - 1. White Oak
 - 2. Size: 1 inch thick, 6 inch wide

2.02 LEED REQUIREMENTS

- A. IW/PS EPD: Products specified under this section must have either a Type III Product Specific EPD or the company must be listed in the industry group responsible for the Industry Wide Externally Verified EPD.
- B. PS EDP: Products specified under this section must have a Type III Product Specific EPD.
- C. HPDs: Products specified under this section must have one of the following unexpired material ingredient reports compliant with LEEDv4.1 requirements and declared to 1000 ppm or less: Declare label, Health Product Declaration (HPD), Cradle to Cradle Certification, Cradle to Cradle Health Product Certificate, or UL Product Lens Certification.
- D. FSC Certified Wood Products: Wood products shall be certified as "FSC 100%" or "FSC Mix Credit" or "FSC Recycled" according to FSC STD 40-004 v3-0 with proper chain of custody.
- E. Interior Wet Applied Products: All wet-applied on-site paints, coatings, adhesives, and sealants products provided under Part 2 of this specification section must be compliant with the VOC limits outlined under IEQc2: Low Emitting Materials in 01 81 13 Sustainable Design Requirements. In addition, all paints and coatings must be



compliant with CDPH Standard Method v1.2-2017 emissions testing with proper unexpired CDPH testing certificates or acceptable third-party certification.

2.03 FABRICATION

- F. The means of fastening various parts together shall be concealed in finished Work. Work which is curved shall be fabricated from solid stock, or if veneered, shall be bent to a uniform radius.

PART 3 - EXECUTION

3.01 GENERAL

- A. Interior and exterior wood, millwork, blocking, and lumber shall be installed level, plumb, and true to line. Members shall be neatly and accurately scribed in place, maintaining full widths of end members, wherever possible. Trim shall be installed in full lengths, without piecing, except where use of single lengths is not required. Butt joints, if necessary, shall be beveled. Exterior angles shall be mitered, and interior angles of molding parts coped. Nails shall be set for putty. Grain and color of adjoining interior finish shall match adjacent finishes. Where Work specified in this section adjoins other Work, provide a neat tight joint.
- B. Interior and exterior finish carpentry and other fixed wooden equipment having hammer marks or other visible damage will be deemed defective Work.
- C. Staff or brick moulds of exterior wood doorframes shall be attached to frames after frames have been set and caulked. Moulds shall be mitered at corners and coped to sills, accurately secured in place with finish nails, and nails set.

3.02 INSTALLATION

- A. Install Work of this section as specified in the North American Architectural Woodwork Standards.
- B. Wood shoe base shall be fitted and temporarily tacked in place until floor covering is installed. Provide and install corner fillets, same contour and materials as shoe base, in corners where shoe base is installed.
- C. Platform Front: Plywood at platform front and adjoining steps in Multi-Purpose Building shall be provided with face veneers of unselect birch. Trim and frames shall match face veneer of panels. Joints shall be V-shaped where indicated.
- D. Door Frames: Frames shall be installed plumb and true, solidly blocked, reinforced for butts and hardware, and shall be fastened to structural frame with 16d set finish nails



at not more than 24 inches on centers. Nails securing exterior door and window frames shall be cement coated. Doorframes shall be dadoed together at the head.

- E. Sealing of Joints: Joints between exterior frames and adjoining surfaces shall be primed before sealing.

3.03 CLEAN UP

- A. Remove debris, rubbish and waste material and legally dispose of off the Project site.

3.04 PROTECTION

- A. Protect the Work of this section until Substantial Completion.

END OF SECTION



SECTION 06 61 00

FIBERGLASS FABRICATIONS

PART 1 - GENERAL

1.01 SUMMARY

- A. The CONTRACTOR shall furnish, fabricate, and install all fiberglass items including gratings, with all appurtenances, accessories and incidentals necessary to produce a complete, operable and serviceable installation as shown on the Contract Drawings and as specified herein, and in accordance with the requirements of the Contract Documents.

1.02 REFERENCES

- A. The publications listed below (latest revision applicable) form a part of this specification to the extent referenced herein. The publications are referred to within the text by the designation only.

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM) Test Methods:

1. ASTM D 635 Rate of Burning and/or Extent and Time of Burning of Self-Supporting Plastics in a Horizontal Position
2. ASTM E 84 Surface Burning Characteristics of Building Materials

1.03 CONTRACTOR SUBMITTALS

- A. The CONTRACTOR shall furnish shop drawings of all fabricated gratings and accessories in accordance with the provisions of this Section.
- B. The CONTRACTOR shall furnish manufacturer's shop drawings clearly showing material sizes, types, styles, part or catalog numbers, complete details for the fabrication and erection of components including, but not limited to, location, lengths, type and sizes of fasteners, clip angles, member sizes, and connection details.
- C. The CONTRACTOR shall submit the manufacturer's published literature including structural design data, structural properties data, grating load/deflection tables, corrosion resistance tables, certificates of compliance, test reports as applicable, concrete anchor systems and their allowable load tables, and design calculations for systems not sized or designed in the contract documents.
- D. The CONTRACTOR may be requested to submit sample pieces of each item specified



herein for acceptance by the ENGINEER as to quality and color. Sample pieces shall be manufactured by the method to be used in the WORK.

1.04 QUALITY ASSURANCE

- A. All items to be provided under this Section shall be furnished only by manufacturers having a minimum of ten (10) years experience in the design and manufacture of similar products and systems. Additionally, if requested, a record of at least five (5) previous, separate, similar successful installations in the last five (5) years shall be provided.
- B. Manufacturer shall offer a 3 year limited warranty on all FIBERGLASS products against defects in materials and workmanship.
- C. Manufacturer shall be certified to the ISO 9001-2008 standard.
- D. Manufacturer shall provide proof of certification from at least two other quality assurance programs for its facilities or products (UL, DNV, ABS, USCG, AARR).

1.05 PRODUCT DELIVERY AND STORAGE

- A. **Delivery of Materials:** Manufactured materials shall be delivered in original, unbroken pallets, packages, containers, or bundles bearing the label of the manufacturer. Adhesives, resins and their catalysts and hardeners shall be crated or boxed separately and noted as such to facilitate their movement to a dry indoor storage facility.
- B. **Storage of Products:** All materials shall be carefully handled to prevent them from abrasion, cracking, chipping, twisting, other deformations, and other types of damage. Adhesives, resins and their catalysts are to be stored in dry indoor storage facilities between 70 and 85 degrees Fahrenheit (21 to 29 degrees Celsius) until they are required.

PART 2 - PRODUCTS

2.01 MANUFACTURER

- A. **Basis of Design:** Floor Grating shall be 1-1/2 Inch Pultruded Wide T-Bar, MS-WT-1810 as manufactured by:

McNichols Grating Products

14108 Arbor Place

Cerritos, CA 90703-2402

(877) 520-0655 (562) 921-1015 (Fax)

Website: www.mcnichols.com



2.02 GENERAL

- A. All FIBERGLASS items furnished under this Section shall be composed of fiberglass reinforcement and resin in qualities, quantities, properties, arrangements and dimensions as necessary to meet the design requirements and dimensions as specified in the Contract Documents.
- B. Fiberglass reinforcement shall be continuous roving in sufficient quantities as needed by the application and/or physical properties required.
- C. Resin shall be Vinyl Ester, Polyester, with chemical formulations as necessary to provide the corrosion resistance, strength and other physical properties as required.
- D. All finished surfaces of FIBERGLASS items and fabrications shall be smooth, resin-rich, free of voids and without dry spots, cracks, crazes or unreinforced areas. All glass fibers shall be well covered with resin to protect against their exposure due to wear or weathering.
- E. All grating products shall have a tested flame spread rating of 25 or less per ASTM E-84 Tunnel Test. Gratings shall also have tested burn time of less than 30 seconds and an extent of burn rate of less than or equal to 10 millimeters per ASTM D635.
- F. All mechanical grating clips shall be manufactured of Type 316SS (stainless steel).

2.03 MOLDED FIBERGLASS GRATING

- A. **Manufacture:** Grating shall be of a one piece molded construction with tops and bottoms of bearing bars and cross bars in the same plane. Grating shall have a square mesh pattern providing bidirectional strength. Grating shall be reinforced with continuous rovings of equal number of layers in each direction. The top layer of reinforcement shall be no more than 1/8" below the top surface of the grating so as to provide maximum stiffness and prevent resin chipping of unreinforced surfaces. Percentage of glass (by weight) shall not exceed 35% so as to achieve maximum corrosion resistance, and as required to maintain the structural requirements of the CONTRACT.

After molding, no dry glass fibers shall be visible on any surface of bearing bars or cross bars. All bars shall be smooth and uniform with no evidence of fiber orientation irregularities, interlaminar voids, porosity, resin rich or resin starved areas.

- B. **Non-slip surfacing:** Grating shall be manufactured with a medium grit top surface.
- C. Bar intersections of full depth bars are to be filleted to a minimum radius of 1/16" to eliminate local stress concentrations and the possibility of resin cracking at these locations. Intersections of secondary, partial depth bars do not require a fillet.



- D. Fire rating: Grating shall be fire retardant with a tested flame spread rating of 25 or less when tested in accordance with ASTM E 84. Certifications shall be dated within the past two years and test data performed only on the resin shall not be acceptable.
- E. Color: As indicated in drawings or as selected by Architect.
- F. Depth: 1-1/2" with a tolerance of plus or minus 1/16

2.04 GRATING FABRICATION

- A. Measurements: Grating supplied shall meet the dimensional requirements and tolerances as shown or specified. The Contractor shall provide and/or verify measurements in field for work fabricated to fit field conditions as required by grating manufacturer to complete the work. When field dimensions are not required, contractor shall determine correct size and locations of required holes or cutouts from field dimensions before grating fabrication.
- B. Layout: Each grating section shall be readily removable, except where indicated on drawings. Manufacturer to provide openings and holes where located on the contract drawings. Grating openings which fit around protrusions (pipes, cables, machinery, etc.) shall be discontinuous at approximately the centerline of opening so each section of grating is readily removable.
- C. Sealing: All shop fabricated grating cuts shall be sealed to provide maximum corrosion resistance. All field fabricated grating cuts shall be coated similarly by the contractor in accordance with the manufacturer's instructions.
- D. Hardware: For panels installed on structural members, Type 316 stainless steel hold-down clips shall be provided, with a minimum of four per piece of grating, or as recommended by the manufacturer.

PART 3 - EXECUTION

3.01 INSPECTION

- A. Shop inspection is authorized as required by the Owner and shall be at Owner's expense. The fabricator shall give ample notice to Contractor prior to the beginning of any fabrication work so that inspection may be provided. The grating shall be as free, as commercially possible, from visual defects such as foreign inclusions, delamination, blisters, resin burns, air bubbles and pits. The surface shall have a smooth finish (except for grit top surfaces).

3.02 INSTALLATION



- A. Contractor shall install gratings in accordance with manufacturer's assembly drawings. Panels are to be supported with grating legs in each corner or other equivalent support mechanism. Lock grating panels securely in place with hold-down fasteners or as specified herein. Field cut and drill fiberglass reinforced plastic products with carbide or diamond tipped bits and blades. Seal cut or drilled surfaces in accordance with manufacturer's instructions. Follow manufacturer's instructions when cutting or drilling fiberglass products or using resin products; provide adequate ventilation.

END OF SECTION



SECTION 07 21 00 THERMAL INSULATION

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

1. Thermal batt insulation for exterior walls and under roof decks.

B. Related Requirements:

1. Division 01 - General Requirements.
2. Section 05 30 00 - Metal Decking.
3. Section 05 41 00 - Structural Metal Stud Framing.
4. Section 09 22 16 - Non-Structural Metal Framing.
5. Section 09 24 23 – Portland Cement Plaster.

1.02 SUBMITTALS

A. Product Data:

1. Material List: Provide a list of materials for installation under this section.
2. Provide manufacturer's printed Product Data for each type insulation and accessory.

B. Manufacturer's Instructions: Submit manufacturer's printed installation instructions.

C. Certification: Provide certification that insulation materials conform to requirements of CBC Chapter 26.

D. Recycled Content: Provide certification that insulation materials contain a minimum 30 percent recycled materials.

E. LEED Submittals: Complete the LEED Material Buyout Form (MBoF) with all materials provided to the project. A complete submittal includes providing all material costs in the MBoF and all of the supporting documentation for the following credits:

1. MRc2 - Environmental Product Declarations (EPD): Provide Industry-Wide or Product-Specific EPD.
2. MRc3 - Sourcing of Raw Materials - Recycled Content: Provide product data for pre- and post- consumer recycled content.
3. MRc4 - Material Ingredients: Provide manufacturers Declare label, Health Product Declaration (HPD), Cradle to Cradle Certification, or Cradle to Cradle Health Product Certificate.
4. IEQc2 - Low-Emitting Materials – Interior Wet Applied Products: For paints, coatings, adhesives and sealants applied on site or used for laminating off-site,



- include product data indicating the VOC content (g/L) and testing certificates or third-party certification demonstrating compliance with California Department of Public Health (CDPH) v1.2-2017 emissions testing.
5. IEQc2 - Low-Emitting Materials –Thermal Insulation: Provide testing certificates or third-party certification demonstrating compliance with CDPH v1.2-2017 emissions testing.

1.03 QUALITY ASSURANCE

- A. Surface Burning Characteristics: Flame spread rating shall not exceed 25 and smoke density shall not exceed 50 when tested in accordance with ASTM E84.
- B. Combustion Characteristics: Rated as non-combustible when tested in accordance with ASTM E136.
- C. Comply with following as a minimum requirement:
1. ASTM C209 – Standard Test Methods for Cellulosic Fiber Insulating Board.
 2. ASTM C553: Specification for Mineral Fiber Blanket Thermal Insulation for Commercial and Industrial Applications.
 3. ASTM C578: Specification for Rigid, Cellular Polystyrene Thermal Insulation.
 4. ASTM C1363 - Standard Test Method for Thermal Performance of Building Materials and Envelope Assemblies by Means of a Hot Box Apparatus.
 5. ASTM D1621 – Standard Test Method for Compressive Properties of Rigid Cellular Plastics.
 6. ASTM D1622 – Standard Test Method for Apparent Density of Rigid Cellular Plastics.
 7. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
 8. ASTM E 136 - Standard Test Method for Behavior of Materials in a Vertical Tube Furnace at 750 degrees C.
- D. CHP Low-Emitting Materials Table: Materials submitted for building insulation must be listed as low emitting on the CHPS website, www.CHPS.net, or must be tested by an independent laboratory to meet CHPS requirements. Components of an assembly must meet CHPS requirements individually or in an assembly.

1.04 DELIVERY, STORAGE AND HANDLING

- A. Deliver materials to Project site and store in a safe, dry place, with labels intact and legible at time of installation.
- B. Protect building insulation materials from damage.

1.05 PROJECT CONDITIONS

- A. Avoid exposure to humidity and moisture. Protect from exposure to sunlight.



PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Owens Corning.
- B. Johns Manville.
- C. CertainTeed Corporation.
- D. The DOW Chemical Company.
- E. Hunter Panels
- F. DiversiFoam Products.
- G. Equal.

2.02 MATERIALS

A. General:

- 1. Provide Unfaced, friction-fit batt insulation where both sides of installation are enclosed.
- 2. Provide batt insulation with integral vapor barrier when one side of installation will be unenclosed.
- 3. Provide batt insulation with integral vapor barrier where at least one side of installation will be exposed to high humidity, such as showers.
- 4. Recycled content shall be a minimum of 30 percent.

B. Mineral Fiber Batt Insulation:

- 1. Unfaced Mineral Fiber Batt Insulation: Provide friction-fit, unfaced mineral fiber batts. Insulation shall consist of mineral fibers, glass or slag, and thermosetting resins complying with ASTM C665, Type I.
- 2. Faced Mineral Fiber Batt Insulation: Provide mineral fiber batts with vapor barrier consisting of mineral fibers, glass or slag, and thermosetting resins complying with ASTM C665, Type III, Class A, with vapor-retardant membrane facing.
- 3. Fasteners for Attaching Insulation to Wood Framing:
 - a. For faced batt insulation provide one of following types of staples: Stainless steel, monel, or copper-coated steel, size as required by manufacturer or applicable code.
 - b. For unfaced batt insulation provide 18 gage, minimum, galvanized steel wire where required to maintain proper insulation placement.
- 4. Fasteners for Attaching Insulation to Underside of Metal Roof Decks:
 - a. Spindle Anchors: Stic-Klip Mfg. Co., Type A or B as required, with Type S adhesive; Miracle Adhesives Corp. "Miracle StukUps" with Type



HT994 adhesive; or Goodloe E. Moore Gemco or Tuff-Weld with G-P Improved or Tuff-Bond Quik-Set Type Adhesive as applicable; or equal. Provide adhesives of correct type for substrates and type of anchor.

- b. String Wires: Minimum 18 gage galvanized steel wire.

2.02 LEED REQUIREMENTS

- A. IW/PS EDP: Products specified under this section must have a Type III Product Specific EPD or the company must be listed in the industry group responsible for the Industry Wide Externally Verified EPD.
- B. PS EPD: Products specified under this section must have a Type III Product Specific EPD.
- C. HPDs: Products specified under this section must have one of the following unexpired material ingredient reports compliant with LEEDv4.1 requirements and declared to 1000 ppm or less: Declare label, Health Product Declaration (HPD), Cradle to Cradle Certification, Cradle to Cradle Health Product Certificate, or UL Product Lens Certification.
- D. Interior Wet Applied Products: All wet-applied on-site paints, coatings, adhesives, and sealants products provided under Part 2 of this specification section must be compliant with the VOC limits outlined under IEQc2: Low Emitting Materials in 01 81 13 Sustainable Design Requirements. In addition, all paints and coatings must be compliant with CDPH Standard Method v1.2-2017 emissions testing with proper unexpired CDPH testing certificates or acceptable third-party certification.
- E. Thermal Insulation: All thermal insulation products provided under this specification section must be compliant with CDPH Standard Method v1.2-2017 emissions testing with proper unexpired CDPH testing certificates or acceptable third-party certification.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine Work to verify suitability to receive insulation. Do not proceed until unsatisfactory conditions have been corrected.

3.02 INSTALLATION

- A. General:
 - 1. Fit batt insulation, of R-value indicated on Drawings, snugly between framing members.
 - 2. Maintain total insulation integrity over entire area to be insulated, including areas between closely spaced members.
 - 3. Extend full thickness insulation over entire area to be insulated. Furnish manufacturer's recommended clips to tightly fit batts at joints.



4. Cut and fit batt insulation tightly around pipes, conduits and penetrations.
5. Do not compress batt insulation in excess of 10 percent (R-19 may be installed in 2 by 6 stud walls).
6. Prevent batt insulation from sagging during and after installation by installing adequate wire.
7. Metal door and window frames in acoustically insulated walls shall be filled with insulation, unless otherwise indicated.
8. Where vapor barrier is provided, install with vapor barrier facing room.
 - a. Batts in Metal Framing: Provide friction-fit batts tightly fitted to stud webs and to metal furring.
 - b. Batts under Metal Roof Decks where underside of insulation will be exposed install foil-faced flanged-type insulation batts and staple flanges together at maximum 4-inch centers and seal joints at abutting vertical surfaces with a pressure-sensitive plastic tape. Where underside of insulation will be inaccessible, install secure with spindle anchors. Provide 18 gage galvanized string wires under batts wherever necessary to prevent sagging. Stretch wire taut.
 - c. Batts in Horizontal or Sloped Applications: Provide tightly stretched string wires along center of horizontal or sloping batts where support spacing exceed 16 inch on centers.
 - d. Batts in Ceiling Framing: Install batts between joists, so top of insulation is level with top of framing members. Do not install insulation over recessed lighting fixtures, speakers, or other heat producing elements in ceilings. At junction boxes, access panels, and other items requiring access from above or below ceiling, cut insulation on each side to fit item and install loosely on top. Fit insulation snugly around ducts, conduits, pipes, and other items projecting through ceiling construction.

B. Continuous Insulation:

1. Continuous insulation shall be installed in accordance to manufacturer instructions. Fasten the insulation board to the exterior face of the steel stud wall framing using preassembled screw/stress plate fasteners, of type and length as recommended by the manufacturer. Fastener spacing shall be 12" on center at the board perimeter and 16" on center in the field of the board.
2. Fasten insulation boards with corrosion resistant fasteners through sheathing into studs. Use 3/8 inch head roofing nails for wood studs, and self-drilling tapping screws for metal studs, or to "Z" channels, as applicable. Fastener penetration into studs shall be not less than 3/4 inch.
3. Stagger vertical joints at least one stud from adjacent courses.

3.03

PROTECTION



Department of Neighborhood Services and Public Safety
GOLETA TRAIN DEPOT PROJECT

- A. Protect Work of this section until Substantial Completion.

3.04 CLEANUP

- A. Remove rubbish, debris, and waste materials and legally dispose of off Project site.

END OF SECTION



SECTION 07 22 00
RIGID INSULATION

PART 1 - GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Roof and wall polyisocyanurate insulation.
- B. Related Requirements:
 - 1. Division 01 - General Requirements.
 - 2. Section 05 30 00 – Metal Decking.
 - 3. Section 05 31 13 – Roof Deck Ceiling.
 - 2. Section 06 10 00 - Rough Carpentry.
 - 3. Section 07 60 00 - Flashing and Sheet Metal.

1.02 REGULATORY REQUIREMENTS

- A. Comply with requirements of authorities having jurisdiction over the Work.

1.03 SUBMITTALS

- A. Shop Drawings: Submit roof plans and details. Include roof dimensions, drain and scupper locations, gutter locations, and the layout of insulation boards. Provide details indicating components, attachment and insulation thickness. Provide calculations indicating the average R-value for the system. Indicate drainage patterns and slopes required.
- B. Product Data: Submit manufacturer's data substantiating the insulation complies with specified requirements.
- C. Installation Instructions: Submit manufacturer's installation instructions.
- D. LEED Submittals: Complete the LEED Material Buyout Form (MBoF) with all materials provided to the project. A complete submittal includes providing all material costs in the MBoF and all of the supporting documentation for the following credits:
 - 1. MRc2 - Environmental Product Declarations (EPD): Provide Industry-Wide or Product-Specific EPD.
 - 2. MRc3 - Sourcing of Raw Materials - Recycled Content: Provide product data for pre- and post- consumer recycled content.



3. MRc4 - Material Ingredients: Provide manufacturers Declare label, Health Product Declaration (HPD), Cradle to Cradle Certification, or Cradle to Cradle Health Product Certificate.
4. IEQc2 - Low-Emitting Materials – Interior Wet Applied Products: For paints, coatings, adhesives and sealants applied on site or used for laminating off-site, include product data indicating the VOC content (g/L) and testing certificates or third-party certification demonstrating compliance with California Department of Public Health (CDPH) v1.2-2017 emissions testing.
5. IEQc2 - Low-Emitting Materials – Thermal Insulation: Provide testing certificates or third-party certification demonstrating compliance with CDPH v1.2-2017 emissions testing.

1.04 QUALITY ASSURANCE

- A. Comply with the following as a minimum requirement:
 1. ASTM C 1289 - Faced Rigid Cell Polyisocyanurate Thermal Insulation Board; Type II Class 1 Grade 2.
 2. Provide systems complying with requirements for FM Class 1.
 3. Provide systems complying with requirements for UL Class A.
 4. Achieve a minimum thermal resistance value of R-7 for re-roofing projects, unless noted otherwise.
 5. UL 2818 Green Guard Gold certification. Gold Standard for Chemical Emissions for Building Materials.
- B. Installer Qualifications: Minimum five years experience installing specified type of insulation under roofing systems, and certified by the insulation manufacturer to install the Work of this section.
- C. Pre-installation Meetings: In accordance with related Division 01 sections, conduct a pre-installation meeting on the Project site.

1.05 DELIVERY, STORAGE AND HANDLING

- A. Deliver materials in manufacturer's original sealed and labeled containers.
- B. Avoid exposure to sunlight and the elements.
- C. Handle materials in a manner to avoid damage or contamination with moisture or foreign matter.

1.06 PROJECT CONDITIONS

- A. Environmental requirements:
 1. Install products in strict accordance with manufacturer's recommendations.



2. Do not install any materials when water in any form is present on the deck or materials are wet. Do not install any materials if precipitation is forecast and partially completed Work will be left unprotected.
3. Do not install the Work of this section if the temperature of the roof deck is below 40 degrees F.

PART 2 - PRODUCTS

2.01 GENERAL

A. Insulation: Rigid polyisocyanurate insulation, with specially formulated organic/inorganic facers as manufactured by:

1. Hunter Panels
2. Dyplast Products.
3. Celotex Insulation.
4. GAFTEMP.
5. Sarnatherm (Atlas ACII).
6. Equal.

2.02 DESCRIPTION

- A. Tapered Roof insulation shall provide minimum per foot slope and provide minimum insulation values as indicated on drawings.
- B. Roof and Deck insulation shall consist of polyisocyanurate foam panels, chemically bonded during the foaming process to special organic/inorganic facers on the top and bottom surfaces, and shall conform to the following:

<u>PROPERTIES</u>	<u>TEST METHOD</u>	<u>VALUE</u>
Compressive Strength	ASTM D 1621	20PSI min.
Dimensional Stability (Thermal and Humid Aging)	ASTM D 2126 (-4 degrees F, amb RH) (158 degrees F, 97 percent RH) (200 degrees F, ambient RH)	Less than 2 percent linear change Less than 2 percent Linear change Less than 2 percent linear change
Flexural Strength (Modulus of Rupture) (Break load)	ASTM C 203	40 PSI min. 17 PSI min.
Tensile Strength (Perpendicular to surface)	ASTM C 203	500 PSF min.



Water Absorption	ASTM C 209	
Water Vapor Transmission	ASTM E 96	
Core Foam Flame Spread	ASTM E 84	

2.02 LEED REQUIREMENTS

- A. IW/PS EDP: Products specified under this section must have a Type III Product Specific EPD or the company must be listed in the industry group responsible for the Industry Wide Externally Verified EPD.
- B. PS EPD: Products specified under this section must have a Type III Product Specific EPD.
- C. HPDs: Products specified under this section must have one of the following unexpired material ingredient reports compliant with LEEDv4.1 requirements and declared to 1000 ppm or less: Declare label, Health Product Declaration (HPD), Cradle to Cradle Certification, Cradle to Cradle Health Product Certificate, or UL Product Lens Certification.
- D. Interior Wet Applied Products: All wet-applied on-site paints, coatings, adhesives, and sealants products provided under Part 2 of this specification section must be compliant with the VOC limits outlined under IEQc2: Low Emitting Materials in 01 81 13 Sustainable Design Requirements. In addition, all paints and coatings must be compliant with CDPH Standard Method v1.2-2017 emissions testing with proper unexpired CDPH testing certificates or acceptable third-party certification.
- E. Thermal Insulation: All thermal insulation products provided under this specification section must be compliant with CDPH Standard Method v1.2-2017 emissions testing with proper unexpired CDPH testing certificates or acceptable third-party certification.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Verify suitability of substrates to receive the Work. Do not proceed until unsatisfactory conditions have been corrected.
- B. Verify suitability of related Work such as the following:
 - 1. Roof drains and scuppers are properly installed.
 - 2. Roof curbs, nailers, equipment supports, vents, and other items penetrating the roof are of the proper height, properly prepared and fastened to the substrate.
 - 3. Concrete surface are sufficiently dry, free from extremes in pH, properly primed and free of fines, edges, or voids.

3.02 INSULATION APPLICATION

- A. General:



1. Install the Roof and Deck insulation in accordance with the manufacturer's recommendations and to provide the R values indicated. Butt the panels snugly together.
 2. Start boards from either the roof drain or the high point depending on the insulation system. Stencil direction of slope on each board. Stagger joints of underlayment boards from insulation boards.
 3. Cut valleys and hips. Field cut crickets from insulation boards. Install valleys, hips, and crickets as required for R values and drainage.
- B. Roofing Systems: Fasten insulation with a method recommended by the manufacturer. Method of attachment shall provide a minimum FM I-90 Wind Uplift Rating.

3.03 PROTECTION

- A. Protect the Work of this section until Substantial Completion.

3.04 CLEANUP

- A. Remove rubbish, debris, and waste materials and legally dispose of off the Project site.

END OF SECTION



SECTION 07 26 00

VAPOR BARRIERS

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

1. Vapor barrier and accessories for installation under concrete slabs.

B. Related Requirements:

1. Division 01 - General Requirements.
2. Section 03 30 00: Cast-in-Place Concrete.
3. Division 09: Finishes; Flooring Sections.

1.02 REFERENCES

A. American Concrete Institute (ACI) Publication:

1. ACI 302.2R - Guide for Concrete Slabs that Receive Moisture-Sensitive Flooring Materials.

B. ASTM International (ASTM):

1. ASTM D882 - Standard Test Method for Tensile Properties of Thin Plastic Sheeting.
2. ASTM D1709 - Standard Test Methods of Impact Resistance of Plastic Film by the Free-Falling Dart Method.
3. ASTM E154 Standard Test Methods for Water Vapor Retarders Used in Contact with Earth under Concrete Slabs.
4. ASTM E1643 - Selection, Design, Installation, and Inspection of Water Vapor Retarders Used in Contact with Earth or Granular Fill under Concrete Slabs.
5. ASTM E1745 - Standard Specification for Plastic Water Vapor Retarders Used in Contact with Soil or Granular Fill under Concrete Slabs.

1.03 SUBMITTALS

A. Product Data: Submit manufacturer's product data and installation instructions for vapor barrier and accessories.

B. Samples:

1. 12 inch by 12 inch vapor barrier samples.



2. Pressure-Sensitive Tape: 12 inch long sample.
- C. Test Reports: Conducted by nationally recognized independent testing agency indicating conformance with specified performance requirements.

1.04 QUALITY ASSURANCE

- A. ASTM tests referenced in this Section shall be performed on a single production roll per ASTM E1745 Section 8.1. Submit third party documentation certifying this requirement.
- B. Pre-Installation Conference: CONTRACTOR shall coordinate and conduct pre-installation conference in accordance to Section 01 31 19, Project Meetings, to review the progress of construction activities and preparations for the installation of vapor barrier.

1.04 DELIVERY, STORAGE AND HANDLING

- A. Deliver, store, handle and protect in accordance with manufacturer's instructions and recommendations.
- B. Deliver materials in manufacturer's packaging with labels intact.
- C. Store materials in a clean and dry area.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Multi-layer plastic extrusion manufactured with high grade prime, virgin, polyolefin resins. Thickness shall be 15 mils minimum.
 1. Stego Wrap by Stego Industries LLC.
 2. Perminator by W.R. Meadows.
 3. Ecoshield-E by Epro.
 4. Husky Yellow Guard by Poly-America.
 5. Equal.
- B. Physical Properties:
 1. Maintain permeance of less than 0.01 Perms [grains/(ft² · hr · inHg)] as tested in accordance with mandatory conditioning tests per ASTM E1745 Section 7.1 (7.1.1-7.1.5).
 2. Class Rating per ASTM E1745: Class A.
 3. Puncture resistance per ASTM D1709: 2200 g or higher.
 4. Provide third party documentation that all testing was performed on a single production roll per ASTM E1745 Section 8.1



- C. Accessories: Provide manufacturer recommended accessories for seams, penetrations and perimeter edges, including tapes, mastics, termination for a complete vapor barrier installation per ASTM E1643.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Verification of Conditions: Examine subsoil and notify OAR of deficiencies detrimental to proper vapor barrier installation; do not proceed until corrected.

3.02 INSTALLATION

- A. Install vapor barrier in accordance ASTM E1643 and manufacturer's instructions.
 - 1. Unroll vapor barrier with the longest dimension parallel with the direction of the concrete placement and face laps away from the expected direction of the placement whenever possible.
 - 2. Extend vapor barrier to the perimeter of the slab. If practicable, terminate it at the top of the slab, otherwise, where obstructed by impediments, such as dowels, waterstops, or any other site condition requiring early termination of the vapor barrier. At the point of termination, seal vapor barrier to the foundation wall, grade beam or slab itself using manufacturer ASTM E1643 compliant accessory designed to adhere to concrete. Seam tape shall not be used for sealing the vapor barrier to the foundation wall, grade beam or slab.
 - 3. Overlap joints 6 inches and seal with manufacturer's seam tape.
 - 4. Seal vapor barrier penetrations per manufacturer's instructions.
 - 5. Avoid the use of non-permanent stakes driven through the vapor barrier.
- B. Prior to concrete placement inspect vapor barrier for damage. Clean damaged areas and with vapor barrier material cut a minimum 6 inches larger than damaged area on all sides. Seal to main vapor barrier with continuous seam tape.

3.03 CLEAN UP

- A. Remove rubbish, debris and waste materials and legally dispose of off the Project site.

3.04 PROTECTION

- A. Protect the Work of this section until Substantial Completion.

END OF SECTION



SECTION 07 31 13

ASPHALT SHINGLES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Granule surfaced asphalt shingle roofing.
- B. Moisture shedding underlayment, eaves, valley and ridge protection
- C. Associated metal flashing

1.02 RELATED SECTIONS

- A. Section 06 10 00 – Rough Carpentry: Plywood Roof Sheathing
- B. Section 07 26 00 – Vapor Retarders
- C. Section 07 60 00 – Flashing and Sheet Metal.

1.03 REFERENCES

- A. ASTM A 653/A 653M – Standard Specification for Steel Sheets, Zinc-Coated (Galvanized) or Zinc-Iron-Alloy-Coated (Galvannealed) by the Hot-Dip Process
- B. ASTM B 209 – Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate
- C. ASTM B 370 – Standard Specification for Copper Sheet and Strip for Building Construction
- D. ASTM D 225 – Standard Specification for Asphalt Shingles (Organic Felt) Surfaced with Mineral Granules
- E. ASTM D 226 – Standard Specification for Asphalt-Saturated Organic Felt used in Roofing and Waterproofing
- F. ASTM D 1970 – Standard Specification for Self-Adhering Polymer Modified Bituminous Sheet Materials used as Steep Roofing Underlayment for Ice Dam Protection



- G. ASTM D 3018 – Standard Specification for Class A Shingles Surfaced with Mineral Granules
- H. ASTM D 3161 – Standard Test Method for Wind Resistance of Asphalt Shingles (Fan-Induced Method)
- I. ASTM D 3462 – Standard Specification for Asphalt Shingles Made from Glass Felt and Surfaced with Mineral Granules
- J. ASTM D 4586 – Standard Specification for Asphalt Roof Cement, Asbestos-Free
- K. ASTM D 4869 – Standard Specification for Asphalt-Saturated Organic Felt Shingle Underlayment used in Roofing
- L. ASTM D 6757 – Standard Specification for Inorganic Underlayment for use with Steep Slope Roofing Products
- M. ASTM E 108 – Standard Test Methods for Fire Test of Roof Coverings
- N. ASTM G 21 – Determining Resistance of Synthetic Polymers to Fungi

1.04 SUBMITTALS

- A. Submit under provisions of Section 01 30 00.
- B. Product Data: Provide manufacturer's printed product information indicating material characteristics, performance criteria and product limitations.
- C. Manufacturer's Installation Instructions: Provide published instructions that indicate preparation required and installation procedures.
- D. Certificate of Compliance: Provide Certificate of Compliance from an independent laboratory indicating that the asphalt fiberglass shingles made in normal production meet or exceed the requirements of the following:
 - 1. ASTM E 108/UL 790 Class A Fire Resistance
 - 2. ASTM D 3161/UL 997 Wind Resistance.
 - 3. ASTM D 3462
- E. Shop Drawings: Indicate specially configured metal flashing, jointing methods and locations, fastening methods and locations and installation details as required by project conditions indicated.
- F. LEED Submittals: Complete the LEED Material Buyout Form (MBoF) with all



materials provided to the project. A complete submittal includes providing all material costs in the MBoF and all of the supporting documentation for the following credits:

1. MRc2 - Environmental Product Declarations (EPD): Provide Industry Wide or Product-Specific EPD.
2. MRc3 - Sourcing of Raw Materials - Recycled Content: Provide product data for pre- and post- consumer recycled content.
3. MRc4 - Material Ingredients: Provide manufacturers Declare label, Health Product Declaration (HPD), Cradle to Cradle Certification, or Cradle to Cradle Health Product Certificate.
4. IEQc2 - Low-Emitting Materials – Interior Wet Applied Products: For paints, coatings, adhesives and sealants applied on site or used for laminating off-site, include product data indicating the VOC content (g/L) and testing certificates or third-party certification demonstrating compliance with California Department of Public Health (CDPH) v1.2-2017 emissions testing.

1.05 QUALITY ASSURANCE

- A. Installer Minimum Qualifications: Installer shall be licensed or otherwise authorized by all federal, state and local authorities to install all products specified in this section. Installer shall perform work in accordance with NRCA Roofing and Waterproofing Manual. Work shall be acceptable to the synthetic slate roof tile manufacturer.
- B. Mock-Up: Provide a mock-up for evaluation of surface preparation techniques and application workmanship.
 1. Finish areas designated by Architect
 2. Do not proceed with remaining work until workmanship, color and pattern are approved by Architect.
 3. Rework mock-up area as required to produce acceptable work.
- C. Pre-Installation Meeting – Conduct a pre-installation meeting at the site prior to commencing work of this section: Require attendance of entities directly concerned with roof installation.

Agenda will include:

1. Installation procedures and manufacturer's recommendations
2. Safety procedures
3. Coordination with installation of other work
4. Availability of roofing materials.



5. Preparation and approval of substrate and penetrations through roof.
6. Other items related to successful execution of work

- D. Maintain one copy of manufacturers application instructions on the project site.
- E. Verify that manufacturer's label contains references to specified ASTM standards

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Store Products in manufacturer's unopened packaging until ready for installation.
- B. Store and dispose of solvent-based materials and materials used with solvent based materials, in accordance with requirements of local authorities having jurisdiction.
- C. Deliver shingles to site in manufacturer's unopened labeled bundles. Promptly verify quantities and conditions. Immediately remove damaged products from site.

1.07 PROJECT CONDITIONS

- A. Anticipate and observe environmental conditions (temperature, humidity and moisture) within limits recommended by manufacturer for optimum results. Do not install products under environment conditions outside manufacturer's absolute limits.
- B. Extra Material – Furnish under provision of section 01 70 00
- C. Provide 10 square feet of extra shingles of each color specified.

1.08 WARRANTY

- A. Manufacturer's Warranty: Furnish shingle manufacturer's warranty for the product listed below:
 1. CertainTeed Grand Manor: Lifetime limited warranty.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Basis of Design: Provide products manufactured by the CertainTeed Corporation. Contact Sales Support Group, P.O. Box 860, Valley Forge, PA 19482, Toll Free 800-233-8990
- B. Or approved Equal.



2.02 ASPHALT FIBERGLASS SHINGLES

- A. CertainTeed Grand Manor Shingles: Conforming to ASTM D 3018 Type I – Self-Sealing; UL Certification of ASTM D 3462, ASTM D 3161 Class “F” (110-mph) /UL997 Wind Resistance and UL Class A Fire Resistance; glass fiber mat base; ceramically colored/UV resistant mineral surface granules across the entire face of the shingle; algae-resistant; full two layer laminated four tab shingle, plus additional random tabs
 - 1. Weight: 425 pounds per square (100 square feet)
 - 2. Color: As selected by Architect from manufacturer's standards.

2.03 SHEET MATERIALS

- A. Underlayment: ASTM D 4869, Asphalt saturated felt.
- B. Underlayment: ASTM D 226, Asphalt saturated felt (non-perforated).

2.04 FLASHING MATERIALS

- A. Sheet Flashing: ASTM A 361/A361M; 26 Gauge (0.45 mm) steel with minimum G115/Z350 galvanized coating
- B. Paint: Color as selected by Architect to coordinate with shingle color.

2.05 ACCESSORIES

- A. Nails: Standard round wire type roofing nails, corrosion resistant; hot dipped zinc coated steel, aluminum or chromated steel; minimum 3.8 inch (9.5mm) head diameter; minimum 11 or 12 gage (2.5mm) shank diameter; shank to be sufficient length to penetrate through the roof sheathing or $\frac{3}{4}$ inch (19mm) into solid wood, plywood or non-veneer wood decking.
- B. Asphalt Roofing Cement: ASTM D 4586, Type I or II

2.06 FLASHING FABRICATION

- A. Form flashing to profiles indicated on Drawings and to protect roofing materials from physical damage and shed water.
- B. Form sections square and accurate to profile, in maximum possible lengths, free from distortion or defects detrimental to appearance or performance.



PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify existing site conditions under provisions of Section 01 70 00.
- B. Verify that roof penetrations and plumbing stacks are in place and flashed to deck surfaces.
- C. Verify deck surfaces are dry and free of ridges, warps or voids.

3.02 ROOF DECK PREPARATION

- A. Follow shingle manufacturer's recommendations for acceptable roof deck material.
- B. Broom clean deck surfaces under eave protection and underlayment prior to their application.

3.03 INSTALLATION – PROTECTIVE UNDERLAYMENT

- A. Roof Slopes 4:12 or Greater: Install one layer of asphalt felt shingle underlayment perpendicular to slope of roof and lap minimum 4 inches (100 mm) over eave protection.
- B. Weather-lap and seal watertight with asphalt roofing cement items projecting through or mounted on roof.

3.05 INSTALLATION – METAL FLASHING

- A. Weather-lap joints minimum 2 inches (50 mm).
- B. Seal work projecting through or mounted on roof with asphalt roofing cement and make weather tight.

3.06 INSTALLATION – ASPHALT SHINGLES

- A. Install shingles in accordance with manufacturer's instructions for product type and application specified.

3.07 FIELD QUALITY CONTROL

- A. Visual inspection of the work will be provided by Owner. If conditions are unacceptable, Owner will notify the Architect.

3.08 PROTECTION OF FINISHED WORK



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GOLETA TRAIN DEPOT PROJECT

- A. Do not permit traffic over finished roof surface.

END OF SECTION

SECTION 07 42 43
COMPOSITE WALL PANELS

PART 1 - GENERAL

1.01 SECTION INCLUDES:

- A. Exterior, panelized fiber cement cladding system and accessories to complete a drained and back-ventilated rainscreen.
- B. Interior fiber cement panelized cladding system and accessories.

1.02 RELATED SECTIONS

- A. Section 05 41 00 - Structural Metal Stud Framing
- B. Section 06 10 00 - Rough Carpentry
- D. Section 07 20 00 - Thermal Protection
- E. Section 07 26 00 - Weather Barriers
- F. Section 07 60 00 - Flashing and Sheet Metal
- G. Section 07 92 00 - Joint Protection

1.03 REFERENCES

- A. American Architectural Manufacturers Association (AAMA):
 - 1. AAMA 509-14 – Voluntary Test and Classification Method of Drained and Back Ventilated Rain Screen Wall Cladding Systems
- B. ASTM International (ASTM):
 - 1. ASTM C 518 - Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus.
 - 2. ASTM C 1185 - Standard Test Methods for Sampling and Testing Non-Asbestos Fiber Cement.
 - a. ASTM C 1186 – Standard Specification for Flat Fiber-Cement Sheets.
 - 3. ASTM E-84 - Standard Test for Surface Burning Characteristics of Building Materials.
 - 4. ASTM E 119 - Standard Test Methods for Fire Tests of Building Construction and Materials.
 - 5. ASTM E 228 - Standard Test Method for Linear Thermal Expansion of Solid Materials with a Vitreous Silica Dilatometer.
 - 6. ASTM E 330 - Standard Test Method for Structural Performance of Exterior Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference.

7. ASTM E 331 - Standard Test Method for Water Penetration of Exterior Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference.

C. Florida Building Code - Test Protocol HVHZ

1. Testing Application Standard (TAS) 202, 203 – HVHZ Test Procedures

D. National Fire Protection Association (NFPA):

1. NFPA 285 - Fire Test Method for Exterior Wall Assemblies Containing Combustible Material.

2. NFPA 268 – Ignition Resistance of Exterior Wall Assemblies.

E. Standards Council of Canada & Underwriters Laboratories Canada (ULC):

1. CAN/ULC S-102 – Standard Method of Test for Surface Burning Characteristics.

2. CAN/ULC S-134 – Standard Method of Fire Test of Exterior Wall Assembly.

1.04 SUBMITTALS

A. Submit under provisions of Section 01 33 00.

B. Product Data: Submit manufacturer’s product description, storage and handling requirements, and installation instructions.

C. Product Test Reports and Code Compliance: Documents demonstrating product compliance with local building code, such as test reports or Evaluation Reports from qualified, independent testing agencies.

D. Manufacturer’s Details: Submit drawings (.dwg, .rvt, and/or .pdf formats), including plans, sections, showing installation details that demonstrate product dimensions, edge/termination conditions/treatments, compression and control joints, corners, openings, and penetrations.

E. Samples: Submit samples of each product type proposed for use.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications:

1. All fiber cement panels specified in this section must be supplied by a manufacturer with a minimum of 10 years of experience in fabricating and supplying fiber cement cladding systems.

a. Products covered under this section are to be manufactured in an ISO 9001 certified facility.

2. Provide technical and design support as needed regarding installation requirements and warranty compliance provisions.

- B. Installer Qualifications: All products listed in this section are to be installed by a single installer trained by manufacturer or representative.
- C. Mock-Up Wall: Provide a mock-up wall as evaluation tool for product and installation workmanship.
- D. Pre-Installation Meetings: Prior to beginning installation, conduct conference to verify and discuss substrate conditions, manufacturer's installation instructions and warranty requirements, and project requirements.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Panels must be stored flat and kept dry before installation. A waterproof cover over panels and accessories should be used at all times prior to installation. Do not stack pallets more than two high. Refer to the information included on each pallet.
- B. If panels are exposed to water or water vapor prior to installation, allow to completely dry before installing. Failure to do so may result in panel shrinkage at ship lap joints, and such action may void warranty.
- C. Panels MUST be carried on edge. Do not carry or lift panels flat. Improper handling may cause cracking or panel damage.
- D. Direct contact between the panels and the ground should be avoided at all times. It is necessary to keep panels clean during installation process.

1.07 WARRANTY

- A. Provide manufacturer's 15-year warranty against manufactured defects in fiber cement panels. Additional 5-year extension available when refinished in year 14-15.
- B. Provide manufacturer's 15-year warranty against manufactured defects in panel finish.
- C. Warranty provides for the original purchaser. See warranty for detailed information on terms, conditions and limitations.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Acceptable Manufacturers:
 - 1. Basis of Design: Nichiha USA, Inc., 3150 Avondale Mill Rd, Macon, GA 301216, USA
- B. Products:

1. Nichiha VintageWood.
 - a. Profile colors: Bark, Cedar, Redwood, Ash, and Spruce.
 - b. Profiles: Wood plank texture with three, 3/8” grooves running lengthwise, spaced 5-5/8” apart.
 - c. Accessory/Component Options:
 - i. Manufactured Corners with 3-1/2” returns for each profile size and color.
 - ii. Aluminum trim options: As shown in drawings or as selected by Architect.
 1. Finish: As selected by Architect.
 - iii. Essential Flashing System: Starter, Overhang.
 1. Finish: Matte black.
 - d. Dimensions:
 1. As indicated in drawings.
 - e. Panel Thickness: 5/8".
 - f. Factory sealed on six 6 sides.
2. Nichiha Illumination Series.
 - a. Profile colors: Designer-specified custom color (finished in U.S.).
 - b. Profiles:
 1. As selected by Architect.
 - i. Do not pair the different sizes directly together.
 - c. Accessory/Component Options:
 - i. Manufactured Corners with 3-1/2” returns for each profile size and color.
 - ii. Aluminum trim options: As shown in drawings or as selected by Architect.
 1. Finish: As selected by Architect.
 - iii. Essential Flashing System: Starter, Overhang.
 1. Finish: Matte black.
 - d. Dimensions:
 1. As shown in drawings or as selected by Architect

- e. Panel Thickness: 5/8".
- f. Factory sealed on six 6 sides.

2.02 MATERIALS

- A. Fiber cement panels manufactured from a pressed, stamped, and autoclaved mix of Portland cement, fly ash, silica, recycled rejects, and wood fiber bundles.
- B. Panel surface pre-finished and machine applied.
- C. Panels profiled along 3030mm edges so that the long joints between the installed panels are ship-lapped.
- D. Factory-applied sealant gasket added to top panel edge; all 3030mm edge joints contain a factory sealant.

2.03 PERFORMANCE REQUIREMENTS:

- A. Fiber Cement Cladding – Must comply with ASTM C-1186, Type A, Grade II requirements:
 - 1. Wet Flexural Strength: Result: 1418 psi, Lower Limit: 1015 psi.
 - 2. Water Tightness: No water droplets observed on any specimen.
 - 3. Freeze-thaw: No damage or defects observed.
 - 4. Warm Water: No evidence of cracking, delamination, swelling, or other defects observed.
 - 5. Heat-Rain: No crazing, cracking, or other deleterious effects, surface or joint changes observed in any specimen.
- B. Mean Coefficient of Linear Thermal Expansion (ASTM E-228): Max 1.0×10^{-5} in./in. F.
- C. Surface Burning (CAN-ULC S102/ASTM E-84): Flame Spread: 0, Smoke Developed: 0.
- D. Wind Load (ASTM E-330): Contact manufacturer for ultimate test pressure data corresponding to framing type, dimensions, fastener type, and attachment clips. Project engineer(s) must determine Zone 4 and 5 design pressures based on project specifics.
 - 1. Minimum lateral deflection: L/120.
- E. Water Penetration (ASTM E-331): No water leakage observed into wall cavity.
- F. Steady-State Heat Flux and Thermal Transmission Properties Test (ASTM C-518): 16mm thick panel thermal resistance R Value of 0.47.

- G. Fire Resistant (ASTM E-119): The wall assembly must successfully endure 60-minute fire exposure without developing excessive unexposed surface temperature or allowing flaming on the unexposed side of the assembly.
- H. Ignition Resistance (NFPA 268): No sustained flaming of panels, assembly when subjected to a minimum radiant heat flux of 12.5 kW/m² ± 5% in the presence of a pilot ignition source for a 20-minute period.
- I. Fire Propagation (NFPA 285): Wall assembly of Nichiha AWP, Ultimate Clips and Starter Track, Tyvek Commercial Wrap, ½” Densglass Gold Sheathing, 16” o.c. 18 gauge steel studs, mineral wool in-cavity insulation, and interior 5/8” Type X gypsum met the acceptance criteria of NFPA 285.
- J. Fire Propagation (CAN/ULC S-134): Wall assembly of Nichiha AWP, Ultimate Clips and Starter Track, Tyvek Housewrap, 5/8” FRT plywood, 16” o.c. 2x wood studs, fiberglass in-cavity insulation, and interior 5/8” Type X gypsum met the acceptance criteria of CAN/ULC S-134.
- K. Drained and Back Ventilated Rainscreen (AAMA 509-14): System classifications: W1, V1.

2.04 INSTALLATION COMPONENTS

A. Ultimate Clip System:

1. Starter Track:
 - a. Horizontal Panel Installations - FA 700 – 3,030mm (l) galvalume coated steel.
 - b. Vertical Panel Installations (AWP-3030 only) – FA 710T – 3,030mm (l) galvalume coated steel.
2. Panel Clips: JEL 778 “Ultimate Clip II” (10mm rainscreen for 16mm AWP) – Zinc-Aluminum-Magnesium alloy coated steel.
 - a. Joint Tab Attachments (included) – used at all AWP-1818 panel to panel vertical joints, NOT used with AWP-3030 installations.
3. Corner Clips: JE 777C (10mm rainscreen for 5/8” AWP Manufactured Corners) -- Zinc-Aluminum-Magnesium alloy coated steel.
4. Single Flange Sealant Backer – FHK 1015 R (10mm) – 6.5’ (l) fluorine coated galvalume.
5. Double Flange Sealant Backer – FH 1015 R (10mm) – 10’ (l) fluorine coated galvalume.
6. Corrugated Spacer – FS 1005 (5mm), FS 1010 (10mm) – 4’ (l).

- B. Aluminum Trim (optional): Paint primed trim as specified in finish schedule.
- C. Essential Flashing System (optional):
 - 1. Starter – main segments (3,030mm), inside corners, outside corners
 - 2. Overhang – main segments (3,030mm), inside corners, outside corners, joint clips
- D. Fasteners: Corrosion resistant fasteners, such as hot-dipped galvanized screws appropriate to local building codes and practices must be used. Use Stainless Steel fasteners in high humidity and high-moisture regions. Panel manufacturer is not liable for corrosion resistance of fasteners. Do not use aluminum fasteners, staples or fasteners that are not rated or designed for intended use. See manufacturer’s instructions for appropriate fasteners for construction method used.
- E. Flashing: Flash all areas specified in manufacturer’s instructions. Do not use raw aluminum flashing. Flashing must be galvanized, anodized, or PVC coated.
- F. Sealant: Sealant shall comply with ASTM C920, Class 35.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Verification of Conditions:
 - 1. Fiber cement panels can be installed over braced wood, steel studs and sheathing including plywood, OSB, plastic foam (1” or less) or fiberboard sheathing. Fiber cement panels can also be installed over Structural Insulated Panels (SIP’s), Concrete Masonry Units (CMU’s) and Concrete Block Structures (CBS’s) with furring strips, and Pre-Engineered Metal Construction. Insulated Concrete Forms (ICFs) require added measures. Consult with Nichiha Technical Services.
 - 2. Allowable stud spacing: 16” o.c. maximum.
 - 3. A weather resistive barrier is required when installing fiber cement panels. Use an approved weather resistive barrier (WRB) as defined by the 2015 IBC or IRC. Refer to local building codes.
 - 4. Appropriate metal flashing should be used to prevent moisture penetration around all doors, windows, wall bottoms, material transitions and penetrations. Refer to local building codes for best practices.

- B. Examine site to ensure substrate conditions are within alignment tolerances for proper installation.
- C. Do not begin installation until unacceptable conditions have been corrected.
- D. Do not install panels or components that appear to be damaged or defective. Do not install wet panels.

3.02 TOLERANCE

- A. Wall surface plane must be plumb and level within +/- ¼ inch in 20 feet in any direction.
 - 1. One layer of Nichiha 5mm (~3/16”) Spacer may be used as shim.

3.03 INSTALLATION

- A. General: Install products in accordance with the latest installation guidelines of the manufacturer and all applicable building codes and other laws, rules, regulations and ordinances. Review all manufacturer installation, maintenance instructions, and other applicable documents before installation.
 - 1. Consult with your local dealer or Nichiha Technical Department before installing any Nichiha fiber cement product on a building higher than 45 feet or three stories or for conditions not matching prescribed standard installation guide requirements and methods. A Technical Design Review (TDR) process is available to evaluate project feasibility.
 - 2. Vertical Control/Expansion Joints are required with AWP-1818, for walls wider than 30 feet, within 2-12 feet of outside corners finished with metal trim and approximately every 30 feet thereafter.
 - A. Vertical Control/Expansion Joints are required at each AWP-3030 vertical joint, or H-Mold trim may be used instead.
 - 3. Horizontal/Compression Joints are required for multi-story installations of AWP. Locate joints at floor lines. Joints are flashed minimum ½” breaks. Do not caulk. Refer to installation guide(s).
 - A. Wood framed buildings of three or more floors require a compression joint at each floor.
 - B. Steel framed buildings (including reinforced concrete core with LGMF exterior walls) of more than three floors (or 45 feet) require a compression joint every 25 feet at a floor line.

B. Panel Cutting

1. Always cut fiber cement panels outside or in a well ventilated area. Do not cut the products in an enclosed area.
2. Always wear safety glasses and NIOSH/OSHA approved respirator whenever cutting, drilling, sawing, sanding or abrading the products. Refer to manufacturer SDS for more information.
3. Use a dust-reducing circular saw with a diamond-tipped or carbide-tipped blade.
 - a. Recommended circular saw: Makita 7-1/4” Circular Saw with Dust Collector (#5057KB).
 - b. Recommended blade: Tenryu Board-Pro Plus PCD Blade (#BP-18505).
 - c. Shears (electric or pneumatic) or jig saw can be used for complicated cuttings, such as service openings, curves, radii and scrollwork.
4. Silica Dust Warning: Fiber cement products may contain some amounts of crystalline silica, a naturally occurring, potentially hazardous mineral when airborne in dust form. Consult product SDS or visit <https://www.osha.gov/dsg/topics/silicacrystalline/>.
5. Immediately clean dust from cut panels as it may bind to the finish.

3.04 CLEANING AND MAINTENANCE

- A. Review manufacturer guidelines for detailed care instructions.

END OF SECTION



SECTION 07 46 20

FIBER CEMENT SIDING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Fiber cement lap siding and shingle siding, trim, fascia, moulding and accessories.
- B. Factory-finished fiber lap siding and shingle siding, trim, fascia, moulding and accessories.

1.02 RELATED SECTIONS

- A. Section 05 40 00 - Cold Formed Metal Framing
- B. Section 06 10 00 - Rough Carpentry: Sheathing.
- C. Section 07 21 00 - Insulation: Exterior wall insulation.
- D. Section 07 48 99 – Rainscreen Attachment System.

1.03 REFERENCES

- A. AS E136 - Standard Test Method for Behavior of Materials in a Vertical Tube Furnace at 750 degrees C.
- B. AS D3359 - Standard Test Method for Measuring Adhesion by Tape Test, Tool and Tape.

1.04 SUBMITTALS

- A. Submit under provisions of Section 01300.
- B. Product Data: Manufacturer's data sheets on each product to be used, including:
 - 1. Preparation instructions and recommendations.
 - 2. Storage and handling requirements and recommendations.
 - 3. Installation methods.
- C. Shop Drawings: Provide detailed drawings of atypical non-standard applications of cementitious siding materials which are outside the scope of the standard details and specifications provided by the manufacturer.
- D. Selection Samples: For each finish product specified, two complete sets of color chips representing manufacturer's full range of available colors and patterns.
- E. Verification Samples: For each finish product specified, two samples, minimum size 4 by 6 inches (100 by 150 mm), representing actual product, color, and patterns.



- F. LEED Submittals: Complete the LEED Material Buyout Form (MBoF) with all materials provided to the project. A complete submittal includes providing all material costs in the MBoF and all of the supporting documentation for the following credits:
1. MRc2 - Environmental Product Declarations (EPD): Provide Industry-Wide or Product-Specific EPD.
 2. MRc3 - Sourcing of Raw Materials - Recycled Content: Provide product data for pre- and post- consumer recycled content.
 3. MRc4 - Material Ingredients: Provide manufacturers Declare label, Health Product Declaration (HPD), Cradle to Cradle Certification, or Cradle to Cradle Health Product Certificate.
 4. IEQc2 - Low-Emitting Materials – Interior Wet Applied Products: For paints, coatings, adhesives and sealants applied on site or used for laminating off-site, include product data indicating the VOC content (g/L) and testing certificates or third-party certification demonstrating compliance with California Department of Public Health (CDPH) v1.2-2017 emissions testing.

1.05 QUALITY ASSURANCE

- A. Installer Qualifications: Minimum of 2 years experience with installation of similar products.
- B. Mock-Up: Provide a mock-up for evaluation of surface preparation techniques and application workmanship.
1. Finish areas designated by Architect.
 2. Do not proceed with remaining work until workmanship, color, and sheen are approved by Architect.
 3. Remodel mock-up area as required to produce acceptable work.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Store products in manufacturer's unopened packaging until ready for installation.
- B. Store siding on edge or lay flat on a smooth level surface. Protect edges and corners from chipping. Store sheets under cover and keep dry prior to installing.
- C. Store and dispose of solvent-based materials, and materials used with solvent-based materials, in accordance with requirements of local authorities having jurisdiction.

1.07 PROJECT CONDITIONS

- A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

1.08 WARRANTY



- A. Product Warranty: Limited, non-pro-rated product warranty for 30 years.
- B. Finish Warranty: Limited product warranty against manufacturing finish defects.
 - 1. When used for its intended purpose, properly installed and maintained according to manufacturer's installation instruction, for a period of 15 years from the date of purchase: will not peel; will not crack; and will not chip. Finish warranty includes the coverage for labor and material.
- C. Workmanship Warranty: Application limited warranty for 2 years.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Acceptable Manufacturer: James Hardie Building Products, Inc., which is located at: 26300 La Alameda Suite 400 ; Mission Viejo, CA 92691; Toll Free Tel: 866-274-3464; Tel: 949-367-4980; Fax: 949-367-4981; Email: [request info \(info@jameshardie.com\)](mailto:info@jameshardie.com); Web: www.jameshardiepros.com.
- B. Allura Fiber Cement Siding located at Plycem USA 396 W. Greens Road Houston, Texas 77067 Toll free (1-844-425-5872): Web: www.allurausa.com
- C. Or approved equal.

2.02 SIDING AND TRIM

- A. Lap siding and Shingle siding requirement for materials:
 - 1. Fiber-cement siding - complies with ASTM C 1186 Type A Grade II.
 - 2. Fiber-cement siding - complies with ASTM E 136 as a noncombustible material.
 - 3. Fiber-cement siding - complies with ASTM E 84 Flame Spread Index = 0, Smoke Developed Index = 5.
 - 4. ICC-ES evaluation reports ESR-2290, ESR-1844, and ESR-2273 (IBC, IRC, CBC, CRC)
- B. Lap Siding:
 - 1. Type: Select Cedarmill 6-1/4 inches (159 mm) with 5 inches (127 mm) exposure.
- C. Shingle Siding:
 - 1. Type: Half Round Notched Panel 48 inches (1219 mm) wide by 19 inches (483mm) high with 7 inches (178 mm) exposure.
- D. Trim:
 - 1. Trim boards
 - a. Product: 5/4 NT3 Boards, width as indicated in drawings.
 - b. Texture: Wood grained.
 - c. Length: 12 feet (3658 mm).
 - d. Thickness: 1 inch (24 mm).
 - 2. Trim Fascia boards: as indicated in drawings.



3. Fiber-cement trim - complies with ASTM C 1186 Type A Grade II.
4. Fiber-cement trim - complies with ASTM E 136 as a noncombustible material.
5. Fiber-cement trim - complies with ASTM E 84 Flame Spread Index = 0, Smoke Developed Index = 5.
6. Intertek Product Listing.

2.03 FASTENERS

- A. Metal Framing:
 1. Fastening as recommended by manufacturer according substrate conditions.

2.04 FINISHES

- A. Factory Finish: Refer to Exterior Finish Schedule.
 1. Factory applied finish; defined as a finish applied in the same facility and company that manufactures the siding substrate.
 2. Process:
 - a. Factory applied finish by fiber cement manufacturer in a controlled environment within the fiber cement manufacturer's own facility utilizing a multi-coat, heat cured finish within one manufacturing process.
 - b. Each finish color must have documented color match to delta E of 0.5 or better between product lines, manufacturing lots or production runs as measured by photospectrometer and verified by third party.
 3. Protection: Factory applied finish protection such as plastic laminate that is removed once siding is installed
 4. Accessories: Complete finishing system includes pre-packaged touch-up kit provided by fiber cement manufacturer. Provide quantities as recommended by manufacturer.
- B. Factory Finish Color for Trim and Shingle Siding Colors:
 1. As selected by Architect from manufacturer's colors.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Do not begin installation until substrates have been properly prepared.
- B. If framing preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.
- C. Minimum 20 gauge (33 mm) 3-5/8 inch (92 mm) C-Stud 16 inches maximum on center or 16 gauge (54 mm) 3-5/8 inches (92 mm) C-Stud 24 inches (610 mm) maximum on center metal framing complying with local building codes, including the use of water-resistive barriers and/or vapor barriers where required. Minimum 1-1/2 inches (38 mm) face and straight, true, of uniform dimensions and properly aligned.
 1. Install water-resistive barriers and claddings to dry surfaces.
 2. Repair any punctures or tears in the water-resistive barrier prior to the installation



- of the siding.
3. Protect siding from other trades.

3.02 PREPARATION

- A. Clean surfaces thoroughly prior to installation.
- B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.
- C. Install a water-resistive barrier is required in accordance with local building code requirements.
- D. The water-resistive barrier must be appropriately installed with penetration and junction flashing in accordance with local building code requirements.
- E. Install weather barrier in accordance with local building code requirements.
- F. Seam Tape and joint and laps.
- G. Install flashings per manufacturer's recommendations.

3.03 INSTALLATION - LAP SIDINGS

- A. Install materials in strict accordance with manufacturer's installation instructions.
- B. Starting: Install a minimum 1/4 inch (6 mm) thick lath starter strip at the bottom course of the wall. Apply planks horizontally with minimum 1-1/4 inches (32 mm) wide laps at the top. The bottom edge of the first plank overlaps the starter strip.
- C. Allow minimum vertical clearance between the edge of siding and any other material in strict accordance with the manufacturer's installation instructions.
- D. Butt joints must not fall within 4 inches (102 mm) of a stud. Do not nail within 2 inches (51 mm) of the end of planks.
- E. Maintain clearance between siding and adjacent finished grade.
- F. Locate splices at least one stud cavity away from window and door openings.
- G. For proper fastener selection and fastening schedules for various wind load requirements and framing options.
- H. Face nail to sheathing.
- I. Locate splices at least 12 inches (305 mm) away from window and door openings.

3.04 INSTALLATION - SHINGLE SIDINGS

- A. Install materials in strict accordance with manufacturer's installation instructions.



- B. Substrate: Install a minimum 7/16 inch (11 mm) thick OSB wall sheathing or equivalent braced walls complying with applicable building codes.
- C. Starting: Install a minimum 1/4 inch (6 mm) thick lath starter strip at the bottom course of the wall.
- D. Maintain clearance between siding and adjacent finished grade.
- E. Apply starter course of 10 inches (254 mm) shingles or 9-1/2 inches (241 mm) lap siding overlapping the starter strip.
- F. Apply subsequent courses horizontally with a minimum 10 inch overlap at the top and a minimum 2 inch (51 mm) side lap. The bottom edge of the first two courses overlaps the starter strip.
- G. Fasten between 1/2 inch (13 mm) and 1 inch (25 mm) in from the side edge and between 8-1/2 inches (216 mm) and 9 inches (229 mm) up from the shingle bottom edge.
- H. Allow minimum vertical clearance between the edge of siding and any other material in strict accordance with the manufacturer's installation instructions.
- I. Ensure vertical joints of overlapping shingle course do not align.
- J. Wind Resistance: Where a specified level of wind resistance is required, provide fasteners as recommended by manufacturer.

3.05 INSTALLATION - TRIMS

- A. Install materials in strict accordance with manufacturer's installation instructions. Install flashing around all wall openings.
- B. Fasten through trim into structural framing or code complying sheathing. Fasteners must penetrate minimum 3/4 inch (19 mm) or full thickness of sheathing. Additional fasteners may be required to ensure adequate security.
- C. Place fasteners no closer than 3/4 inch (19 mm) and no further than 2 inches (51 mm) from side edge of trim board and no closer than 1 inch (25 mm) from end. Fasten maximum 16 inches (406 mm) on center.
- D. Maintain clearance between trim and adjacent finished grade.
- E. Trim inside corner with a single board trim both side of corner.
- F. Outside Corner Board Attach Trim on both sides of corner with 16 gage corrosion resistant finish nail 1/2 inch (13 mm) from edge spaced 16 inches (406 mm) apart, weather cut each end spaced minimum 12 inches (305 mm) apart.
- G. Allow 1/8 inch gap between trim and siding.



- H. Seal gap with high quality, paint-able caulk.
- I. Shim frieze board as required to align with corner trim..
- J. Fasten through overlapping boards. Do not nail between lap joints.
- K. Overlay siding with single board of outside corner board then align second corner board to outside edge of first corner board. Shim frieze board as required to align with corner trim.
- L. Install Trim Fascia boards to rafter tails or to sub fascia.

3.06 FINISHING

- A. Finish unprimed siding with a minimum one coat high quality, alkali resistant primer and one coat of either, 100 percent acrylic or latex or oil based, exterior grade topcoats or two coats high quality alkali resistant 100 percent acrylic or latex, exterior grade topcoat within 90 days of installation. Follow paint manufacturer's written product recommendation and written application instructions.
- B. Finish factory primed siding with a minimum of one coat of high quality 100 percent acrylic or latex or oil based exterior grade paint within 180 days of installation. Follow paint manufacturer's written product recommendation and written application instructions.

3.07 PROTECTION

- A. Protect installed products until completion of project.
- B. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION



SECTION 07 48 00

RAINSCREEN ATTACHMENT SYSTEM

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Thermally broken, rainscreen attachment system for attachment of exterior cladding installed over exterior mineral fiber insulation.

1.02 RELATED SECTIONS

- A. Section 05 40 00 - Light Gage Metal Framing: Wall framing and bracing.
- B. Section 07 22 00 - Rigid Insulation: Exterior wall insulation.
- C. Section 07 46 20 – Fiber Cement Siding

1.03 SYSTEM DESCRIPTION

- A. System assembly shall include the following components from the substrate out:
 - 1. Substrate: Wall framing assembly and sheathing
 - 2. Weather Resistant/Air Barrier over substrate.
 - 3. Mineral fiber insulation.
 - 4. Thermally broken rainscreen attachment system.
 - 5. Exterior cladding.
- B. Design Requirements:
 - 1. Manufacturer is responsible for designing system, including anchorage to structural system and necessary modifications to meet specified requirements and maintain visual design concepts.
 - 2. Employ registered professional engineer, licensed to practice engineering in jurisdiction where Project is located, to engineer each component of rainscreen attachment system.
 - 3. Structural Design: Exterior-insulated rainscreen wall assembly capable of withstanding effects of load and stresses from dead loads, wind loads, ice loads (if applicable) as indicated on Structural General Notes on Structural Drawings, and normal thermal movement without evidence of permanent defects of assemblies or components.



- a. Thermal Movements: Provide assemblies that allow for thermal movements resulting from the following maximum ambient temperatures by preventing overstressing of components and other detrimental effects:
 - 1) Temperature Change (range): 120 degrees Fahrenheit (67 degrees C), ambient:
 4. Support Framing/Attachment System: a. Frequency and spacing of brackets as indicated by manufacture in project specific engineering package.
- C. Performance Requirements:
1. Rainscreen Attachment System Performance: Comply with ANSI/ASHRAE 90.1-2010 maximum U-Value for walls.
 2. Thermal Performance:
 - a. Wall Assembly effective R-Value required by Title 24 calculations.
 - b. Full constructed exterior assembly must have a minimum 90% EFFECTIVE R-value when compared to the exterior insulation's rated R-Value.
 - c. Continuous framing profiles (including C- or Z-shaped sections or furring) penetrating insulation not allowed.
 - d. Perform effective R-Value calculation or modeling in accordance with ASHRAE guidelines.
 3. Structural Performance:
 - a. Framing Members:
 - 1) Test framing components to AAMA TIR- A8-[04] – Section 7.2 to determine structural performance and effective moment of inertia for each perforated component. Minimum Effective Moment of Inertia for Primary Rail: 0.0134 in⁴ .
 - 2) Localized bending stress for eccentrically loaded framing members must be evaluated with the maximum effective length of resisting element not more than 12 inches.
 - b. Fasteners:
 - 1) Tension shall be taken as sum of direct tension plus tension due to prying for eccentrically loaded connections. Prying may be reduced or eliminated if proven via engineering analysis or testing.
 - 2) Minimum Safety Factor of 3 for both tension and shear values.



- 3) Combined tension and shear shall be evaluated according to an interaction formula. Sum of terms shall not exceed 1.0.

1.04 SUBMITTALS

- A. Submit under provisions of Section 01 33 00.
- B. Product Data: Submit manufacturer's product literature and descriptions of testing performed on system components to indicate meeting or exceeding specified performance.
- C. Shop Drawings:
 1. Submit connection details to the cladding manufacturer, showing interface of rainscreen attachment system to substrate and panels with adjacent construction, signed and sealed by Professional Engineer.
 2. Show system installation and attachment, including fastener size and spacing.
- D. Structural Calculations:
 1. Submit rainscreen attachment manufacturer's comprehensive Structural Design analysis signed and sealed by a Professional Engineer
- E. Samples: Submit following material samples for verification:
 1. Wall Brackets: Two (2) samples.
 2. Horizontal Rails: Two (2) 12-inch long samples. Store products in manufacturer's unopened packaging until ready for installation.
- F. Test Reports:
 1. Test to the following standards and provide written test reports by a third party:
 - a. AAMA TIR-A8-[04]: Structural Performance of Composite Thermal Barrier Framing Systems – Section 7.2.
 2. Comprehensive three-dimensional thermal modeling report indicating framing systems impact on exterior insulation rated R-value.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications:
 1. Minimum 5 years' experience specializing in the manufacturing of façade attachment/support framing similar to those specified.
 2. Ability to demonstrate conformance to testing requirements.



- B. Installer Qualifications:
 - 1. Minimum of 3 years' documented experience or minimum of 5 completed projects of equivalent scope and quality and recommended by manufacturer to perform work of this Section.
 - 2. Onsite superintendent or foreman overseeing installation on site during entire work of this Section with experience equivalent to installer and in good standing with the manufacturer.
- C. Engineer Qualifications: Registered professional engineer experienced in the design of curtain wall systems, anchors, fasteners and licensed to practice engineering in the jurisdiction where Project is located.
- D. Pre-Installation Meeting:
 - 1. Discuss sequence and scheduling of work and interface with other trades.
 - 2. Review metal wall framing assemblies for potential interference and conflicts and coordinate layout and support provisions for interfacing work.
 - 3. Review and document methods, procedures and manufacturer's installation guidelines and safety procedures for exterior wall assembly.
- E. Mock-Ups: Coordinate mock-up materials and requirements with mock-up specified in Division 01.

1.06 QUALITY CONTROL

- A. Single source responsibility:
 - 1. Furnish engineered rainscreen attachment system components under direct responsibility of single manufacturer.
- B. Field Measurements: Verify actual supporting and adjoining construction before fabrication.
- C. Record field measurements on project record shop drawings.
- D. Established Dimensions: Where field measurements cannot be made without delaying work, guarantee dimensions and proceed with fabrication of rainscreen attachment system corresponding to established dimensions.

1.07 WARRANTY

- A. Manufacturer Warranties:
 - 1. Attachment System: Ten (10) year Limited Warranty.
 - a. Covers components of the attachment system, including structural failure of



- components when all the materials and components are supplied and installed per manufacturer's requirements.
- b. Includes labor and material for removal and replacement of defective material.
 - c. Includes labor to remove and reinstall façade finish panels, finish closures and façade finish accessories necessary to access defective material.
- B. Contractor's Warranties: 2-year labor warranty, starting from date of Owner acceptance of completed work, to cover repair of materials found to be defective as a result of installation errors.
- C. Limitation of Warranties: Exclude repairs, replacement, and corrective work to the substrate, primary structure, finish panels, and/or property – unless otherwise noted above. Warranties exclude mechanical damage due to abuse, neglect, primary structure failure, or forces of nature greater than normal weather conditions.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Basis of Design: MFI "S" Series as manufactured by KNIGHT WALL SYSTEMS, inc 28308 N. Cedar Road - Deer Park, WA 99006 Toll Free: 1.855.KWS.WALL (597.9255) Telephone: 509.262.0104 Fax: 509.262.0106 Web: www.knightwallsystems.com E-mail: info@knightwallsystems.com General sales: sales@knightwallsystems.com
- B. Or approved equal.

2.02 RAINSCREEN ATTACHMENT/SUPPORT FRAMING SYSTEM

- A. Comply with ANSI/ASHRAE 90.1-2010.
- B. Coating Material: ASTM A1046, Zinc-Aluminum-Magnesium, minimum thickness ZM40.
 - 1. ASTM A653 Galvanized steel is not acceptable.
- C. Steel Classification: Structural Steel (SS), Grade 50, 50 ksi Yield.
- D. Spacing: Comply with manufacturer's Professional Engineer's project specific calculations.
- E. Wall Brackets:
 - 1. Minimum 0.074 inch thick (14 gauge) sheet steel.
 - 2. Dimensions:
 - a. Bracket Base: Minimum 3.125 inch high by 2.125 inch wide.



- b. Offset Brackets: As indicated in drawings.
 - 1) Align offsets to differing wall planes as shown on Drawings.
 3. Pre-Punched Holes: Two wall anchors per bracket.
 4. Recommended Product: ThermaBracket-S by Knight Wall Systems or approved equal.
- F. Primary Horizontal [Vertical] Rail, Static S-Series.
1. Minimum 0.046-inch thick (18 gauge) [0.054-inch thick (16 gauge)] cold-formed steel.
 2. Profile: C channel, two flanges of equal length and one web.
 3. Nominal Dimensions: Minimum 1.0 inch flange for attaching to wall bracket and 1.625 inch at web.
 4. Pre-Punched Attachment Holes: 1.0 inch on center along length of track and oversized allowing for thermal contraction and expansion of rail without placing stress on brackets.
 5. Recommended Product: S-Rail by Knight Wall Systems or approved equivalent.
- G. Secondary Rail: Nominal 0.046 inch thick cold-formed steel.
1. Profile: Hat channel with stiffening lips.
 2. Profile Depth: 0.75 inches.
 3. Girt Fastening Face: Manufacturer's recommendation
 4. Weep Drains: 0.75 inches diameter at 4 inches on center along flanges to allow for free air flow laterally.
 5. Attachment Holes: Locate at 2 inch on center along back to facilitate number 14 self drilling self-tapping screw attachment to primary rail.
 - a. Oversize holes to allow for thermal contraction and expansion of rail. 6. Basis of Design: PanelRail™ by Knight Wall Systems.
 7. Or approved equal.
- H. Reveal Rail: Nominal 0.046 inch thick (18 gauge) [0.054-inch thick (16 gauge)] cold-formed steel.
1. Profile: Square hat channel with stiffening lips



2. Depth: 0.75 inches.
3. Dimensions: 2.0 inches at web, 1.625 inches at each flange with 0.25 stiffening lips.
4. Basis of Design: RevealRail™ by Knight Wall Systems or approved equivalent.
- I. Thermal Isolation:
 1. Material: Injection molded Polyoxymethylene copolymer (POM), non-fiber reinforced.
 2. Tensile Yield Strength: 9.57 ksi per ISO 527.
 3. Melting Temperature: 329 degrees Fahrenheit per ISO 3146.
 4. Components:
 - a. Wall Anchor Isolation Washer: minimum 0.125 inch thick.
 - b. Support Wall Substrate Isolation: Minimum 0.375-inch thick at each wall bracket.
 - c. Rail to Bracket Isolation: Minimum 0.125 inch thick at each connection.
 - d. Bracket Shim: Match support wall substrate isolator profile; available in 0.125-inch thickness and does not decrease thermal or structural performance of system.
 5. Basis of Design: ThermaStop™ Isolators by Knight Wall Systems.
 6. Or approved equal.
- J. Fasteners:
 1. Sufficient length to provide solid attachment to structure as required by manufacturer.
 2. Thermally isolated.
 3. Framed substrate with sheathing: Self-drill hex-washer-head stainless steel with 1,000 hour salt-spray rated thermoset polyester coating.
 - a. Embedment depth: 0.625 inches or three full threads minimum, whichever is greater.
 - b. Minimum ultimate pull-out capacity from 18 gauge steel: 450 pounds.
 4. Concrete and concrete masonry units substrate:



- a. Embedment depth: 1.25 inches minimum.
 - b. Minimum ultimate pull-out capacity from substrate material: 450 pounds.
 - c. 1/4 inch Kwik-Con II+ by Hilti
 - d. 1/4 inch Tapcon by Buildex
 - e. 1/4 inch UltraCon by Elco Industries
 - f. Or approved equal.
5. For primary to secondary rail connection: Self-drill hex-washer-head stainless steel with 1,000 hour salt-spray rated thermoset polyester coating.
- a. Embedment depth: 0.625 inches or three full threads minimum, whichever is greater.
 - b. Minimum ultimate pull-out capacity from 18 gauge steel: 450 pounds.
- K. Accessories:
1. Bracing, Furring, Bridging, Plates, Gussets, and Clips: Formed sheet steel, thickness as necessary to meet structural requirements for special conditions encountered.
 2. Galvanic Protection: Utilize tapes and other methods as necessary to separate and prevent contact between dissimilar metals.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Examine substrates and conditions for compliance with manufacturer requirements for installation conditions affecting performance of the work.
 1. Do not proceed with installation until unsatisfactory conditions have been corrected.
 2. Ensure weather-resistant barrier (WRB) is installed prior to installing rainscreen attachment system.
 3. Ensure fenestration, transitions, discontinuities, sills, and ledgers are flashed and sealed to move moisture to the exterior of the building.
- B. Field verify architectural details and mechanical and electrical requirements prior to commencing installation.
- C. Commencement of installation constitutes acceptance of existing conditions and



3.02 PREPARATION

- A. Review areas of potential interference and conflicts and coordinate layout and support provisions for interfacing work.
- B. Installation: Install in strict accordance with manufacturer's installation instructions.
- C. Wall Brackets and Primary Rail:
 - 1. Mount wall brackets at 16 inch on center horizontally [vertically] on support wall (at each stud location).
 - a. Brackets must be laid out at 0.5 inch increments vertically or horizontally.
 - b. Tighten screws to substructure to a snug tight condition and not stripped. Do not over-torque beyond manufacturer's recommendation. If installed using hand tools, verify for each installer at beginning of project using snug-tight criteria. Do not use stripped holes.
 - 2. Thermally isolate wall bracket attachments by sandwiching thermal break material between metal bracket and support wall substrate.
 - 3. Thermally isolate screw fastener washers using material to thermally isolate fastener heads from metal bracket.
 - 4. Mineral Fiber Insulation: Install to expand into and friction fit between wall brackets as specified by Section 07 21 00 prior to installing horizontal rails.
 - 5. Attach horizontal rail to wall bracket stem by use of a self-tapping screw fastener through the pre-punched holes in the rail and into the pre-punched pilot holes on the bracket.
 - 6. Isolate horizontal rail from bracket by sandwiching a thermal break material between rail and bracket stem.
 - 7. Attach horizontal rail at proper pre-punched pilot holes on bracket stem to align plumb and true. Account for irregularities in support wall.
 - 8. Establish and re-establish and restart vertical bracket locations using laser or chalk-line at fenestrations and other obstructions to establish horizontal alignments.
- D. Secondary Rail:
 - 1. Space to make suitable bearing surfaces for each cladding system as instructed by manufacturer and as shown on drawings and accepted shop drawings.
 - 2. Begin at bottom and mount to horizontal rails using No. 14 self-drilling self-tapping stainless steel screws.



3. Tighten screws to snug tight. Verify equivalent snug tight condition for installers using hand tools.
 4. Install successive vertical rails as required for panel type and engineering.
 5. When encountering fenestrations and other openings, mount vertical rails so that fastening points are as close to the lower and upper edges as possible.
- E. Touch-up shop-applied protective coatings damaged during handling and installation.
 - F. Use shearing instruments (i.e. snips, nibbler, etc.) for cutting metal framing components. Saws are not recommended, as the sparks produced during cutting will damage the anti-corrosion coating. If sparks are generated during cutting, be sure the portion of the component to be installed on the building is protected from sparks and that any stockpile near the cutting station is also protected.
 - G. The systems components should not be cut while installed on the building, unless using a shearing instrument.
 - H. Replace thermal isolator pieces that break during installation.
 - I. Provide a 3/8" – 1/2" gap between girts for expansion when multiple lengths of rail are installed.
 - J. Minimum length of installed cut primary rail is 12" and must be attached to at least two separate wall brackets to prevent rotation of rail. Unsupported cantilever must not exceed 6" unless specified differently by manufacturer's engineer.
 - K. Minimum length of installed cut secondary rail is 12" and must be mechanically attached to at least two separate primary rails.

3.3 ERECTION TOLERANCES

- A. Maximum Framing Member Variation from True Position: 1/4 inch.
- B. Maximum Framing Member Variation from Plane:
 1. Individual Framing Members: Do not exceed 1/4 inch in 10 foot.
 2. Accumulative Over-all Variation for Wall and Floor System: Do not exceed 1/4 inch.

3.4 FIELD QUALITY CONTROL

- A. Manufacturer's Field Technical Service: Make intermittent and final inspection to verify installation in conformance to manufacturer instructions and suitable as framing assembly for subsequent metal panels, acrylic plastering, and other cladding installations.
 1. Confirm snug tight and fastener sizing.



2. Confirm framing members installed in correct orientation.

3.5 ADJUSTING

- A. Inspect and adjust after installation. Replace or repair defective work.
- B. Adjust, and reconfigure as necessary to accommodate cladding systems for installations over work of this Section. Do not reuse pre-drilled holes unless fastener size is increased.

END OF SECTION



SECTION 07 60 00

FLASHING AND SHEET METAL

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

1. Sheet metal flashings in connection with roofing.
2. Miscellaneous metal flashing and counter flashing as required, except where provided under Divisions 22, Plumbing, 23, HVAC, or 26, Electrical.
3. Coping caps.
4. Gravel stops and metal edging.
5. Gutters and downspouts.
6. Splash pans where downspouts empty onto roofing.
7. Drip flashings.
8. Roof pipe flashings.
9. Other sheet metal items not necessarily specified herein or in other sections but required to prevent penetration of water into building.
10. Gutter guards.

B. Related Requirements:

1. Division 01 - General Requirements.
2. Section 05 30 00 – Metal Decking.
3. Section 07 22 00 - Roof and Deck Insulation.
4. Section 07 31 13 - Asphalt Shingles.
5. Section 07 64 25 – Fully Adhered TPO Roofing
6. Section 07 71 00 - Roof Specialties.
7. Section 07 92 00 - Joint Sealants.
8. Section 08 63 23 - Metal-Framed Skylights.
9. Division 22 – Plumbing.
10. Division 23 - HVAC.
11. Division 26 - Electrical.

1.02 SUBMITTALS



- A. Shop Drawings: Submit for fabricated sheet metal indicating shapes, details, methods of joining, anchoring and fastening, thicknesses and gages of metals, concealed reinforcement, expansion joint details, sections, and profiles.
- B. Samples: Submit Samples for materials or assemblies as requested.
- C. Product Data: Submit brochures of manufactured items.
- D. LEED Submittals: Complete the LEED Material Buyout Form (MBoF) with all materials provided to the project. A complete submittal includes providing all material costs in the MBoF and all of the supporting documentation for the following credits:
 - 1. MRc2 - Environmental Product Declarations (EPD): Provide Industry-Wide or Product-Specific EPD.
 - 2. MRc3 - Sourcing of Raw Materials - Recycled Content: Provide product data for pre- and post- consumer recycled content.
 - 3. MRc4 - Material Ingredients: Provide manufacturers Declare label, Health Product Declaration (HPD), Cradle to Cradle Certification, or Cradle to Cradle Health Product Certificate.
 - 4. IEQc2 - Low-Emitting Materials – Interior Wet Applied Products: For paints, coatings, adhesives and sealants applied on site or used for laminating off-site, include product data indicating the VOC content (g/L) and testing.

1.03 QUALITY ASSURANCE

- A. Drawings and requirements specified govern. Provide the Work of this section in conformance with the Architectural Sheet Metal Manual published by SMACNA for conditions not indicated or specified and for general fabrication of sheet metal items.
- B. Materials shall conform to following standards:
 - 1. ASTM A167 - Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet and Strip.
 - 2. ASTM A653 - Sheet Steel, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
 - 3. ASTM B370 - Copper Sheet and Strip for Building Construction.
- C. Pre-installation Meetings: Refer to Division 07 roofing sections as appropriate. Attend the pre-installation and inspection meetings for roofing Work.

1.04 DELIVERY, STORAGE AND HANDLING

- A. Do not install bent or otherwise damaged materials.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Galvanized Sheet Steel: ASTM A653, coating designation G90, hot-dip galvanized.
- B. Copper Plate, Sheet and Strip: ASTM B370, cold-rolled, tempered. Copper sheet and strip shall be cold-rolled-temper.



- C. Stainless Steel: Plate, sheet and strip shall conform to ASTM A167, Type 304 or Type 316, No. 4 finish on exposed surfaces and No. 2 finish on concealed surfaces unless otherwise specified or indicated. Furnish Type 304 for general applications and Type 316 where exposed to acidic or alkaline conditions.
- D. Aluminum Sheet: ASTM B 209, alloy as standard with manufacturer for finish required, with temper as required to suit forming operations and performance required; with smooth, flat surface.
 - 1. Finish: Kynar 500 finish, color as selected by Architect.
- E. Fastenings:
 - 1. Galvanized Steel: Nails, rivets, and other fastenings furnished in connection with galvanized sheet steel Work shall be sealed with rust resistive coating. Rivets shall be tinned. Nails and other fastenings shall be zinc-coated.
 - 2. Copper: Nails, rivets, and other fastenings furnished in connection with copper sheet metal Work, shall be manufactured from hard-temper copper or hard brass.
 - 3. Stainless Steel: Nails, rivets and other fastenings furnished in connection with stainless steel Work, shall be 300 series alloy to match alloy of stainless steel being fastened.
- F. Soldering Flux: Raw muriatic acid for galvanized steel; rosin for tin, and tinned copper; non-corrosive soldering salts for uncoated copper and acid-type flux formulated for soldering stainless steel.
- G. Solder: ASTM B32, Grade 5A, composed of 95-5 tin-antimony. Name of product manufacturer and grade designation shall be labeled, stamped or cast onto each coil or bar.

2.02 FABRICATION

- A. General:
 - 1. Accurately form sheet metal Work to dimensions and shapes indicated and required. Cope finish molded and brake metal shapes with true, straight, sharp lines and angles and, where intersecting each other, to a precise fit. Unless otherwise specified, all galvanized sheet steel shall be 22 gage. Exposed edges of sheet metal shall have a ½ inch minimum hemmed edge.
 - 2. Soldering of sheet steel or copper shall be performed with well-heated copper soldering iron or soldering torch, joints full flowing, neat and consistent. Fill joint completely with solder. Clean materials at joints before soldering, and tin coppers before soldering. Exposed soldering on finished surfaces shall be scraped smooth. Lock seam work shall be fabricated flat and true to line and soldered along its entire length. Acid-fluxed Work shall be neutralized after fabrication.
 - 3. Form and install sheet metal Work to provide proper allowances for expansion and contraction, without causing undue stresses in any part of completed Work. Installation shall be water and weathertight.
- B. Gutters and Downspouts:



1. Gutters: Fabricate from 0.04 inch thick aluminum unless otherwise indicated. Maximum length of gutter shall be 40 feet between end or expansion joints unless the system is specially designed to accommodate the greater expansion, the larger flow and the need for special supports. Drain gutter towards nearest downspout and provide an expansion joint at mid-point between downspout outlets, but not to exceed 40 feet on center. Gutters shall not pond water. Rivet joints and ends with a minimum of 6 rivets per joint or maximum rivet spacing not to exceed 1 ½-inch on center and ½ inch from the edge of the metal, consisting of 3-inch overlap. Sweat solder from inside of gutter and in horizontal position where possible. Neatly fit downspouts to gutter using a slip joint. Provide expansion joints, consisting of 3-inch lap joints at not over feet.
 2. Form and install sheet metal Work to provide allowance for expansion and contraction without causing undue stresses in the completed Work.
 3. Downspouts: Fabricate downspouts from 3-inch by 4-inch rectangular shapes, unless noted otherwise, 0.04 inches thick aluminum unless indicated otherwise indicated in drawings. Downspouts shall be constructed connected to gutters or conductor heads. Downspout shall be fabricated with elbows at bottom discharge or connected to drains as indicated. Joints, except expansion joints shall be sealed with a continuous weld.
 4. Outlets where occurs: Fabricate outlets of 22 gage galvanized sheet steel with a 1/4 inch rolled flanged soldered continuously to gutter. Outside diameter shall be 1/8 inch less than the inside diameter of the downspout and extend into downspout 4 inches. Install a removable wire “bulb type” strainer to outlet opening. Strainer shall be fabricated of 22 gage galvanized steel and ½ inch hardware cloth.
- C. Splash Pans: Provide splash pans for all downspouts, which empty onto lower roofs. Pans shall be galvanized sheet steel 12-inch by 18-inch, unless otherwise indicated, and turned up 2 inches on at least three sides.
- D. Miscellaneous Flashing: Unless otherwise indicated, miscellaneous flashing shall be fabricated of galvanized steel. Exterior doors and windows, unless covered by overhangs shall be provided with 22 gage galvanized steel drip flashing as detailed. At wood construction, nail flashing to framing before paper backed lath is installed.
- E. Roof Pipe Flashings:
1. PVC roofs: provide PVC flashings or prefabricated welded or seamless flashings.
 2. Tile and built up roofs: provide 24 gage galvanized steel flashings with a storm worker.
- K. Gutter Guard:
1. Stainless steel micro-mesh gutter guard as manufactured by “Gutterglove”, email: gutterguard.com, (866) 892-8442. Or approved equal.

2.02 LEED REQUIREMENTS



- A. IW/PS EDP: Products specified under this section must have a Type III Product Specific EPD or the company must be listed in the industry group responsible for the Industry Wide Externally Verified EPD.
- B. PS EPD: Products specified under this section must have a Type III Product Specific EPD.
- C. HPDs: Products specified under this section must have one of the following unexpired material ingredient reports compliant with LEEDv4.1 requirements and declared to 1000 ppm or less: Declare label, Health Product Declaration (HPD), Cradle to Cradle Certification, Cradle to Cradle Health Product Certificate, or UL Product Lens Certification.
- D. Interior Wet Applied Products: All wet-applied on-site paints, coatings, adhesives, and sealants products provided under Part 2 of this specification section must be compliant with the VOC limits outlined under IEQc2: Low Emitting Materials in 01 81 13 Sustainable Design Requirements. In addition, all paints and coatings must be compliant with CDPH Standard Method v1.2-2017 emissions testing with proper unexpired CDPH testing certificates or acceptable third-party certification.

PART 3 - EXECUTION

3.01 PREPARATION

- A. Concrete and masonry materials in contact with sheet metal shall be painted with alkali resistant coating, such as heavy-bodied bituminous paint. Wood in contact with sheet metal shall be painted with two coats of aluminum paint or one coat of heavy-bodied bituminous paint.

3.02 INSTALLATION

- A. General: Coordinate with installation of underlayment indicated in the Drawings.
- B. Gutters and Downspouts:
 - 1. Anchor gutters to structure with 10 gage steel straps, galvanized after fabricating. Secure straps with galvanized fasteners at 3 feet on center. Drill pilot holes and use 12 by 2-inch pan head screws.
 - 2. Install 1/4 inch galvanized wire mesh continuous cover on gutter.
 - 3. Secure downspouts to walls with 1/8 inch by 2-inch galvanized steel straps. Straps shall be located at top, bottom, and at not over 10 feet on center. Block downspouts out 1/2 inch from the finish wall surfaces and 1 inch from the bottom of downspout grade. Secure straps to wall framing with 1/4 inch by 2-inch long galvanized anchors. Expansion type anchors shall be provided when anchoring to concrete and masonry. Provide toggle bolts for attachment to masonry or plaster. At steel columns, provide fasteners as indicated. Plastic anchors are not permitted.
 - 4. Anchor conductor heads to walls with 1/4 inch diameter by 2 1/2-inch long galvanized lag screws or 1/4 inch expansion type anchors.



- C. Reglets: Install reglets at constant height above cant or as indicated. Provide minimum 3-inch lap at end splices of reglets. Seal laps watertight.
- D. Counterflashing:
 - 1. Install at constant horizontal elevation across roof slope and slope at constant height above cant or as indicated.
 - 2. Provide minimum 3-inch lap at all end splices of counterflashing.
- E. Galvanized sheet steel parapet coping and flashing shall be continuous over top of parapet to form a watertight cap, with waterproof seams at approximately 10 feet on center, or as indicated. Anchor coping to outside of wall with a continuous cleat face nailed at 24 inch centers. Coping shall be fastened on inside wall with hex head screws and bonded sealing washers through oversized holes in the back of the coping. Corners and angles shall be lapped and soldered; do not install joint sealant.

3.03 TESTING

- A. Perform field water testing to demonstrate installation is watertight. Continue testing with a continuous hose stream applied at base of installation for at least 30 minutes. If leaking is observed, discontinue test and repair installation, then test until satisfactory results are obtained.

3.04 PROTECTION

- A. Protect the Work of this section until Substantial Completion.

3.05 CLEANING

- A. Remove rubbish, debris, and waste materials and legally dispose of off the Project site.

END OF SECTION



SECTION 07 64 25

FULLY ADHERED TPO ROOFING

GENERAL

1.01 SUMMARY

- A. Description: This section includes the Work for Fully Adhered TPO Roofing systems including the installation vapor retarder, roofing membrane, edge metal and walkways, and other miscellaneous items over concrete on steel deck at Mechanical spaces.
- B. Section Includes
 - 1. Inspection
 - 2. Preparation
 - 3. Installation of Roofing
 - 4. Installation – Membrane
 - 5. Installation Edge Metal and Coping
 - 6. Installation of Adjoining Work
 - 7. Installation – Walkways
 - 8. Protection and Cleaning
 - 9. Clean Up
- C. Related Specification Sections include but are not necessarily limited to:
 - 1. Completely coordinate with work of other trades.
 - 2. Section 07 62 00 - Flashing and Sheet Metal

1.02 REFERENCES

- A. SPRI: “Wind Load Design Guide for Low Sloped Flexible Membrane Roofing Systems.”
- B. Factory Mutual (FM) Research Corporation: “Loss Prevention Data Sheets 1-28, 29, and 49.”



- C. National Roofing Contractors Association (NRCA): Roofing and Waterproofing Manual.
- D. Material Standards – TPO Membrane:
 - 1. Standard Specification for TPO Membrane: ASTM D6878.
 - 2. Tolerance on Nominal Thickness (Max): ASTM D751
 - 3. Thickness over scrim (Min): ASTM D4637
 - 4. Breaking Strength (Min): ASTM D751
 - 5. Ultimate Elongation – Fabric Failure (Min): ASTM D751
 - 6. Tear Strength (Min): ASTM D751
 - 7. Linear Dimensional Change (Shrinkage) :ASTM D1204
 - 8. Field Seam - Peel Strength (min): ASTM D1876
 - 9. Permeance (max): ASTM E96
 - 10. Puncture Resistance (min): FTM 101C Method 2031
 - 11. Solar Reflectance (albedo X 100): ASTM E903
 - 12. Brittleness Point: ASTM D2137

1.03 QUALITY ASSURANCE

- A. Manufacturers Qualifications: Company specializing in successfully manufacturing the specified TPO membrane for a minimum of 10 years in their own facilities and not had any formulation changes within the last ten years. Membrane manufacturers shall submit the following certification for review when making substitution requests or submittals.
- B. Applicator Qualifications: Roofing installer shall have the following:
 - 1. Current approval, license, or authorization as applicator by the manufacturer.
 - 2. Manufacturer authorized roofing installer with five years-experience on projects of similar size, scale, complexity and location.
- C. The roof operations shall be coordinated with appurtenant work such as sheet metal work so that the roofing surfacing operations once started are continuous to completion.



- D. Total roofing system materials and applications shall be as per manufacturer's recommendations.

1.04 DESIGN CRITERIA

- A. Design roof system, including roof covering and metal edge securement to satisfy requirements of applicable building codes including local amendments:

- 1. Design Roof System and anchorage to meet Design Loads.

- a. Wind Loads: Use the greater of the following:

- 1) Wind Pressures as required per local building code based on wind speed, exposure factor and importance factor noted in the Structural Plans.
- 2) Wind Pressures defined by Building Code as locally adopted and amended.
- 3) 20 psf minimum.

- 2. Requirements applicable to designated warranty.

- 3. Roof Height(s) and Parapet Height(s): As indicated.

- B. Windborne-Debris-Impact Resistance: Provide exterior roofing that passes enhanced-protection testing requirements in ASTM E 1996 for Wind Zone indicated when tested according to ASTM E 1886. Test specimens shall be no smaller in width and length than glazing indicated for use on the Project and shall be installed in same manner as roofing indicated for use on the Project.

- 1. Small-Missile Test: For roofing located more than 30 feet above grade.

- 2. Large-Missile Test: For all roofing, regardless of height above grade.

- C. Fire resistance rating:

- 1. UL 790, Class A.

- 2. Assembly in conformance with fireproofing as specified.

1.05 SUBMITTALS

- A. Shop Drawings:

- 1. Roof layout showing insulation thicknesses and special details.



2. Profiles of flashing assemblies.
 3. Installation Drawings and pertinent details.
 4. Indicate location of expansion joints, crickets, saddles, curbs, safety tiebacks, vents, drains and other penetrations.
 5. Indicate slope amount and direction, locations of crickets, and key vertical elevation points.
- B. Samples:
1. 5 IN x 5 IN specimens of sheet goods.
 2. Color swatches of sheet metal colors for pre-selection.
 3. 3 IN x 5 IN samples of sheet metal color(s) for final approval.
- C. Products Data:
1. Submit Manufacturer's Material Product and Data and Material
 2. Safety Data Sheets for the following items:
 - a. Single-ply membrane sheet roofing
 - b. Vapor Barrier
 - c. Flashing and flashing accessories
 - d. Fasteners & Adhesive
- D. Certificates:
1. Contractor Certification: Prior to the start of any work, submit a signed certificate from the proposed roofing manufacturer stating that the roofer is a trained and authorized applicator of the assemblies and that the Manufacturer or the Technical Representative of the Manufacturer has trained the installation crew in the system's proper installation.
 2. Technical Representative Certification: Submit a signed certificate from the proposed roofing manufacturer naming their technical representative and their independent roofing auditor/inspector (where applicable) and attesting that this person is both qualified and authorized to act on and make commitments in their behalf.



3. Manufacturer's Certification: TPO membrane supplied for this project is made in its own facility and has had no formulations changes, within the past 10 years.
 4. Manufacturer's Certification: Roof membrane manufacturer to certify that metal flashing gauge specified, meets, ANSI/SPRI ES-1 Test Method RE-3.
 5. Warranty Certification: Submit a signed certificate from the Manufacturer or its Technical Representative stating that the plans and specifications for the project have been reviewed and fully comply with the Manufacturer's standards and meet the requirements for warranty of the Complete Roofing System for the specified project.
 6. Listing: Submit listing's from national recognized testing laboratory UL indicating the proposed roofing system has a fire classification rating of Class A or B. The listing's report shall also indicate the maximum roof slope permitted for the proposed roofing assembly. Where required, Factory Mutual approval for the roofing system must be clearly noted with the listing's.
 7. Warranty Certificate: Submit samples of the Manufacturer's Warranty from manufacturer-exhibiting conformance with the item entitled "Warranty" herein below.
- E. Project Information:
1. Meeting minutes from pre-installation conference.
 2. Report by manufacturer's representative that roof has been properly installed.
- F. Contract Closeout Information:
1. Warranty.
 2. Maintenance Data:
 - a. Include cleaning instructions.
- G. LEED Submittals: Complete the LEED Material Buyout Form (MBoF) with all materials provided to the project. A complete submittal includes providing all material costs in the MBoF and all of the supporting documentation for the following credits:
1. MRc2 - Environmental Product Declarations (EPD): Provide Industry-Wide or Product-Specific EPD.
 2. MRc3 - Sourcing of Raw Materials - Recycled Content: Provide product data for pre- and post- consumer recycled content.
 3. MRc4 - Material Ingredients: Provide manufacturers Declare label, Health Product Declaration (HPD), Cradle to Cradle Certification, or Cradle to Cradle Health Product Certificate.



4. IEQc2 - Low-Emitting Materials – Interior Wet Applied Products: For paints, coatings, adhesives and sealants applied on site or used for laminating off-site, include product data indicating the VOC content (g/L) and testing.

1.06 PRE-INSTALLATION CONFERENCE

- A. Pre-installation conference, directed by Contractor, prior to beginning of roofing work to discuss following:
 1. Contract Document requirements.
 2. Roof plan.
 3. Roofing and flashing details.
 4. Drain and scupper elevations.
 5. Roofing manufacturer's Specifications and details.
 6. UL requirements.
 7. Insulation manufacturer's recommendations.
 8. Available on site storage.
 9. Roof protection from damage by other trades.
- B. Attendance is recommended for:
 1. Contractor.
 2. Roofing installer's superintendent.
 3. Roofing manufacturer's representative.
 4. Sheet metal installer performing metal flashing work.
 5. Mechanical installer.
 6. Plumbing installer.
 7. Deck installer.
 8. Other trades whose work may affect roofing system.
- C. Minimum two (2) weeks prior to meeting forward pertinent information to Contractor for review.



1. Installation Drawings.
 2. Manufacturer product data.
 3. Samples of proposed materials.
 4. Sample warranty.
 5. Other information deemed pertinent for sound and secure application.
- D. Include review of Specifications, details, application requirements and preliminary work.
- E. Objectives of pre-installation meeting to include:
1. Review foreseeable methods and procedures related to roofing work.
 2. Tour representative areas of roofing substrates (decks), inspect and discuss condition of substrate, roof drains, curbs, penetrations and other preparatory work performed by others.
 3. Review structural loading limitations of deck and inspect deck for loss of flatness and for required attachment.
 4. Review roofing system requirements (Plans, Specifications and other Contract Documents).
 5. Review required submittals both completed and yet to be completed.
 6. Review and finalize construction schedule related to roofing work and verify availability of materials, installer's personnel, equipment and facilities needed to make progress and avoid delays.
 7. Review required inspection, testing, certifying and material usage accounting procedures.
 8. Review weather and forecasted weather conditions and procedures for coping with unfavorable conditions, including possibility of temporary roofing.
 - a. Review notification procedures for weather or non-working days.
 9. Record discussion of conference including decisions and agreements (or disagreements) reached.



- a. If substantial disagreements exist at conclusion of meeting, determine how disagreements will be resolved and set date for reconvening meeting.
- F. Furnish copy of record to each party who may be affected by roofing work, (weather or not they were in attendance) and to Owner and Architect.

1.07 WARRANTY

- A. The Contractor shall furnish a written warranty on the roofing membrane system and sheet membrane flashing for a three (3) year period covering labor and installation of specified system and components.
1. Repair of roofing, flashing, roof drains, overflow drains, sealants, etc. as necessary to seal leaks which are attributable to faulty materials and/or workmanship.
- B. The roofing system manufacturer shall submit a written 20-year roof membrane system and wind warranty up to 105 mph and flashing endorsement. The warranty shall cover both material and workmanship and shall provide that the roofing system manufacturer will make repairs as necessary to maintain the roof in a watertight condition at no cost to the Owner. The issuance of the warranty by the manufacturer is acceptance that the roof has been installed in accordance with the manufacturer's instructions.
1. Warranty to include the entire system: membrane, flashings, adhesives, sealants, counterflashings, fastener plates, fastener strips, hard rubber or metal edging, metal termination bars, sheet metal edge metal, and other material authorized by manufacturer.
- C. 20-year warranty on stainless steel coatings on edge metal and copings.

PRODUCTS

1.08 ACCEPTABLE MANUFACTURERS

- A. Roofing materials:
1. Base:
 - a. Carlisle SynTec.
 2. Acceptable Alternates:



- a. Firestone Building Products.
- b. Sika/sarnafil.
- c. Or approved equal.

1.09 GENERAL

- A. All components products shall be made by, or accepted as compatible by the selected membrane manufacturer.
- B. Unless otherwise approved by OWNER and accepted by the membrane manufacturer, products including insulation, concealed fasteners, fastening plates and edgings, must be manufactured and supplied by roofing system manufacturer and covered by warranty.

1.10 VAPOR RETARDER

- A. Vapor Retarder:
 - 1. Two plies of polyethylene, bonded over one layer of scrim reinforcing.
 - 2. Fire retardant type, with compatible fire retardant adhesive.
 - 3. Base Product: “TX-1200 FR” by Griffolyn, or approved equal as acceptable by the TPO membrane manufacturer.
 - 4. Minimum Properties:

26 LBS
0.036 Perm (US)
100 LBS / 4,504 PSI
26 LBS

- 5. Seaming Tape:
 - a. Self-adhering, asphaltic mastic.
 - b. Base Product: “Fab Tape” by Griffolyn.
- 6. Repair Tape, for punctures and other damaged areas:



- a. Base Product: “Griff Tape” by Griffolyn.

1.11 ROOFING MEMBRANE

A. TPO Roofing membrane:

1. Material: Thermoplastic Polyolefin (TPO) single-ply roofing membrane. Width and length of sheet shall be as recommended by the manufacturer.
 - a. Fire Retardant.
 - b. Polyester fabric reinforced.
2. Color:

Color 1: Tan.

Thickness: 80 mil thick.
3. Base Product: “SureWeld” by Carlisle SynTec, Firestone Building Products-Genflex or Approved Equal.
4. Minimum Physical Properties:

Minimum Physical Properties – 80mil, Reinforced, TPO Membrane		
Property	Test Method	Required Value
Tolerance on Nominal Thickness (Max)	ASTM D751	+/- 10%
Thickness over scrim (Min)	ASTM D4637	15 mil
	Optical	18 mil
Breaking Strength (Min)	ASTM D751	225 LBS
	Grab Method	340 LBS
Ultimate Elongation – Fabric Failure (Min)	ASTM D751	25%
Tear Strength (Min)	ASTM D751	55 LBS
	B Tongue Tear	130 LBS
Linear Dimensional Change (Shrinkage)	ASTM D1204	+/- 1.0%
Field Seam - Peel Strength (min)	ASTM D1876	40 LBS/IN



Permeance (max)	ASTM E96	<0.1 Perm (US)
Puncture Resistance (min)	FTM 101C Method 2031	250 LBS
Solar Reflectance (albedo X 100)	ASTM E903	80 (White Membrane)
Brittleness Point	ASTM D2137	-40 DegF

B. Membrane flashings, fasteners, adhesives, tapes, cements and sealants: Roofing manufacturer's standard.

1.12 EDGE METAL

A. General:

1. Roofing Manufacturer's pre-engineered, prefabricated system for termination of roofing membrane.
2. All fasteners must be concealed from view.
3. Concealed splice plates, with color matching snap-on covers.
4. Anchor cleats:
 - a. Material: G90 galvanized steel.
 - b. Thickness: 20 GA.
5. Snap-on cover:
 - a. Material: G90 galvanized steel.
 - b. Thickness:
 - 1) For dimensions less than 10 IN: 24 GA.
 - 2) For dimensions 10 to 24 IN: 22 GA.
 - c. Finish: Stainless Steel Type A316.
6. Wind Rating: Design for same FM design pressure indicated for balance of roof system.
7. Coverage of these items to be included in roof system warranty.
8. Comply with applicable FM and SPRI standards.



- B. Roof Edge/Fascia:
 - 1. Match profiles indicated.
 - 2. Include accessories such as pre-fabricated inside and outside corners, Spillover, Overflow and Downspout Scuppers, Edging Extensions, Fascia Sumps, and other items indicated.
 - 3. Base Product: “SecurEdge 200 Fascia” by Carlisle SynTec.

1.13 FASTENERS

- A. Type, spacing and quantity as recommended by manufacturer.
 - 1. All exposed fasteners to be Stainless Steel Type A316.
 - 2. Designed to resist uplift forces generated by specified wind speed (105 miles/hour).
- B. Minimum pullout values per fastener:
 - 1. For use with 22 GA steel decks: 350 LBS each.
 - 2. For use with normal weight concrete decks: 800 LBS each.
- C. Fasteners shall be capable of providing a static back-out resistance of at least 10 IN/LBS.

1.14 WALKWAYS

- A. Walkway: Where shown on Plans:
 - 1. Manufacturer’s standard walkway roll stock, designed to protect TPO roof membrane.
 - a. Slip-resistant surface.
 - 2. Nominal Thickness: 160 mil.
 - 3. Width: 30 IN.
 - 4. Color: To be selected by Architect from manufacturer’s standard line.
 - 5. Secure by heat welding tape as recommended by membrane manufacturer.

1.15 MISCELLANEOUS ITEMS

- A. Roofing accessories:



1. Use manufacturer's standard prefab accessories where available.
 2. Nailing strips: As detailed and required.
 3. Pipe flashings: Provide TPO pre-molded flashings for each pipe penetration; include clamps, adhesive and sealants.
- B. Bonding adhesives, cleaners, and primers: As recommended by roofing manufacturer.
- C. Fire-resistive Treated (FRT) Wood Blocking.
- D. Other Materials as required by manufacturer for complete system warranty.
- E. Sealers and Sealants: As recommended by the manufacturer.
- F. Metal Termination Bars: Manufacturer's standard stainless steel bars, approximately 1-inch wide, pre-formed and pre-punched.
- G. Fasteners and Plates: Manufactured supplied factory-coated steel fasteners and metal discs of appropriate type and lengths, designed for fastening system components to substrates meeting 2006 IBC uplift pressure and warranty requirements as specified.
- H. Miscellaneous Accessories: Provide preformed inside and outside corner sheet, flashings, and other accessories recommended by roofing system manufacturer for intended use. Provide products, which are recommended by membrane manufacturer to be fully compatible with indicated substrates, or provide separation materials as required to eliminate contact between incompatible materials.
- I. Pourable Sealer: Two-component, solvent free, polyurethane based sealant as furnished by membrane manufacturer to fill and seal pipe penetrations; to create a temporary seal of membrane to substrate when work is interrupted.
- J. Sealant Pockets: Prefabricated pockets for sealing irregular and hard to flash penetrations through the membrane.
- K. Pipe Flashing: TPO premolded pipe flashing.

1.16 ROOF SYSTEM

- A. Roof System – Fully Adhered TPO over concrete deck



EXECUTION

1.17 INSPECTION

- A. Inspect entire area to be roofed for acceptability.
 - 1. Correct, or have corrected, unsatisfactory conditions.
- B. A representative of manufacturer shall make an inspection during roofing construction and issue a report to OWNER that construction following manufacturers installation instructions.
- C. A representative of manufacturer shall make an inspection and issue written report to OWNER that roofing system has been installed properly.

1.18 PREPARATION

- A. Coordinate work with other trades to ensure that components, which are to be incorporated into the roofing system, are available to prevent delays or interruptions as the work progresses. Examine roofing substrates to which the roofing materials are to be applied to insure that their condition is satisfactory for its application. Do not permit voids greater than 1/4 -inch wide in the existing roofing substrate. Inspect substrates and correct defects before application of membrane sheets.
- B. Clean substrates of dust, debris, moisture, foreign material and other substances detrimental to roofing installation according to roofing system manufacturer's written instructions.
- C. Properly sloped roof should not have standing water before covering the area to be roofed prior to starting roofing work.
- D. Install required nailers.

1.19 INSTALLATION OF ROOFING - GENERAL

- A. Install materials in accordance with manufacturer's instructions and recommendations.
- B. Comply with code, design, and warranty requirements.
- C. Fasteners which will be exposed to view from finished spaces below:
 - 1. Project fastener through roof deck maximum 1 IN and cap.
- D. Comply with the manufacturer's instructions for the installation of the membrane roofing system including proper substrate preparation, jobsite considerations and weather restrictions.



- E. Install materials in accordance with procedures required for FM and UL assemblies.
- F. Arrange work to prevent use of newly constructed roofing for storage, walking surface, or equipment movement. If access is necessary, provide temporary walkways, platforms or runways to proceed to protect new roofing surfaces and flashing from mechanical damage.
- G. Do not dilute coatings or sealants unless specifically recommended by the material manufacturer's printed application instructions. Do not thin liquid materials with cleaners used for cleaning membrane sheet.
- H. Keep all liquids in airtight containers and keep containers closed except when removing materials.
- I. Use liquid components, including adhesives, within their shelf life period. Store adhesives at 90 to 80 degrees F for at least 24 hours prior to use. Avoid excessive adhesive application and adhesive spills, as they can be destructive to some membranes sheets and insulations; follow adhesive manufacturer's printed application instructions.
- J. Do not allow contact between various materials through mixing of remains, dual use of mixing, transporting or application equipment. Do not use equipment containing the remains of previous materials.
- K. Require workmen and others who walk on the membrane to wear clean, soft-soled shoes to avoid damage to roof materials.
- L. Do not use equipment with sharp edges which could puncture the membrane sheet.
- M. No roofing shall be installed during precipitation and shall not be started in the event there is a possibility of precipitation during applications.
- N. Absolutely no roofing shall be applied before the deck and the work in connection therewith have met the following conditions:
 - 1. Adjoining work, such as scuppers, metal counter-flashing, leader heads and collars for vent pipes shall either be in place, ready for the Installer to work in or shall be available for installation by others, as applicable.
 - 2. Phased construction (roofing purposely interrupted for a period to permit other work and trafficking over the membrane) shall not be permitted.
 - 3. At the end of the day's work, all incomplete roofing shall be protected using water cut-off and other materials to seal all incomplete edges against intrusion of water.



4. Water cut-off shall be removed before continuing installation of the roofing System.

1.20 INSTALLATION OF NAILERS

- A. Install nailers at perimeter of each roof level, curbs, skylights, expansion joints, and similar penetrations.

1.21 INSTALLATION - WOOD BLOCKING

- A. Install where indicated or required for proper securement of roofing system.
- B. Securement of wood blocking:
 1. Design to resist a minimum of 200 LBS/LF in any direction per SPRI Test Method RE-1.
- C. Install so that top of blocking is substantially flush ($\pm 1/4$ IN) with top of insulation.

1.22 INSTALLATION – MEMBRANE

- A. General:
 1. Unroll and position membrane without stretching.
 2. Secure the membrane with the required fasteners and plates.
 - a. Spacing as dictated by wind design and project conditions.
 3. Install adjoining membrane sheets in the same manner in accordance with the manufacturer's requirements.
 4. Position sheets to accommodate contours of roof deck.
 - a. Shingle splices to avoid bucking water.
 5. Perimeter Securement: Secure membrane along the perimeter of each roof level, roof section, curb, interior wall, penthouse, and other penetrations as recommended by membrane manufacturer.
 6. Hot or Cold Weather Procedures: Comply with manufacturer's instructions.
 7. Protect membrane from stains/discoloring caused by adhesives.
 8. Temporary Work: Install temporary cutoffs around incomplete edges of roofing assembly at the end of each day's work and when work must be postponed due to inclement weather. Temporary cutoffs provide protection



against moisture infiltration and absorption. Remove the temporary seals completely when work resumes. Provide temporary ballast on the roofing as necessary to prevent wind damage to the membrane sheet.

B. Adhering TPO Membrane:

1. Position TPO membrane over substrate.
2. Fold membrane sheet back lengthwise onto itself exposing half underside of membrane.
3. Apply bonding adhesive in accordance with the manufacturer's instructions, to exposed underside of the membrane and the corresponding substrate area.
 - a. Do not apply bonding adhesive along the splice edge of membrane to be hot air welded over the adjoining sheet.
 - b. Allow adhesive to dry until it is tacky.
 - c. Roll the coated membrane into coated substrate while avoiding wrinkles.
 - d. Brush down bonded section of the membrane sheet immediately after rolling membrane into the adhesive with a soft bristle push broom to achieve maximum contact.
 - e. Fold back unbonded half of sheet lengthwise and repeat the bonding procedures.
4. Membrane Splicing/Hot Air Welding Procedures:
 - a. Position adjoining sheets to allow a minimum overlap of 2 IN.
 - b. Hot air weld TPO membrane sheets using Automatic Hot Air Welding Machine or Hot Air Hand Welder in accordance with the manufacturer's hot air welding procedures.
 - 1) At splice intersections, roll seam with a roller prior to membrane seam cooling.
 - 2) Splice intersections shall be overlaid with non-reinforced TPO flashing material of type recommended by membrane manufacturer.



- c. Probe seams once the hot air welds have thoroughly cooled.
- d. Repair seam deficiencies same day they are discovered.
- e. Apply sealant of type recommended by membrane manufacturer on cut edges of reinforced membrane where scrim reinforcement is exposed after seam probing is complete.
- f. Pull membrane back along the welded splice so entire underside of membrane is exposed once Hot Air Weld has been completed.
 - 1) Apply bonding adhesive to exposed underside of membrane sheet and substrate.
 - 2) Allow adhesive to dry until tacky and roll membrane into substrate and brush down bonded section with a bristle broom following procedure noted above.
 - 3) Continue to install adjoining membrane sheets in same manner, overlapping edges a minimum of 2 IN and complete bonding procedures.

5. Flashing.

- a. Follow manufacturer's typical flashing procedures for wall, curb, and penetration flashing including metal edging/coping and roof drain applications.
- b. Flashing of parapets, curbs, expansion joints and other parts of roof must be performed using reinforced TPO membrane.
- c. Manufacturers standard, non-reinforced TPO membrane can be used for flashing pipe penetrations, sealant pockets, scuppers, as well as inside and outside corners when use of pre-fabricated accessories is not feasible.
- d. Terminate base-of-wall flashings in accordance with manufacturer's approved details.
 - 1) Install flashing as roofing sheets are installed in accordance with printed instructions of the sheet membrane manufacturer. Extend base flashing as indicated on the drawings above roofing surface. Completely adhere flashing sheets in place.



- e. Use prefabricated pipe seals at pipe penetrations. Pre-flashing at sheet metal parapet copings:
 - 1) Extend TPO membrane, flashing or both over top of parapet prior to capping with sheet metal.
- f. Expansion Joints:
 - 1) Extend TPO membrane across roofing expansion joints.
 - 2) Include adequate slack in membrane to accommodate anticipated movement.

1.23 INSTALLATION - EDGE METAL AND COPING

- A. Verify blocking has been installed and adequately secured.
- B. Sub-flash details with a layer of TPO membrane prior to installation of edge metal or coping system.
- C. Secure anchor cleat to blocking as recommended, using corrosion-resistant fasteners.
- D. Install splice plates and snap-on covers.
- E. Protect finished items from damage for balance of construction period.
 - 1. Repair/replace damaged items.

1.24 INSTALLATION OF ADJOINING WORK

- A. Unless otherwise shown on the plans, all adjoining work shall be done in accordance with the specifications and details of the manufacturer of the roofing assembly being used. The Contractor shall coordinate the Roofer's installation and any work that requires tying-in with the roofing so that the combined installation is leak-proof

1.25 INSTALLATION – WALKWAYS

- A. Install walkways at traffic concentration points, such as roof hatches, access doors, rooftop ladders, etc., and locations as indicated.
 - 1. Do not locate within 10 FT of roof edge.
- B. Clean surfaces to be bonded.
- C. Secure by heat welding as recommended by membrane manufacturer.



1.26 PROTECTION AND CLEANING

- A. Any work or materials damaged during the handling of roofing materials shall be restored to their original (undamaged) condition or replaced.
- B. The work of other trades shall not be marred or injured. Daubed or splashed surfaces shall be removed and the surface or finish restored to its original finish and appearance.
- C. Protective coverings shall be installed at all pavement and exposed building walls as necessary to prevent the marring of existing surfaces.
- D. Protection shall remain in place for the duration of the roofing work.
- E. Contractor shall have on hand at the roof appropriate weather protection materials to protect the substrate and building interior during inclement weather.
- F. Upon completion of roofing (including associated work), institute appropriate procedures for surveillance and protection of roofing during remainder of construction period. At end of construction period, or at a time when remaining construction will in no way affect or endanger roofing, make a final inspection of roofing and prepare a written report to the Engineer describing nature and extent of deterioration or damage found.
- G. Repair or replace (as required) deteriorated or defective work found at time of final inspection to a condition free of damage and deterioration at time of Substantial Completion and in accordance with requirements of specified warranty.

1.27 CLEAN UP

- A. Remove all construction debris and legally dispose off-site.
 - 1. The roof shall be left in good, clean condition.
- B. Roof drains, scuppers and overflow roof drains shall be cleaned out and all blockages shall be removed prior to acceptance of the project.

END OF SECTION



SECTION 07 84 13

PENETRATION FIRESTOPPING

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

1. Penetrations for the passage of duct, cable, cable tray, conduit, piping, electrical busways and raceways through fire-rated vertical barriers (walls and partitions), horizontal barriers (floor/ceiling assemblies. Gaps between the top of walls and ceilings or roof assemblies.

B. Related Requirements:

1. Division 01 - General Requirements.
2. Section 03 30 00 - Cast-in-Place Concrete.
3. Section 07 21 00 - Thermal Insulation.
4. Section 07 92 00 - Joint Sealants.
5. Section 09 29 00 - Gypsum Board.
6. Division 22 - Plumbing.
7. Division 23 - HVAC.
8. Division 26 - Electrical.

1.02 REFERENCES

A. ASTM Standards:

1. ASTM E84 – Standard Test Method for Surface Burning Characteristics of Building Materials.
2. ASTM E119 – Standard Test Methods for Fire Tests of Building Construction and Materials.
3. ASTM E814 - Standard Test Method for Fire Tests of Through-Penetration Fire Stops.
4. ASTM E1399 – Standard Test Method for Cyclic Movement and Measuring Minimum and Maximum Joint Widths on Architectural Joint Systems.



5. ASTM E1966 – Standard Test Methods for Fire-Resistive Joint Systems.
 6. ASTM E2174 - Standard Practice for On-Site Inspection of Installed Firestops
 7. ASTM E2307 – Standard Test Method for Determining Fire Resistance of Perimeter Fire Barriers Using Intermediate-Scale, Multi-story Test Apparatus.
 8. ASTM E2393 - Standard Practice for On-Site Inspection of Installed Fire Resistive Joint Systems and Perimeter Fire Barriers.
- B. Underwriters Laboratories, Inc.
1. UL Fire Resistance Directory.
 2. UL 263 – Standard for Fire Tests of Building Construction and Materials.
 3. UL 723 – Standard for Test for Surface Burning Characteristics of Building Materials.
 4. UL 1479 – Fire Tests of Through Penetration Firestops.
 5. UL 2079 – Test for Fire Resistance of Building Joint Systems.
- C. Testing Services:
1. Intertek ES SAT.
 2. Southwest Research Institute.
 3. Underwriters Laboratories.
- D. International Firestop Council Guidelines for Evaluating Firestop Systems Engineering Judgments.
- E. California Building Code, Chapter 7 Fire Tests of Through-Penetration Fire Stops.
- F. Firestop Contractors International Association (FICA) Manual of Practice.

1.03 SYSTEM DESCRIPTION

- A. Provide fire stops and smoke seals to prevent the passage of fire, smoke, toxic gasses or water from one floor or area to another. Seal openings in floors, fire rated walls and permanent partitions penetrated by pipes, ducts, conduits and other items as shown, specified, and as required for the type of construction.
- B. Mineral fiber insulation installed as fire safing at non-rated penetrations not containing pipes, ducts, conduits, and other items in floor slabs, wall partitions, construction-joint conditions between slabs and adjacent construction and where indicated or required.
- C. Provide damming material, clips, and closures as required for support and containment of dams, and other insulation materials required for tested and rated fire stop systems.



1.04 QUALITY ASSURANCE

A. Performance Criteria:

1. Provide materials and Work to conform to source quality control criteria specified herein and CBC requirements in fire resistant wall and floor assemblies to prevent the passage of fire, smoke, and toxic gases.
2. Installed fire stops shall be of sufficient thickness, width, and density to provide a fire resistance rating at least equal to the floor, wall, or partition construction into which it is installed.

B. Comply with CBC requirements for fire rated construction.

C. Qualifications of Manufacturer: Products furnished for fire stopping and smoke seals shall be manufactured by a firm which has been continuously and regularly employed in the manufacture of these materials for a period of at least 5 years; and which can provide evidence of these materials being satisfactorily installed on at least 5 projects of similar size and type within such period.

D. Qualifications of Installer: The Work of this section shall be installed by a firm which has been in the business of installing similar materials for at least 5 consecutive years; and can provide evidence of satisfactory completion of 5 projects of similar size and scope. Installer shall have applicators trained and certified by manufacturer for performing this Work. Comply with requirements of FICA Manual of Practice.

E. For those firestop applications that exist for which no UL tested system is available through a manufacturer, an engineering judgment derived from similar UL system designs or other tests will be submitted to local authorities having jurisdiction for their review and approval prior to installation. Engineering judgment drawings must follow requirements set forth by the International Firestop Council.

F. Firestopping tests shall be performed by a qualified testing and inspection agency. A qualified testing and inspection agency shall be UL, Intertek or another agency performing testing and follow-up inspection services for firestop systems acceptable to authorities having jurisdiction. Firestopping products shall bear the classification marking of a qualified testing and inspection agency.

1.05 SUBMITTALS

A. Product Data:

1. Submit manufacturer's Product Data for each type of fire stop and smoke seal material proposed for installation. Indicate product characteristics, typical installations, performance, and limitation criteria and test data.
2. Submit manufacturer's printed installation instructions for each type of product, system, and construction required for the Work. Indicate fire resistance rating of each installation.
3. Submit fire test reports from independent testing agency indicating the following:



- a. Fire test report of fire stop material installed to substrate and penetration materials similar to the Work of this section. Test to indicate both Fire Resistance (F) and Temperature (T) Ratings.
 - b. Test reports of products to be installed shall indicate conformance to ASTM E814 or UL 1479 for penetrations, ASTM E1966 or UL 2079 for joints, and ASTM E2307 for perimeter fire barrier (edge-of-slab) systems.
- B. Field Samples: No less than 10 days before commencing the Work of this section, provide field installed Samples of fire stop materials and systems.
1. Apply one Sample of fire stop material for each different penetration and related fire rating required for the Work.
 2. Sample areas shall comply with thickness, fire resistance ratings, and finished appearance.
- C. Manufacturer's Qualifications: Submit evidence of conformance with qualification requirements specified above.
- D. Installer's Qualifications: Submit evidence of conformance with qualification requirements specified above.
- E. LEED Submittals: Complete the LEED Material Buyout Form (MBoF) with all materials provided to the project. A complete submittal includes providing all material costs in the MBoF and all of the supporting documentation for the following credits:
1. MRc2 - Environmental Product Declarations (EPD): Provide Industry-Wide or Product-Specific EPD.
 2. MRc3 - Sourcing of Raw Materials - Recycled Content: Provide product data for pre- and post- consumer recycled content.
 3. MRc4 - Material Ingredients: Provide manufacturers Declare label, Health Product Declaration (HPD), Cradle to Cradle Certification, or Cradle to Cradle Health Product Certificate.
 4. IEQc2 - Low-Emitting Materials – Interior Wet Applied Products: For paints, coatings, adhesives and sealants applied on site or used for laminating off-site, include product data indicating the VOC content (g/L) and testing.

1.06 DELIVERY, STORAGE AND HANDLING

- A. Deliver products to the Project site in manufacturer's original, unopened containers bearing correct UL labeling.
- B. Fire stop material shall be stored above grade in an area protected from detrimental weather and moisture conditions and in compliance with manufacturer's requirements, including temperature restrictions.
- C. Fire stop and seal materials shall be installed before expiration of shelf life.



PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Unless otherwise noted, products of this section shall be as manufactured by:
1. 3M Fire Protection Products.
 2. Hilti, Inc.
 3. Nelson Firestop Products.
 4. Specified Technologies, Inc. (STI).
 5. Tremco, Inc.
 6. Equal.
- B. Provide materials and systems of specified manufacturers to suit penetration and substrate as determined by various conditions of installation.
- C. Provide firestopping composed of components that are compatible with the substrates forming openings and the items penetrating the firestop, under conditions of service and application, as demonstrated by the fire stopping manufacturer based on testing and field experience.

2.02 MATERIALS

- A. Cast-in Firestop Devices: Pre-installed firestop devices penetrating cast-in-place concrete decks and concrete over metal decks, for use with combustible and non-combustible pipe, (closed and open systems) insulated pipe, conduits and cable bundles. Provide metal deck adapters and top seal plugs.
1. 3M: Fire Barrier Cast-in-Place Devices.
 2. Hilti: CP 680 Cast-in-Place FS Device
 3. Tremco: CIPP Plastic, CIPP Metal.
 4. Specified Technologies, Inc. (STI): Cast-In Firestop Devices.
 5. Equal.
- B. Firestop Collar: Made of galvanized steel housing and Intumescent inserts for firestopping combustible pipes through walls and floors. For use with concrete, masonry, wood floor and gypsum wall assemblies. Provide two collars on walls, one on each side, and one collar on underside of floors.
1. 3M: Plastic Pipe Device PPD.



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2. Hilti: CP 643N and CP 644.
 3. Tremco: TREMstop D.
 4. Nelson Firestop Products: PCS Pipe Choke System.
 5. Specified Technologies, Inc. (STI): Intumescent Firestop Collars, type LCC, SSC or RTC.
 6. Equal.
- C. Fire Pillows and Blocks: Intumescent flexible pillows consisting of a mineral fiber core sealed with a water-resistant intumescent membrane, heat-sealed in a durable fire-retardant poly bag; or intumescent block based on a two component foam, for use in walls and floors and concrete, masonry and gypsum wall assemblies. For large openings containing multiple penetrations: wall openings up to 48 inches by 48 inches and floors up to 36 inches by 36 inches.
1. 3M: Fire Barrier Self-Locking Pillow.
 2. Hilti: FS 657.
 3. Tremco: TREMstop PS1, TREMstop PS2.
 4. Nelson Firestop Products: Fire Brick, Pillows.
 5. Specified Technologies, Inc. (STI): SSB Firestop Pillows.
 6. Equal.
- D. Firestop Mortar: Fire-resistant mortar suitable for firestopping large horizontal or vertical, concrete or masonry openings penetrated by single or multiple non-combustible pipes or cable trays.
1. 3M: Fire Barrier Mortar.
 2. Hilti: CP 637.
 3. Tremco: TREMstop Mortar.
 4. Nelson Firestop Products: CMP Firestop Mortar.
 5. Specified Technologies, Inc. (STI): SSM Firestop Mortar.
 5. Equal.
- E. Firestop Putty Stick: Intumescent, non-hardening, firestop putty for single or bundled cables and non-combustible pipe penetrations. For use in horizontal or vertical, concrete, masonry or gypsum wall assemblies.
1. 3M: MP + Stix.



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2. Hilti: CP 618 and CP 619T.
 3. Tremco: TREMstop MP Putty Stick.
 4. Nelson Firestop Products: FSP AA445, AA439.
 5. Specified Technologies, Inc. (STI): SSP Firestop Putty.
 6. Equal.
- F. Firestop Putty Pad: Moldable firestop putty for protection of electrical outlet boxes.
1. 3M: MPP+.
 2. Hilti: CP 617.
 3. Tremco: TREMstop MP Putty Pad.
 4. Nelson Firestop Products: FSP AA452, AA439.
 5. Specified Technologies, Inc. (STI): SSP Putty Pads or Electrical Box Insert.
 6. Equal.
- G. Firestop Sealant: Smoke, gas and water resistant. For use in horizontal or vertical, concrete, masonry or gypsum wall assemblies.
1. Single component intumescent sealant for protection of combustible and non-combustible pipe, conduit and cable penetrations.
 - a) 3M: CP-25WB+, IC-15WB+, 3000WT.
 - b) Hilti: FS ONE.
 - c) Tremco: TREMstop IA+ or FyreCaulk.
 - d) Nelson Firestop Products: ES1399.
 - e) Specified Technologies, Inc, (STI): LCI or SSS Intumescent Firestop Sealant.
 - f) Equal.
 2. Silicone based system that provides maximum movement in fire-rated joint applications and pipe penetrations.
 - a) 3M: 2000+, 2000 NS.
 - b) Hilti: CP 601S.
 - c) Tremco: TREMstop Fyre-sil.



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- d) Nelson Firestop Products: CLK AA529, AA542, AA492.
 - e) Specified Technologies, Inc. (STI): SIL Silicone Firestop Sealant SIL300 or SIL300SL (self-leveling).
 - f) Equal.
3. Acrylic based system that provides movement capability in fire rated joints and seals through penetration applications.
- a) 3M: FD 150+.
 - b) Hilti: CP 606.
 - c) Tremco: TREMstop Acrylic GG.
 - d) Nelson Firestop Products: FSC3.
 - e) Specified Technologies, Inc. (STI): ES Elastomeric Firestop Sealant.
 - f) Equal.
4. Self-leveling silicone-based firestop sealant for use with through penetrations and construction joints in horizontal floor/ceiling assemblies.
- a) 3M: 1000 SL.
 - b) Hilti: CP 604.
 - c) Tremco: TREMstop Fyre-sil S.L.
 - d) Nelson Firestop Products: CLK AA539, AA552.
 - e) Specified Technologies, Inc. (STI): SIL Silicone Firestop, type SIL300SL.
 - f) Equal.
- H. Firestop Wrap Strip: Wrap strip of intumescent, flexible firestop for use with plastic and insulated pipe penetrations. For use in horizontal or vertical, concrete, masonry or gypsum wall assemblies.
1. 3M: Ultra GS, FS-195.
 2. Hilti: CP 648-S, CP 648-E.
 3. Tremco: TREMstop SuperStrip or TREMstop WS.
 4. Nelson Firestop Products: MCT, MPS.
 5. Specified Technologies, Inc. (STI): SSW Intumescent Wrap Strips, type BLU, BLU2, RED or RED2.



6. Equal.
- I. Spray: Sprayable or brush applied fire-rated mastic for construction joints where maximum movement is required. For use in horizontal or vertical, concrete, masonry or gypsum wall assemblies, at top of wall joints, curtain wall/slab edge and expansion joints.
 1. 3M: FD 200.
 2. Hilti: CP 672.
 3. Tremco: TREMstop Acrylic SP spray.
 4. Nelson Firestop Products: FSC3.
 5. Specified Technologies, Inc. (STI): AS200 Elastomeric Spray with or without SpeedFlex® Joint Strip, or Fast Tack® Firestop Spray.
 6. Equal.
- J. Drywall Track Gaskets: Intumescent cover for drywall ceiling track providing fire, smoke and acoustical ratings for head-of-wall joints between gypsum walls and concrete floor slabs.
 1. Hilti: CFS-TTS Top Track Seal.
 2. Specified Technologies, Inc. (STI): TTG Track Top Gasket.
 3. Equal.
- K. Fire Rated Cable Pathways: Gangable device modules capable of being retrofitted around existing cables and comprised of steel raceway with built-in intumescent material allowing 0 to 100 percent cable fill and requiring no additional action in the form of plugs, twisting closure, putty, pillow, or sealant to achieve fire and leakage ratings.
 1. 3M: Fire Barrier Pass-Through Device.
 2. Hilti: CP 653 Firestop Speed Sleeve.
 3. Specified Technologies, Inc. (STI): EZ-Path Fire Rated Pathway.
 4. Equal.
- L. Fire Rated Grommet or Disc: For single or dual cable penetrations through the same small opening.
 1. Hilti: CFS-D Firestop Cable Disc.
 2. Specified Technologies, Inc. (STI): EZ-Path Firestop Grommets
 3. Equal.



- M. Metal Deck Strips and Plugs: Precut preformed mineral wool plugs and strips to fit flutes of metal deck profile and gap between top of wall and metal deck.
1. 3M: PM4.
 2. Hilti: CP 777 Speed Plugs; CP 767 Speed Strips.
 3. Tremco.
 4. Nelson Firestop Products.
 5. Equal.
- N. Fire Safing, Mineral Fiber or Ceramic Wool Non-Combustible Insulation:
1. Mineral Fiber: Density 4 pounds per cubic foot, USG Thermafiber, Johns Manville Industrial Insulation Group (IIG), Roxul AFB, or equal.
 2. Ceramic Wool: Density 6 pounds per cubic foot, Johns Manville "Ceramic Fiber Insulation", Unifrax "Fiberfrax" ceramic fiber, or equal. Provide material in tested thickness for required hour rating.
 - a. Flame Spread: Less than or equal to 25.
 - b. Smoke developed: Less than or equal to 50.
 3. For mineral fiber, provide 20 gage minimum size metal retainer clips and plates for fire safing support in vertical applications and in compliance with tested system design.
- O. Supplemental Material: Provide supplementary materials required for complete, fire rated, installation.

2.03 SOURCE QUALITY CONTROL

- A. Fire stop and smoke seal material shall be tested by an independent testing agency for conformance to Flame (F) and Temperature (T) requirements of ASTM E814/UL 1479, ASTM E1966/UL 2079, or ATSM E2307.
- B. Conform to UL Fire Hazard Classification Requirements. Material shall be classified as a fill, void, or cavity material and system for UL through Penetration Firestop System.
- C. Material shall be tested and shall display Flame Spread Index of 25 or less, and Smoke Developed Index of 450 or less when tested in accordance with ASTM E84.

2.02 LEED REQUIREMENTS

- A. IW/PS EDP: Products specified under this section must have a Type III Product Specific EPD or the company must be listed in the industry group responsible for the Industry Wide Externally Verified EPD.



- B. PS EPD: Products specified under this section must have a Type III Product Specific EPD.
- C. HPDs: Products specified under this section must have one of the following unexpired material ingredient reports compliant with LEEDv4.1 requirements and declared to 1000 ppm or less: Declare label, Health Product Declaration (HPD), Cradle to Cradle Certification, Cradle to Cradle Health Product Certificate, or UL Product Lens Certification.
- D. Interior Wet Applied Products: All wet-applied on-site paints, coatings, adhesives, and sealants products provided under Part 2 of this specification section must be compliant with the VOC limits outlined under IEQc2: Low Emitting Materials in 01 81 13 Sustainable Design Requirements. In addition, all paints and coatings must be compliant with CDPH Standard Method v1.2-2017 emissions testing with proper unexpired CDPH testing certificates or acceptable third-party certification.

PART 3 - EXECUTION

3.01 APPLICATION REQUIREMENTS

- A. Provide single component fire stop sealant or putty:
 - 1. Within penetrations subject to movement including conduit, cable bundles, buss duct, and noncombustible pipe.
 - 2. As a sealant or caulking for smoke barrier construction, fire, and smoke dampers, mechanical/electrical framed elements in masonry and gypsum board partition systems, and other conditions.
- B. Provide mineral fiber insulation for fire safing at joints and openings through floor slabs, walls, and partitions not indicated to be grouted, gaskets, sealed or otherwise made sound or air tight in this or other sections. Fire safing shall be packed and wedged solidly from both sides of walls and partitions, and from both top and bottom sides of slabs with noncombustible mineral fiber insulation.

3.02 PREPARATION

- A. Examine the areas and conditions where fire stops and smoke seals are to be installed for conditions detrimental to the proper completion of the Work. Do not proceed with the Work until unsatisfactory conditions have been corrected for rated fire protection.
- B. Surface to receive fire stops or smoke seals shall be free of dirt, dust, grease, form release agents, or other matter that would impair the bond of the fire stop material to the substrate or penetrating items. Substrate shall be frost free and when required, dry.
- C. Voids and cracks in substrate shall be filled and unnecessary projections removed before installation of fire stops.



- D. Assure that all pipes, conduit, cable, and other items, which penetrate fire rated construction, have been permanently installed before installation of fire stops. Schedule and sequence the Work to assure that partitions and other construction, which would conceal penetrations, are not installed before the installation of fire stops and smoke seals.
- E. Comply with manufacturer's recommendations for temperature and humidity conditions before, during, and after installation of fire stops and smoke seals.

3.03 INSTALLATION

- A. General: Provide installation in accordance with manufacturer's installation procedures, as required. Install fire stops in accordance with fire test reports, UL Fire Resistance Directory, Intertek Testing Services Directory or SpecDirect, and reviewed Sample installations.
- B. Dam Construction:
 - 1. Install dams when required to properly contain fire stopping materials within openings and as required to achieve fire resistance rating as tested and rated.
 - 2. Provide in conformance with installation requirements for type of floor, wall, and partition construction, and as recommended by fire stop manufacturer.
 - 3. Combustible damming material shall be removed after appropriate curing. Noncombustible damming material may be left as a permanent component of the fire stop system.
 - 4. Placement of dams shall not interfere with function, or adversely affect the appearance, of adjacent construction.
- C. Installation of Single Component Fire Stop Sealant:
 - 1. Provide noncombustible insulation as required to achieve fire resistance rating.
 - 2. Install with manual or powered sealant gun. For up to four hour rating, install to the thickness required by the Listed System Designs as directed for wall and floor applications.
 - 3. Surface of gun grade fire stop sealant shall be tooled in accordance with manufacturer's recommendations.
 - 4. Remove excess materials from adjacent surfaces within 10 minutes, with either water or other material compatible with sealant and recommended by sealant manufacturer, leaving the Work in a neat, clean condition.
- D. Installation of Cementitious Fire Stop Mortar:
 - 1. Mixing: Add dry powder to water and mix with mechanical mixer or hand mixing tools. Ratio and duration of mix shall be as instructed by fire stop mortar manufacturer. Average wet density of mortar shall be 70 pounds per cubic foot (plus or minus 5).



2. Wet surfaces before installation of fire stop mortar. Mortar may be hand installed or pumped into the opening.
3. When installing around layered and grouped cables, vibrate or move the cables slightly to prevent voids from forming between the cables.
4. Exposed surfaces shall be finished with conventional plastering tools before curing.
5. Allow at least 48 hours for initial cure before form removal. For full cure allow 28 days.

3.04 FIELD QUALITY CONTROL

- A. Examine sealed penetration areas to ensure proper installation before concealing or enclosing areas.
- B. Repair damaged areas and restore integrity of assembly.
- C. Keep areas of work accessible until inspection by authorities having jurisdiction.
- D. OWNER will engage a qualified independent inspection agency to inspect through-penetration firestop systems in accordance with ASTM E2174, or joint systems in accordance with ASTM E2393. Manufacturer representatives shall not perform inspections of installed firestopping systems.

3.05 PROTECTION

- A. Protect the Work of this section until Substantial Completion.

3.06 CLEANUP

- A. Clean surfaces adjacent to sealed openings and joints and remove excess of firestopping materials.
- B. Remove rubbish, debris, and waste materials and legally dispose of off the Project site.

END OF SECTION



SECTION 07 92 00

JOINT SEALANTS

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

1. Joint sealants.
2. Preparation for application of sealants.

B. Related Requirements:

1. Division 01 - General Requirements.
2. Section 06 20 00 - Finish Carpentry.
3. Section 07 60 00 - Flashing and Sheet Metal.
4. Section 07 84 13 - Penetration Firestopping.
5. Division 08 - Openings.
6. Division 09 - Finishes.
7. Section 10 28 13 - Toilet Accessories.

1.02 SUBMITTALS

- A. **Shop Drawings:** Submit Shop Drawings indicating sealant joint locations, with full-size sealant joint details.
- B. **Product Data:** Submit manufacturer's literature for each sealant material.
- C. **Material Samples:** Submit Samples indicating color range available for each sealant material intended for installation in exposed locations.
- D. **Certifications:** Submit manufacturer's certification materials comply with requirements specified.
- E. **Site Samples:** At locations required, provide a Sample of sealant for each typical installation, approximately 24 inches long, including joint preparation, backing, sealant and tooling. Allow backing to extend 6 inches beyond end of sealant for inspection of substrate.



- F. Test Reports: Submit manufacturer's adhesion compatibility test reports according to ASTM C794 for each substrate.

1.03 QUALITY ASSURANCE

- A. Qualifications of Installer: The Work of this section shall be installed by a firm which has been in the business of installing similar materials for at least five consecutive years; and can show evidence of satisfactory completion of five projects of similar size and scope. Installer shall have applicators trained and approved by manufacturer for performing this Work.

1.04 DELIVERY, STORAGE AND HANDLING

- A. Store in accordance with manufacturer's recommendations. Provide a uniform ambient temperature between 60 and 80 degrees F.

1.05 WARRANTY

- A. Manufacturer: five year material warranty.
- B. Installer: two year installation/application warranty.

PART 2 - PRODUCTS

2.01 GENERAL

- A. Furnish sealants meeting following in-service requirements:
 - 1. Normal curing schedules are permitted.
 - 2. Non-staining, color fastness (resistance to color change), and durability when subjected to intense actinic (ultraviolet) radiation are required.
- B. Furnish the products of only one manufacturer unless otherwise required, sealant colors as selected to match the adjoining surfaces.

2.02 MANUFACTURERS

- A. Tremco Inc.
- B. Pecora Corporation
- C. Dow Corning Corp.
- D. General Electric Co.
- E. Equal.

2.03 MATERIALS



A. Sealants:

1. Sealant 1: Acrylic latex, one-part, non-sag, mildew resistant acrylic emulsion compound complying with ASTM C834, Type S, Grade NS, formulated to be paintable.
 - a. Tremco Inc., Acrylic Latex Caulk.
 - b. Pecora Corporation, AC-20.
 - c. Equal.
2. Sealant 2: Butyl sealant, one-part, non-sag, solvent-release-curing sealant complying with ASTM C1311, gun grade and formulated with a minimum of 75 percent solids.
 - a. Tremco Inc., Tremco Butyl Sealant.
 - b. Pecora Corp., BC-158.
 - c. Equal.
3. Sealant 3: Silicone sealant, one-part non-acid-curing silicone sealant complying with ASTM C920, Type S, Grade NS, Class 25.
 - a. Dow Corning Corp., Dow Corning 790, 791, 795.
 - b. General Electric Co., Silpruf.
 - c. Tremco, Inc., Spectrem 1.
 - d. Pecora Corp., 864.
 - e. Equal.
4. Sealant 4: One-part mildew-resistant silicone sealant, complying with ASTM C920, Type S, Grade NS, Class 25.
 - a. Dow Corning Corp., Dow Corning 786.
 - b. General Electric Co., Sanitary 1700.
 - c. Tremco, Inc., Proglaze White.
 - d. Equal.
5. Sealant 5: One-part non-sag urethane sealant, complying with ASTM C920, Type S, Grade NS, Class 25.
 - a. Sika Corporation, Sikaflex -221e.



- b. Equal.
- 6. Sealant 6: Multi-part pouring urethane sealant, complying with ASTM C920, Type M, Grade P, Class 25.
 - a. Sika Corporation, Sikaflex 2C NS/SL.
 - b. Equal.
- 7. Sealant 7: Acoustical sealant, non-drying, non-hardening permanently flexible conforming to ASTM D217.
 - a. Pecora Corp., BA-98 Acoustical Sealant.
 - b. Equal.
- B. See 07 8413 - Penetration Firestopping for rated sealants.
- C. .Joint Backing: ASTM D1056; round, closed cell Polyethylene Foam Rod; oversized 30 to 50 percent larger than joint width, reticulated polyolefin foam.
- D. Primer: Non-Staining Type. Provide primer as required and shall be product of manufacturer of installed sealant.
- E. Bond Breaker: Pressure sensitive tape recommended by sealant manufacturer.
- F. Sealants shall have normal curing schedules, shall be nonstaining, color fast and shall resist deterioration due to ultraviolet radiation.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Verify that joint openings are ready to receive Work and field tolerances are within the guidelines recommended by sealant manufacturer.

3.02 SURFACE PREPARATION

- A. Joints and spaces to be sealed shall be completely cleaned of all dirt, dust, mortar, oil, and other foreign materials which might adversely affect sealing Work. Where necessary, degrease with a solvent or commercial degreasing agent. Surfaces shall be thoroughly dry before application of sealants.
- B. If recommended by manufacturer, remove paint and other protective coatings from surfaces to be sealed before priming and installation of sealants.
- C. Preparation of surfaces to receive sealant shall conform to the sealant manufacturer's specifications. Provide air pressure or other methods to achieve required results. Provide masking tape to keep sealants off surfaces that will be exposed in finished Work.



- D. Etch concrete or masonry surfaces to remove excess alkalinity, unless sealant manufacturer's printed instructions indicate that alkalinity does not interfere with sealant bond and performance. Etch with 5 percent solution of muriatic acid; neutralize with dilute ammonia solution, rinse thoroughly with water and allow to dry before sealant installation.
- E. Perform preparation in accordance with ASTM C804 for solvent release sealants, and ASTM C962 for elastomeric sealants.
- F. Protect elements surrounding Work of this section from damage or disfiguration.

3.03 SEALANT APPLICATION SCHEDULE

	<u>Location</u>	<u>Type</u>	<u>Color</u>
A.	Exterior and Interior joints in horizontal surfaces of concrete; between metal and concrete masonry and mortar.	Sealant 6	To match adjacent material
B.	Exterior door, entrance and window frames. Exterior and interior vertical joints in concrete and masonry metal flashing.	Sealant 3 or 5	To match adjacent material
C.	Joints within glazed curtain wall system. Skylight framing system. Aluminum entrance system glass and glazing.	Sealant 3	Translucent or Black
D.	Interior joints in ceramic tile and at plumbing fixtures.	Sealant 4	Translucent or White
E.	Under thresholds.	Sealant 2	Black
F.	All interior joints not otherwise scheduled	Sealant 1	To Match Adjacent Surfaces
G.	Heads and sills, perimeters of frames and other openings in insulated partitions	Sealant 7	Match Adjacent Surfaces

3.04 APPLICATION



- A. Provide sealant around all openings in exterior walls, and any other locations indicated or required for structure weatherproofing and/or waterproofing.
- B. Sealants shall be installed by experienced mechanics using specified materials and proper tools. Preparatory Work (cleaning, etc.) and installation of sealant shall be as specified and in accordance with manufacturer's printed instructions and recommendations.
- C. Concrete, masonry, and other porous surfaces, and any other surfaces if recommended by manufacturer, shall be primed before installing sealants. Primer shall be installed with a brush that will reach all parts of joints to be filled with sealant.
- D. Sealants shall be stored and installed at temperatures as recommended by manufacturer. Sealants shall not be installed when they become too jelled to be discharged in a continuous flow from gun. Modification of sealants by addition of liquids, solvents, or powders is not permitted.
- E. Sealants shall be installed with guns furnished with proper size nozzles. Sufficient pressure shall be furnished to fill all voids and joints solid. In sealing around openings, include entire perimeter of each opening, unless indicated or specified otherwise. Where gun installation is impracticable, suitable hand tools shall be provided.
- F. Sealed joints shall be neatly pointed on flush surfaces with beading tool, and internal corners with a special tool. Excess material shall be cleanly removed. Sealant, where exposed, shall be free of wrinkles and uniformly smooth. Sealing shall be complete before final coats of paint are installed.
- G. Comply with sealant manufacturer's printed instructions except where more stringent requirements are indicated on Drawings or specified.
- H. Partially fill joints with joint backing material, furnishing only compatible materials, until joint depth does not exceed 1/2 inch joint width. Minimum joint width for metal to metal joints shall be 1/4 inch. Joint depth, shall be not less than 1/4 inch and not greater than 1/2 inch.
- I. Install sealant under sufficient pressure to completely fill voids. Finish exposed joints smooth, flush with surfaces or recessed as indicated. Install non-tracking sealant to concrete expansion joints subject to foot or vehicular traffic.
- J. Where joint depth prevents installation of standard bond breaker backing rod, furnish non-adhering tape covering to prevent bonding of sealant to back of joint. Under no circumstances shall sealant depth exceed 1/2 inch maximum, unless specifically indicated on Drawings.
- K. Prime porous surfaces after cleaning. Pack joints deeper than 3/4 inch with joint backing to within 3/4 inch of surface. Completely fill joints and spaces with gun applied compound, forming a neat, smooth bead.

3.05 MISCELLANEOUS WORK



- A. Sealing shall be provided wherever required to prevent light leakage as well as moisture leakage. Refer to Drawings for condition and related parts of Work.
 - B. Install sealants to depths as indicated or, if not indicated, as recommended by sealant manufacturer but within following general limitations:
 - 1. For joints in concrete walks, slab and paving subject to traffic, fill joints to a depth equal to 75 percent of joint width, but not more than 3/4 inch deep or less than 3/8 inch deep, depending on joint width.
 - 2. For building joints, fill joints to a depth equal to 50 percent of joint width, but not more than 1/2 inch deep or less than 1/4 inch deep.
- 3.06 CLEANING
- A. Remove rubbish, debris, and waste materials and legally dispose of off the Project site.
- 3.07 CURING
- A. Sealants shall cure in accordance with manufacturer's printed recommendations. Do not disturb seal until completely cured.
- 3.08 PROTECTION
- A. Protect the Work of this section until Substantial Completion.

END OF SECTION



SECTION 08 11 13

HOLLOW METAL DOORS AND FRAMES

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

1. Hollow metal doors and frames.

B. Related Requirements:

1. Division 01 - General Requirements.
2. Section 07 92 00 - Joint Sealants.
3. Section 08 71 00 - Door Hardware.
4. Section 08 80 00 - Glazing.
5. Section 09 90 00 - Painting and Coating.

1.02 DESIGN REQUIREMENTS

- ###### A.
- Door-and-frame assemblies or frames shall include reinforcing and provisions for hardware as shown and specified. Drawings indicate profile and general details of steel frame fabrication and installation.

1.03 SUBMITTALS

- ###### A.
- Shop Drawings: Submit composite Shop Drawings indicating detailed relationships of installation including Work of adjacent construction, finish hardware, security, fire and life safety devices, glazing, sealing, and requirements for field installation. Include elevations of each hollow metal door type, details of each frame type, location schedule of doors and frames indicating same reference for details and openings as indicated on Drawings, conditions of openings of various wall sections and materials, typical and special details of construction, methods of assembling sections, location and installation requirements for hardware, material size, shape, and thickness, and joints and connections.
- ###### B.
- Product Data: Submit manufacturer's Product Data indicating composition and construction for each fabricated item including louvers, coatings, finishes, and other components demonstrating compliance with referenced standards.



- C. Certification: Submit certification of compliance with referenced standards and specified criteria, including but not limited to fire ratings in accordance with UL 10C, Physical Endurance in accordance with ANSI A250.4 and Prime Paint performance in accordance with ANSI A250.10.
- D. Samples:
 - 1. Hollow Metal Frame: Corner section of typical exterior and interior frame, of sufficient composite size to illustrate corner joint construction, hinge reinforcement, closer re-enforcement, floor anchor, dust cover, and jamb anchors, and showing galvanizing and prime coat finishes.
 - 2. Hollow Metal Door: Section of typical interior door of sufficient composite size to illustrate edge, top, bottom, and core construction, hinge reinforcement and face stiffening, closer reinforcement and kick plate reinforcement, and corner of vision opening construction with glazing beads.
- E. LEED Submittals: Complete the LEED Material Buyout Form (MBoF) with all materials provided to the project. A complete submittal includes providing all material costs in the MBoF and all of the supporting documentation for the following credits:
 - 1. MRc2 - Environmental Product Declarations (EPD): Provide Industry-Wide or Product-Specific EPD.
 - 2. MRc3 - Sourcing of Raw Materials - Recycled Content: Provide product data for pre- and post- consumer recycled content.
 - 3. MRc4 - Material Ingredients: Provide manufacturers Declare label, Health Product Declaration (HPD), Cradle to Cradle Certification, or Cradle to Cradle Health Product Certificate.
 - 4. IEQc2 - Low-Emitting Materials – Interior Wet Applied Products: For paints, coatings, adhesives and sealants applied on site or used for laminating off-site, include product data indicating the VOC content (g/L) and testing.

1.04 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Minimum documented experience of more than five years in work of this section.
- B. Installer Qualifications: Minimum documented experience of more than five years in work of this section
- C. Coordinate with hardware supplier for fabrication of doors and frames to receive hardware items.
- D. Coordinate with intrusion alarm supplier for fabrication of doors and frames to receive intrusion detection devices.



- E. References: Work shall comply with physical and performance requirements of following standards, including standards referenced in them, except for more stringent provisions specified herein or required by regulatory agencies:
1. ANSI/SDI A250.8, SDI 100 Recommended Specifications for Standard Steel Doors and Frames.
 2. ANSI/NFPA 252, Fire Tests of Door Assemblies.
 3. ANSI/UL 10B, Fire Tests of Door Assemblies.
 4. ANSI/UL 10C, Positive-Pressure Fire Tests of Door Assemblies.
 5. ANSI/NFPA 80, Fire Doors and Fire Windows
 6. HMMA, Guide Specifications for Commercial Hollow Metal Doors & Frames (Standard of National Association of Architectural Metal Manufacturers).
 7. ANSI/SDI A250.4, Test Procedure and Acceptance Criteria for Physical Endurance for Steel Doors, Frames, Frame Anchors and Hardware Reinforcings.
 8. ANSI A250.10, Test Procedure and Acceptance Criteria for Prime Painted Steel Doors and Frames.
 9. ANSI A250.6, Recommended Practice for Hardware Reinforcing on Standard Steel Doors and Frames.
- F. Standards of Fabrication and Installation:
1. Finished Work shall be of uniform profile, accurately fabricated, rigid and strong, square and true, neat in appearance, smooth and free from dents, waves, warps, buckles, open joints, tool marks and/or other defects.
 2. Steel sheet shall be clean with smooth surfaces free of scale, pitting or other defects.
 3. Construction joints shall be flush, tight and welded their full length, ground flush and smooth on exposed surfaces.
 4. Frame and door reinforcing and hardware provisions shall be performed in fabrication shop. Provide cuts, welds, and other fabrications before galvanizing or shop priming.
 5. Lines and molded members shall be straight and true with angles as sharp as practical for thickness involved, surfaces flat, and fastenings concealed.



1.05 DELIVERY, STORAGE AND HANDLING

- A. Frames: Before shipment, install temporary spreaders at bottom of bucks and do not remove until frames are installed.
- B. Doors: Provide protection as required to protect doors during shipping and storage. Damaged doors will be rejected.
- C. Inspect hollow metal Work upon delivery for damage. Remove and replace damaged items with new Work as required.
- D. Store doors and frames in an upright position at Project Site under cover and protected from weather-related elements. Store units on minimum 4-inch high wood blocking with ½ inch air spaces between stacked doors to provide circulation. Do not store doors and frames under plastic or canvas shelters that can create a humidity chamber. If shipping packaging becomes wet, immediately remove packaging.

1.06 WARRANTY

- A. Manufacturer shall provide a five year material warranty.
- B. Installer shall provide a two year fabrication and installation warranty.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Doors and frames shall be products of a single manufacturer.
- B. The following are acceptable manufacturers, as are others that can demonstrate their products are equivalent in quality, performance and compliance with these specifications.
 - 1. Security Metal Products Corp.
 - 2. Curries Manufacturing, Inc.
 - 3. Steelcraft.
 - 4. Amweld Metal Doors and Frames.
 - 5. Stiles Custom Metal, Inc.
 - 6. Door Components Inc.
 - 7. CECO Door.



8. Equal.

C. Materials, fabrication and installation must comply with requirements of standards referenced in Section 1.04, Quality Assurance.

2.02 MATERIALS

A. Steel:

1. Exterior Doors and Frames: Galvanized Carbon Sheet Steel, Commercial Quality, A60 zinc coating (0.30 ounces per square foot per side), ASTM A653.
2. Interior Doors and Frames: Cold-Rolled Steel Sheets, Commercial Quality Carbon Steel, ASTM A1008.
3. Steel shall be free of scale, pitting, coil breaks or other surface blemishes, and free of buckles, waves or other defects.
4. Steel thicknesses expressed in steel gages (MSG) is for reference only. Actual steel thicknesses must meet minimum requirements of ASTM standards and as described in ANSI/SDI A250.8.

B. Supports and Anchors: Fabricate from a minimum 16 gauge galvanized sheet steel unless noted otherwise.

C. Fasteners: Provide as shown on Drawings and to suit conditions of secure installations. Furnish 304 Grade stainless steel types at exterior doors.

D. Door Louvers:

1. Louver free air flow shall be 50% free area.
2. Louvers shall be comply with SDI 111C and be furnished with factory primer.

E. Vision panels: Manufacturer's standard, U.L. approved, finished flush with door face, with no visible fasteners on either door face.

F. Shop Paint:

1. Conform to Steel Structures Painting Council (SSPC) for steel components.
2. Pretreatment/priming coatings shall be compatible with Project site finish painting system in accordance with Section 09 9000.
3. At frames to be grouted, surfaces that are inaccessible after installation shall be coated with bituminous or asphaltic base paint.



2.03 FABRICATION GENERAL

- A. General: Fabricate hollow metal units to be rigid, neat in appearance, and free from defects including warp or buckle.
 - 1. Accurately form metal to required sizes and profiles. Fit and assemble units in manufacturer's plant. Where practical, factory or shop fit and assemble units for shipment.
 - 2. Weld joints continuously; grind, dress, and make smooth, flush, and invisible. Filler to conceal manufacturing defects or damage is not permitted.
 - 3. Corner Joints: Finish corner joints by mitering, or coping and butting, or a combination of both. Trim and backbend shall be continuous around corner.
 - 4. Continuously weld joints for full depth and width of frame, trim, and backbends.
 - 5. Clearances for Fire-Rated Doors: As required by NFPA 80.

2.04 FRAMES

- A. General: Provide fully welded steel frames with integral stops and trim for doors, transoms, sidelights, borrowed lights, and other openings, and with details indicated for type and profile. Use concealed fastenings, unless otherwise indicated.
- B. Metal Thickness of Frames (minimum):
 - 1. Interior hollow metal frames up to 4-foot wide 16 gage
 - 2. Interior hollow metal frames wider than 4-foot 14 gage
 - 3. Exterior hollow metal frames 14 gage
 - 4. Borrowed lights up to 4-foot wide 16 gage
- C. Supports and Anchors: Fabricate from at least 16-gage, galvanized steel sheet. Frame anchors shall comply with fire rated label requirements of opening.
 - 1. Floor Anchors:
 - a. Minimum thickness: 12 gage galvanized steel sheet or bent steel plate, securely fastened inside each jamb, with two holes in anchor at each jamb for 3/8 inch floor anchorage fasteners. For preframed wood stud walls provide and additional wood stud anchor located as close to the bottom of the jamb as is practical.



- b. Where required at sloping and uneven floor conditions, or to coordinate adjustments for trim alignments, provide adjustable floor anchors, providing at least 2-inch height adjustments.
2. Jamb Anchors:
 - a. Locate anchors near top and bottom and at intermediate points not to exceed 24 inches on center. Provide two anchors per head for openings up to 48 inches wide; over 48 inches wide provide anchors at 24 inches on center maximum.
 - b. Anchors in masonry construction: Provide manufacturers standard jamb anchors. Steel wire complying with ASTM A510, 0.177 inch in diameter, may be furnished.
 - c. Anchors in Stud Partitions: Provide steel anchors, 16 gage minimum sheet steel, of design to suit partition construction, securely welded inside each jamb.
 - d. Through-Frame Anchors: At frames indicated to be anchored with bolts through frame, provide countersunk holes for bolts with 16 gauge minimum sheet steel stiffeners full thickness of frame, and securely welded inside each frame at each hole.
- D. Inserts, Bolts, and Fasteners: Provide manufacturer's standard units. Where zinc-coated items are to be built into exterior walls, comply with ASTM A153 Class C or D as required.
- E. Head Reinforcing: Refer to Detail #2 of this section. Reinforcing shall not act as lintel or load-carrying member and shall comply with fire rating requirements. Provide at frames regardless of whether a closer is called for.
- F. Hardware Reinforcement and Accessories:
 1. Butt Hinge: 7 gage minimum.
 2. Head assemblies: Reinforced internally with, full length, 10 gage angles on each side of frame and bar at bottom of stop for closer reinforcement in frames as shown in Detail #2 of this section.
 3. Reinforcing for other items of finish hardware shall be accomplished according to ANSI A250.6.
 4. Plaster Guards: Provide 26 gage galvanized steel plaster guards or dust cover boxes, welded to frame, at back of finish hardware cutouts where mortar or other materials might obstruct hardware operation and to close off interior of openings.



- G. Mullion and Transom bars: Furnished and fabricated as specified for frames.
- H. Glazed Openings: Applied stops with mitered or butted corners, of minimum 18 gage galvanized steel, one-piece lengths, secured within 3” of ends and at 12” centers with oval head countersunk tamper resistant screws. Corner joints shall be furnished with contact edges closed tight, with trim faces mitered and continuously welded. Frames for multiple openings shall be provided with mullion and/or rail members, fabricated of closed tubular shapes with no visible seams or joints. Joints between faces of abutting members shall be securely welded and finished smooth. Provide condensate weeps 4 inches on centers, maximum.
- I. Door Silencers: Except for exterior doors, drill and punch frames for three silencers at lock jamb of single swing doors or in double doors with astragal and one silencer per leaf in heads of doubled door frames.
- J. Where frames are installed in walls sitting on a concrete curb, provide a closure plate or extend backbends to provide closure where frame abuts concrete curb.

2.05 DOORS

- A. General: Custom-made, flush-panel “seamless type” with one-piece face panels; continuous weld, seamless edge construction with no visible seams or joints on faces or on vertical edges.
 - 1. Provide type and size of doors shown with louvers and openings for glazing where indicated.
 - 2. Door thickness: 1 ¾ inches.
 - 3. Face Sheet Minimum Gage: 16 gage.
 - 4. Stiffeners: Stiffen door face sheets with continuous vertical-formed steel (rib) sections or back to back hat sections, minimum 20 gage, full thickness of interior space between door faces, spaced 6” on center maximum, and spot welded to both faces 4” on center maximum.
 - 5. Acoustical Insulation: Provide sound deadening and insulating material through entire core of door (full height, width, and thickness of door). Provide STC ratings where indicated on Drawings, scheduled, or for partition ratings indicated on Drawings.
 - a. Doors shall have a minimum STC of 28 as tested under ASTM E90 and ASTM E413, unless noted otherwise..
 - 6. Thermal Insulation: Exterior doors shall be insulated to R values scheduled or indicated on drawings.



7. Labeled Doors: Where fire-rated openings and conditions are indicated.
 - a. Labeled doors shall be provided with fire-resistance rating indicated and shall be constructed as tested and approved by Underwriters' Laboratories (UL) for installation in labeled frame and door assemblies.
 - b. Gaskets: Gaskets are supplied under Section 08 7100 - Door Hardware. Gaskets and installation shall conform to requirements of NFPA 105, "Installation of Smoke and Draft Control Door Assemblies."
 - c. Fabricate labeled doors with same finished appearance as specified for non-labeled hollow metal doors; with welded door edges, filled and ground smooth; with label affixed to door.
 - d. Where fire labels are required and continuous hinge is specified, install label on top of door within 6" of hinge side of door.
8. Door Edges: Join door face sheets at vertical edges of door with continuous weld full height of door. Grind, fill, and dress welds smooth to provide invisible seam with smooth, flush surface.
 - a. Close ends of doors with continuous recessed channels, 16 gage steel minimum, spot welded to both face sheets. Close top and bottom edges of doors with a internal steel channel, screw attached into top and bottom of door. Channel shall be galvanized at exterior doors. No screws are allowed on visible faces of door. Provide openings in bottom closure of exterior doors to permit escape of entrapped moisture.
 - b. Profile of Door Edges:
 - 1) Single-acting swing doors: Bevel both vertical edges 1/8" in 2".
 - 2) Pairs of single-acting swing doors: Bevel hinge edge 1/8" in 2". Provide surface mounted astragals for labeled or unlabeled doors unless otherwise shown on Drawings or required.
 - 3) Double-acting swing doors: Round both vertical edges on 2" minimum radius.
9. Door Louvers: Install according to manufacturers recommendations.
10. Glass Stops:
 - a. Furnish fixed stops integral with and welded at security side of door.



- b. Finish: Factory primer.
- 11. Transom: Fabricate to requirements specified for flush doors.
- B. Hardware Reinforcement and Accessories:
 - 1. Provide sheet steel or plate reinforcement for finish hardware items wherever necessary. Mortise, drill and tap to template requirements for mortise type hardware.
 - 2. Butt reinforcing: 7 gage minimum, of length 4" longer than length of butt. Minimum 3 spot welds at top and bottom.
 - 3. Door closer reinforcement: 14 gage minimum steel channel, 6" high on each side of door. Reinforcement to extend full width of door in accordance with Detail #1 of this section.
 - 4. Kick plate reinforcement: 14 gage minimum steel plate, 10" high on each side of door. Reinforcement to extend full width of door in accordance with Detail #1 of this section.
 - 5. Other Hardware Requirements: Cut, reinforce, drill, and tap doors and frames for other hardware, including energy management switches or contacts and security devices, in accordance with furnished hardware templates for accessory items. Thickness and size of reinforcement shall be as required by ANSI A250.6.

2.06 SHOP PRIMING

- A. Exposed and concealed metal surfaces of hollow metal doors, frames and other hollow metal Work of this Section shall be bonderized and then shop primed.
- B. Exposed surfaces of doors, frames and accessories shall be filled, sanded smooth and cleaned before painting.
- C. Exposed surfaces shall be shop primed after assembly.

PART 3 - EXECUTION

3.01 FRAME INSTALLATION

- A. Install steel frames accurately in location, perfect alignment, plumb, straight and true. Brace frames to prevent displacement.



- B. Anchor frames in concrete and concrete unit masonry with galvanized anchor bolts; 3/8 inch diameter, counter-sunk at 24 inches on center at head and jamb unless noted otherwise.
- C. Anchor frames in steel and wood frame partitions with manufacturer recommended anchors.
- D. Install frame at fire rated openings in accordance with NFPA Standard No. 80.
- E. Furnish filler for anchor attachment screws, and sand smooth.

3.02 DOOR INSTALLATION

- A. Install steel doors in accordance with manufacturer's instructions and as indicated on Drawings and in Finish Hardware Specifications. Coordinate with Work of other trades.
- B. Ensure that door and jamb clearances comply with requirements of ANSI/NFPA 80. When wood doors are being installed in metal frames constructed pursuant to this section, allowable door and jamb clearances shall be as specified in Specification Section 08 1416.
- C. Adjust operable parts for correct function.
- D. Remove hardware, except primer-coated items, tag, box and install after finish painting has been completed.

3.03 PRIME COAT TOUCH-UP

- A. Immediately after installation, remove rust, repair damaged surfaces to new condition, sand smooth, and install touch-up primer.

3.04 CLEAN UP

- A. Remove rubbish, debris and waste materials and legally dispose of off Project site.

3.05 PROTECTION

- A. Protect Work of this section until Substantial Completion.

END OF SECTION



SECTION 08 14 05

ARCHITECTURAL WOOD DOORS

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

1. Interior flush wood doors.

B. Related Requirements:

1. Section 08 71 00: Door hardware.

1.02 COORDINATION

- ###### A. STC-Rated Doors: Where installed in hollow metal frames, fill frames with compressed mineral wool insulation.

1.03 PREINSTALLATION MEETINGS

- ###### A. Conduct pre-installation meeting at Project site.

B. Discussion Topics:

1. Delivery, storage, and handling.
2. Coordination with hardware installers.
3. Protection of installed doors.

1.04 ACTION SUBMITTALS

A. Product Data: Each type of door and finish.

1. Core and edge construction.
2. Fire rated doors.
3. Finishes.

B. Shop Drawings and Schedule:

1. Use same unit designations used in Contract Documents.



2. Hardware preparation.

C. Samples for Selection:

1. Available standard stain colors and gloss options. Submit samples in the form of actual materials; printed brochures are not acceptable.
2. Available molding profiles for glazed openings.

D. Samples for Verification:

1. Each required veneer species and factory finish; corner unit showing construction and finish minimum 8 by 10 inches.

1.05 INFORMATIONAL SUBMITTALS

A. Sustainable Design Submittals:

1. Chain-of-Custody Certificates: For certified wood products. Include statement of costs.
2. Chain-of-Custody Qualification Data: For manufacturer and vendor.
3. Laboratory Test Reports: For adhesives, indicating compliance with requirements for low-emitting materials.
4. Laboratory Test Reports: For composite wood products, indicating compliance with requirements for low-emitting materials.

1.06 CLOSEOUT SUBMITTALS

- A. Maintenance data.
- B. Manufacturer warranties transferrable to Owner.

1.07 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Certified for chain of custody by an FSC-accredited certification body.
- B. Vendor Qualifications: Certified for chain of custody by an FSC-accredited certification body.



1.08 DELIVERY, STORAGE, AND HANDLING

- A. Package factory-finished doors individually in manufacturer's standard plastic bags, stretch wrap, or cardboard cartons.
- B. Store doors inside building in clean, dry location.
- C. Mark each door on top bottom rail with opening number used on Shop Drawings.

1.09 FIELD CONDITIONS

- A. Environmental Limitations: Do not deliver or install doors until spaces are enclosed and weather tight, wet work in spaces is complete and dry, and HVAC system is operating and maintaining temperature between 60 and 90 deg F (16 and 32 deg C) and relative humidity at occupancy levels during remainder of construction period.

1.10 MANUFACTURER WARRANTIES

- A. Manufacturer agrees to repair or replace doors that fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Warping (bow, cup, or twist) more than 1/4 inch (6 mm) in 42-by-84-inch (1065-by-2130-mm) section.
 - b. Telegraphing of core construction in face veneers exceeding 0.01 inch in 3-inch (0.25 mm in 76-mm) span.
 - 2. Warranty shall also include installation and finishing that may be required due to repair or replacement of defective doors.
- B. Warranty Periods:
 - 1. Solid-Core Interior: Life of installation

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Basis of Design: Products of Aspiro™ Series | Marshfield-Algoma by Masonite Architectural are specified to indicate requirements for quality and appearance.
 - 1. Website: masonite.com/architectural/products/aspiro-series
 - 2. Phone: (877) 332-4484



3. Or approved equal

B. Source Control: Supply all wood doors from a single manufacturer.

2.02 MANUFACTURING STANDARDS

A. Interior Flush Wood Doors: Window & Door Manufacturers Association publication ANSI/WDMA I.S. 1A “Industry Standard for Interior Architectural Wood Flush Doors”.

B. Fire-Rated Wood Doors: Conforming to NFPA 80; listed and labeled for required ratings based on testing at positive pressure NFPA 252 or UL 10C by UL or other testing agency acceptable to authorities having jurisdiction

1. Pairs: Formed-steel edges and astragals with intumescent seals as required for ratings.

a. Steel edges and astragals factory primed for field painting.

b. Veneer wrapped steel edges in same species and finish as door faces.

c. Steel edges and astragals with baked enamel in color selected by Architect from manufacturer’s standard offering.

d. Stainless steel edges and astragals, #4 satin polish.

C. Acoustical Rating for Solid Core Doors: Unless indicated otherwise indicated on Drawings, provide STC 50 doors supplied with seals and gaskets tested by manufacturer.

2.03 SUSTAINABILITY REQUIREMENTS

A. Certified Wood: “FSC Pure” per FSC STD-01-001 and FSC STD-40-004.

B. Adhesives: Meeting testing and product requirements of California Department of Public Health’s “Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers.”

C. Composite Wood Products: Manufactured with ultra-low-emitting formaldehyde resins as defined in California Air Resources Board’s “Airborne Toxic Control Measure to Reduce Formaldehyde Emissions from Composite Wood Products” or with no added formaldehyde.

2.04 INTERIOR SOLID CORE FLUSH WOOD DOORS FOR TRANSPARENT FINISH

A. Basis of Design: Aspiro™ Series | Marshfield-Algoma™ by Masonite Architectural.

B. Solid Core Select Wood Veneer Flush Doors:

1. WDMA Quality grade: Premium.



2. WDMA Performance Level: Heavy Duty.
3. Faces:
 - a. Veneer Grade: AA.
 - b. Veneer Species: White Oak.
 - c. Veneer Cut: Rift cut.
 - d. Veneer Leaf Match: Book match.
 - e. Veneer Face Match/Assembly: Center-balance.
4. Pair Match: Provide for doors hung in same opening.
5. Vertical Edges: Structural composite lumber Matching/Compatible Hardwood lumber that matches face veneer.
6. Horizontal Edges: Structural composite lumber. Veneer edge band-top rail only.
7. Core: Extra heavy duty wood-based particleboard (PC).
8. Construction: Five Plies; stiles and rails bonded to core, and entire unit is abrasive planed before veneering.
9. Thickness: 1-3/4 inch.
10. Wood Applied Moldings:
 - a. Pattern: As selected by Architect

2.05 FABRICATION

- A. Door Pairs
 1. Veneer Matching: Pair match.
- B. Factory Fitting: Fit to frame openings with clearances specified in WDMA I.S. 1A.
 1. Undercut: Maximum 3/8 inch (10 mm) above thresholds.
 2. Fire-Rated Doors: Comply with NFPA 80.
- C. Factory Machining: Machine doors for hardware that is not surface applied.
 1. Verify dimensions for hardware mortises in metal frames before machining.
- D. Door Frames:
 1. Refer to Section 08 13 11 – Hollow Metal Doors and Frames.
- E. Finish Grade: Match grade of door.
- F. Transparent: WDMA TR-8, UV-Cured Acrylated Polyester/Urethane.



1. Staining: Standard color selected by Architect.
2. Sheen: Satin.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Verify that door frames are plumb, square, and accurate size.
- B. Inspect each door before installation for damage and defects per WDMA Section F-6.

3.02 INSTALLATION

- A. Hardware installation is conforming to Section 08 7100 – Door Hardware.
- B. Reference Standards:
 1. Wood Doors: WDMA I.S. 1A and WDMA I.S. 6A.
- C. Align doors with uniform vertical and top edge clearance.

3.03 REPAIR

- A. Repair of damage or defects is subject to Architect's acceptance, including removal of soiling. Provide new replacement doors for doors that cannot be satisfactorily repaired.

3.04 PROTECTING AND CLEANING

- A. Protect installed doors from damage and soiling.
- B. Clean doors shortly before inspection for Substantial Completion.

END OF SECTION



SECTION 08 31 16

ACCESS PANELS AND FRAMES

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

1. Steel access panels, except those specified under Divisions 22 - Plumbing, 23 - HVAC, or 26 - Electrical.

B. Related Sections:

1. Division 01 - General Requirements.
2. Section 01 81 13: Sustainable Design Requirements.
3. Section 09 29 00 - Gypsum Board.
4. Section 09 30 00 - Ceramic Tiling.
5. Section 09 90 00 - Painting and Coating.
6. Division 22 - Plumbing.
7. Division 23 - HVAC.
89. Division 26 - Electrical.

1.02 SUBMITTALS

A. Shop Drawings:

1. Indicate sizes, materials, thickness, fabrication methods, panel door and frame reinforcement, anchorage, and installation details.
2. Provide layout drawings, indicating dimensioned locations of proposed access panels, size of each panel, and installation details. Determine and indicate required access panels in finished surfaces, whether furnished under this section or as part of Work of Divisions 22-Plumbing, 23- HVAC, and 26-Electrical.

B. LEED Submittals: Complete the LEED Material Buyout Form (MBoF) with all materials provided to the project. A complete submittal includes providing all material costs in the MBoF and all of the supporting documentation for the following credits:

1. MRc2 - Environmental Product Declarations (EPD): Provide Industry-Wide or Product-Specific EPD.



2. MRc3 - Sourcing of Raw Materials - Recycled Content: Provide product data for pre- and post- consumer recycled content.
3. MRc4 - Material Ingredients: Provide manufacturers Declare label, Health Product Declaration (HPD), Cradle to Cradle Certification, or Cradle to Cradle Health Product Certificate.
4. IEQc2 - Low-Emitting Materials – Interior Wet Applied Products: For paints, coatings, adhesives and sealants applied on site or used for laminating off-site, include product data indicating the VOC content (g/L) and testing.

1.03 QUALITY ASSURANCE

- A. Panels shall be provided with UL listings and labels.
- B. Access panels and frames shall be products of one manufacturer.
- C. Coordinate access panels with plumbing, HVAC, and electrical work.

1.04 DELIVERY, STORAGE AND HANDLING

- A. Panels and Frames: Provide protection as required by manufacturer to protect panels from damage during storage.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Access Panels:

<u>Non-Rated</u>	<u>Milcor</u>	<u>Karp</u>	<u>Nystrom</u>
Ceramic Tile	MS	DSC214M	NT
Plaster	K	DSC214M	NP
Drywall, Plaster Veneer	DW	DSC214M	NW
<u>Fire Rated</u>			
Ceramic Tile	MS	KRP150FR	IT
Plaster	M	KRP150PR	IP
Drywall, Plaster Veneer	M	KRP150FR	IW

Equal.

- B. Unless otherwise indicated, provide brushed stainless steel finish for panels installed in ceramic tile. Provide prime coat finish suitable for field painting for panels installed in other finishes.
- C. Access Panels shall be 18 gage minimum with vandal-proof lock operated by Allen wrench or other special tool. Exposed fastenings shall be secured with vandal-proof screws.



2.02 LEED REQUIREMENTS

- A. IW/PS EDP: Products specified under this section must have a Type III Product Specific EPD or the company must be listed in the industry group responsible for the Industry Wide Externally Verified EPD.
- B. PS EPD: Products specified under this section must have a Type III Product Specific EPD.
- C. HPDs: Products specified under this section must have one of the following unexpired material ingredient reports compliant with LEEDv4.1 requirements and declared to 1000 ppm or less: Declare label, Health Product Declaration (HPD), Cradle to Cradle Certification, Cradle to Cradle Health Product Certificate, or UL Product Lens Certification.
- D. Interior Wet Applied Products: All wet-applied on-site paints, coatings, adhesives, and sealants products provided under Part 2 of this specification section must be compliant with the VOC limits outlined under IEQc2: Low Emitting Materials in 01 81 13 Sustainable Design Requirements. In addition, all paints and coatings must be compliant with CDPH Standard Method v1.2-2017 emissions testing with proper unexpired CDPH testing certificates or acceptable third-party certification.

PART 3 - EXECUTION

3.01 GENERAL

- A. Provide access panels in finish construction, where indicated on Drawings, wherever required for access to concealed mechanical and electrical equipment, and where required by codes. Panels indicated on architectural Drawings shall be furnished under this section. Required panels for access to equipment, but not indicated on architectural Drawings, shall be furnished as part of Work requiring access.

3.02 INSTALLATION

- A. Install panels accurately in location, perfect alignment, plumb, straight and true. Brace to prevent displacement by adjacent Work.
- B. Examine panels after installation for proper opening, closing and clearances. Replace damaged or defective panels.

3.03 CLEAN UP

- A. Remove rubbish, debris and waste materials and legally dispose of off Project site.

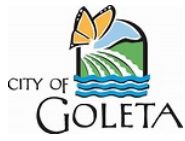
3.04 PROTECTION

- A. Protect Work of this section until Substantial Completion.



Department of Neighborhood Services and Public Safety
GOLETA TRAIN DEPOT PROJECT

END OF SECTION



SECTION 08 36 26

HYDRAULIC BI-FOLD DOOR

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Furnish SST-II Hydraulic Bi-Fold System complete from one manufacturer. Provide all labor, materials, tools, and equipment to furnish the SST-II Hydraulic Bi-Fold System complete as herein specified.
- B. Provide hydraulic fluid in quantity necessary for proper system operation.

1.02 RELATED SECTION

- A. Section 05 12 00 – Structural Steel Framing
- B. Section 05 41 00 – Cold Formed Metal Framing
- C. Section 07 46 20 –Fiber Cement Siding
- D. Section 07 92 00 – Joint Sealant
- E. Section 09 90 00 – Painting Coating

1.03 SUBMITTALS

- A. Product Data:
 - 1. Submit manufacturer's product data and roughing-in diagrams.
- B. Shop Drawings:
 - 1. Complete shop drawings are to be provided prior to fabrication indicating construction and installation details.
- C. Structural Calculations:
 - 1. Prior to fabrication, submit design calculations prepared by a Licensed Engineer in the State of California. The Engineer shall seal the calculations stating that the system components conform to the structural performance requirements.
- D. LEED Submittals: Complete the LEED Material Buyout Form (MBoF) with all materials provided to the project. A complete submittal includes providing all material costs in the MBoF and all of the supporting documentation for the following credits:



1. MRc2 - Environmental Product Declarations (EPD): Provide Industry-Wide or Product-Specific EPD.
2. MRc3 - Sourcing of Raw Materials - Recycled Content: Provide product data for pre- and post- consumer recycled content.
3. MRc4 - Material Ingredients: Provide manufacturers Declare label, Health Product Declaration (HPD), Cradle to Cradle Certification, or Cradle to Cradle Health Product Certificate.
4. IEQc2 - Low-Emitting Materials – Interior Wet Applied Products: For paints, coatings, adhesives and sealants applied on site or used for laminating off-site, include product data indicating the VOC content (g/L) and testing.

1.04 QUALITY ASSURANCE

- A. Provide each Hydraulic Bi-Fold System as a complete unit by one manufacturer, including frames, panels, brackets, guides, hardware, operators, and installation accessories to suit opening.
- B. Wind Loading: Design and reinforce Hydraulic Bi-Fold system to withstand wind loading pressure to comply with State and Federal Code or as indicated in structural loading criteria.
- C. Preparation of the opening shall conform to current criteria set forth by the California Building Code

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Proper storage of the system before installation and continued protection during and after installation will be the responsibility of the general contractor.

1.06 WARRANTY

- A. All materials and components, supplied by Crown, shall be guaranteed against defects in material and workmanship, for a period of one year from date of delivery.
- B. Materials and components supplied by other than Crown is not included in this warranty.

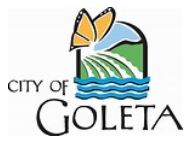
PART 2 PRODUCTS

2.01 MANUFACTURERS

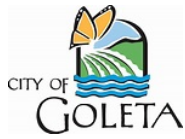
- A. Subject to compliance with requirements, manufacturers offering products which may be incorporated into the work, include, but are not limited to, the following:

Crown Doors, LLC 135 McLeod Avenue South Plato, MN. 55370 (320) 238-2616
www.crowndoors.com info@crowndoors.com

2.02 MATERIALS



- A. Product to be SST-II Hydraulic Bi-Fold System as furnished by Crown Doors, LLC
1. Construct operable panel and frame sections with structural steel (of ASTM-A500 grade minimum) framing to comply with applied wind code.
 2. Operable panels and frame shall be constructed of structural steel tubing and other structural steel shapes, and shall be designed to the same loading requirements for live, dead and wind loads as the surrounding construction.
 3. System shall be designed so that no center “cane bolt” is required in the floor
 4. Operable panels and frame shall be factory-welded at all joints and connections, with smooth welds not to exceed 1/4” thickness.
 5. Inside-Sash (infill) glass retainer system shall be factory pre-installed and seam-sealed, and necessary setting blocks, spacers, butyl and foam tape shall be supplied.
 6. System frame, operable panels, and factory pre-installed, inside-sash glass retainer shall be primed with gray-zinc, powder-based, epoxy primer, and finished with manufacturer’s standard powdercoat
 7. Factory-Supplied neoprene seals/weather stripping will be shipped loose for field-install to protect against damage during transport
 8. Bi-fold System shall be operated by hydraulic cylinders that are mechanically fastened to the panel frame.
 9. Cylinders are to be located on the top half of the door, only. Cylinders will be designed to carry the required loads during operation, open position, and closed position. Internal stops will be install so as not to allow over-extension of the cylinders, therefore restricting the system from opening or closing beyond its limit
 - a. Lift straps or cables, horizontal top and bottom drive shafts, pulleys, and strap or cable “kick outs” are unacceptable.
 - b. System shall be locked closed by means of the hydraulic cylinders providing a minimum of 1,000 lbs. of closing force
- C. Power Operator - Standard voltage is 208-230v, single phase.
1. Constant contact push-button or key-switch controls for separate mounting.
 2. Power unit to power (2) hydraulic cylinders which open and close the system. Power unit to be prewired and factory tested.
 3. “Open-Close” control units will be wired for constant-hold operation
 4. Coordinate with installation of incoming electrical source to hydraulic power unit.



5. Each door operator shall have thermal overload protection for the motor.

2.04 Finishes

- A. Entire system frame, operable panels, and factory pre-installed, inside-sash glass retainer shall be primed with gray-zinc, powder-based, epoxy primer, and finished with manufacturer's standard powder-coat
 1. Custom matched powder-coat color as selected by Architect.
 2. System shall be designed so that no center "cane bolt" is required in the floor

2.03 MATERIALS

- A. The Hydraulic Bi-Fold System shall be extended/retracted in the opening using a constant-contact pushbutton or key switch, operating hydraulic cylinders mounted to the system frame.

2.04 LEED REQUIREMENTS

- A. IW/PS EDP: Products specified under this section must have a Type III Product Specific EPD or the company must be listed in the industry group responsible for the Industry Wide Externally Verified EPD.
- B. PS EPD: Products specified under this section must have a Type III Product Specific EPD.
- C. HPDs: Products specified under this section must have one of the following unexpired material ingredient reports compliant with LEEDv4.1 requirements and declared to 1000 ppm or less: Declare label, Health Product Declaration (HPD), Cradle to Cradle Certification, Cradle to Cradle Health Product Certificate, or UL Product Lens Certification.
- D. Interior Wet Applied Products: All wet-applied on-site paints, coatings, adhesives, and sealants products provided under Part 2 of this specification section must be compliant with the VOC limits outlined under IEQc2: Low Emitting Materials in 01 81 13 Sustainable Design Requirements. In addition, all paints and coatings must be compliant with CDPH Standard Method v1.2-2017 emissions testing with proper unexpired CDPH testing certificates or acceptable third-party certification.

PART 3 EXECUTION

3.01 SAFETY

- A. Hydraulic power unit to have a manual emergency let-down valve for closing the system in case of a power outage.
- B. SST-II Hydraulic Bi-Fold System to incorporate pressure compensated orifice valves.



- C. Provide photoelectric and lead-edge pressure sensor.

3.02 INSTALLATION

- A. Installation of the Hydraulic Bi-Fold System shall be by a contractor familiar with this type of installation and be in strict accordance with the approved build drawings and manufacturers standard printed specifications, instructions, and recommendations. All moving parts will be left in good operating condition.
- B. Permanent or temporary electric wiring shall be brought to the power unit location before installation. After the Hydraulic Bi-Fold System is installed, the general contractor assumes the responsibility of any damage to the system or system components during construction until the building is turned over to the owner
- C. Fill reservoir with hydraulic fluid. Use ATF for cold weather applications or #32 hydraulic fluid for all other applications.

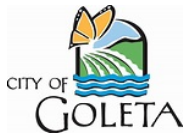
3.03 CLEANING

- A. Install in accordance with manufacturer's instructions. All surfaces shall be wiped clean and free of handprints, grease, and oil.

3.04 TRAINING

- A. Installer shall demonstrate proper operation and maintenance procedures to owner's representative.
- B. Operating keys and owner's manual shall be provided to owner's representative.

END OF SECTION



SECTION 08 41 13

ALUMINUM ENTRANCES AND STOREFRONTS

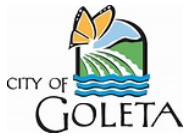
PART 1 - GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Aluminum framed, insulated glazing entrances and storefronts.
- B. Related Requirements:
 - 1. Division 01 - General Requirements.
 - 2. Section 05 41 00 – Cold Formed Metal Framing
 - 3. Section 07 26 00 – Vapor Barrier
 - 4. Section 07 46 20 –Fiber Cement Siding
 - 5. Section 07 92 00 - Joint Sealants.
 - 6. Section 08 51 13 - Aluminum Windows.
 - 7. Section 08 71 00 - Door Hardware.
 - 8. Section 08 80 00 - Glazing.
 - 9. Section 09 29 00 – Gypsum Board.

1.02 REFERENCES

- A. ASTM International (ASTM):
 - 1. ASTM B221 – Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles and tubes.
 - 2. ASTM E283 - Standard Test Method for Determining Rate of Air Leakage through Exterior Windows, Curtain Walls and Doors by Uniform or Cyclic Static Air Pressure Difference.
 - 3. ASTM E330 - Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference.
 - 4. ASTM E331 - Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference
 - 5. ASTM E783 - Standard Test Method for Field Measurement of Air Leakage through Installed Windows and Doors.
 - 6. ASTM E1105 Standard test Method for Field Determination of Water Penetration of Installed Exterior Windows, Curtain Walls and Doors by Uniform or Cyclic Static Air Pressure Difference.
- B. American Architectural Manufacturers Association (AAMA):



1. AAMA 611 – Voluntary Specification for Anodized Architectural aluminum.
 2. AAMA 2605 – Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels.
 - C. National Fenestration Council Rating (NFRC):
 1. Component Modeling Approach (CMA), CMA Software Tool (CMAST).
 2. NFRC-100- Standard Procedure for Determining Fenestration Product U-factors.
 3. NFRC-200 - Procedure for Determining Fenestration Product Solar Heat Gain Coefficient and Visible Transmittance at Normal Incidence.
 - D. Code of Federal Regulations, Title 16, Part 1201 (16 CFR 1201):
 1. Consumer Product Safety Commission Safety Standard for Architectural Glazing Materials.
- 1.03 PERFORMANCE REQUIREMENTS
- A. Water-Resistance test: In accordance with ASTM E331. No water leakage when tested at 8 PSF (pounds per square foot) static pressure differential.
 - B. Air-Infiltration: In accordance with ASTM E283. Air infiltration shall not exceed 0.06 cfm/SF at a static air pressure difference of 6.24 psf.
 - C. Structural Performance: In accordance with ASTM E330. Deflection under design load shall not exceed L/175 of the clear span.
 - D. Energy-Related Performance Ratings:
 1. Thermal Performance U-Factor:
 2. Solar Heat Gain Coefficient (SHGC):
 3. Visible Transmittance (VT):
- 1.04 SUBMITTALS
- A. Shop Drawings: Submit Shop Drawings for the Work of this section, prepared and reviewed before fabrication. Include plans, elevations, opening, identification symbols, sizes, and complete details for materials, finishes, sizes, profiles, moldings, dimensioned locations of hardware items with reinforcement, methods of anchoring, assembly, installation, isolation, glazing procedure as well as reglazing procedures, materials, flashing and caulking.
 - B. Product Data: Submit manufacturer’s Product Data.
 - C. Test Reports: Submit test reports from AAMA accredited laboratories certifying the performance requirements of Article 1.03.
 - D. Material Samples: Submit the following:
 1. Storefront, door and frame sections with specified finish, fasteners and accessories.
 2. Cured sealant colors.



- E. Calculations: Provide structural calculations, signed and sealed by a structural engineer licensed in the State of California, indicating that materials furnished for installation conform to requirements specified.
- F. Energy Performance: Submit a report or calculation for each system and glass type listing the frame, glazing and spacer components and indicating the U-Factor, solar heat gain coefficient (SHGC) and visible transmittance (VT) of the storefront assembly demonstrating conformance to project energy calculations.
 - 1. Insulated Storefronts: Submit NFRC CMAST Fenestration Calculation Report / Bid Report:
 - 2. Non-Insulated Storefronts: Submit energy calculations.
- G. LEED Submittals: Complete the LEED Material Buyout Form (MBoF) with all materials provided to the project. A complete submittal includes providing all material costs in the MBoF and all of the supporting documentation for the following credits:
 - 1. MRc2 - Environmental Product Declarations (EPD): Provide Industry-Wide or Product-Specific EPD.
 - 2. MRc3 - Sourcing of Raw Materials - Recycled Content: Provide product data for pre- and post- consumer recycled content.
 - 3. MRc4 - Material Ingredients: Provide manufacturers Declare label, Health Product Declaration (HPD), Cradle to Cradle Certification, or Cradle to Cradle Health Product Certificate.
 - 4. IEQc2 - Low-Emitting Materials – Interior Wet Applied Products: For paints, coatings, adhesives and sealants applied on site or used for laminating off-site, include product data indicating the VOC content (g/L) and testing.

1.05 QUALITY ASSURANCE

- A. Regulatory Requirements:
 - 1. Except for more stringent requirements specified in this Section, manufactured aluminum windows shall comply with the requirements of the CBC Part 6, California Energy Code, Section 110.6, Mandatory Requirements for Fenestration Products and Exterior Doors.
 - 2. Windows shall be designed to withstand the minimum loads prescribed in CBC Section 1609.
- B. Field applied products that release VOC's, such as sealants, caulking, adhesives, primers and paints, shall be approved by the OWNER.
- C. Installer Qualifications:
 - 1. Minimum five-year experience installing windows of the type specified by this Section.
 - 2. Installer shall be approved by the window manufacturer as an approved installer.
- D. Manufacturer Qualifications: Minimum 5-year experience in producing aluminum windows of the type specified. Window manufacturer technical representative shall



provide field services to verify window installation is in accordance with manufacturer's written instructions.

- E. Mock-ups: Provide mock-up of one typical door and window unit for review by the ARCHITECT.
- F. Pre-Installation Conference: CONTRACTOR shall coordinate and conduct pre-installation conference, Project Meetings, to review the progress of construction activities and preparations for the installation of storefronts and other related work of this Section.

1.06 WARRANTY

- A. Manufacturer shall provide a 10-year material warranty for aluminum storefront.
- B. Manufacturer shall provide a 10-year material warranty for doors.
- C. Anodized finish of storefronts, doors and related components shall be warranted for 10 years against cracking, crazing, flaking, or blistering,
- D. Pigmented organic finished storefronts, doors and related components shall be warranted for 15 years against blistering, cracking, peeling or chipping or fading beyond AAMA 2605.

PART 2 - PRODUCTS

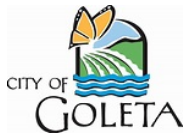
2.01 MANUFACTURERS

- A. Offset Glazing:
 - 1. Kawneer (Basis of Design)
 - 2. Arcadia
 - 3. EFCO
 - 4. Or Approved Equal.

2.02 MATERIALS

- A. Extrusions shall be 6063-T6 alloy and temper, per ASTM B221.
- B. Fasteners: Aluminum, stainless steel, or zinc-plated steel at exposed conditions. Perimeter anchors shall be aluminum or steel. Steel anchors shall be isolated from aluminum members.
- C. Glazing Gaskets: EPDM elastomeric extrusions or vinyl reinforced with fiberglass cord.
- D. Glazing Sealants: As recommended by manufacturer for joint type.
- E. Spacers and Setting Blocks: Manufacturer's standard elastomeric type.
- F. Joint Sealants: For installation at perimeter of storefront system shall be as specified in Section 07 92 00, Joint Sealants.
- G. Glazing: Glazing shall be as specified in Section 08 80 00, Glazing.

2.03 FABRICATION



- A. Framing shall be per Kawneer Trifab Versa Glaze 451/451T Framing System.
 - 1. Dimensions: 4 ½" x 2"
 - 2. Major portions of door sections, except glazing beads, shall be nominal 0.125 inch.
 - 3. Wall thickness of frame members shall be nominal 0.093 inch.
- B. Framing system shall provide continuous head and sill channels spliced together with formed brake metal sleeves at center of vertical mullions. The framing system shall provide for flush glazing on sides with no projecting stops. Vertical and horizontal framing members shall have a nominal face dimension and overall depth as noted above. Diverters shall be provided to collect water infiltration and divert to the exterior.
- C. Door framing members shall match storefront framing appearance. Door stiles and rails shall be tubular sections, accurately joined at corners with heavy concealed reinforcement brackets secured with bolts and screws and shall be metal inert gas (MIG) welded. Doors shall be furnished with snap-in stops with bulb glazing gasket both sides of glass. Exposed screws are not permitted. Each door leaf shall be furnished with an adjusting mechanism, located in the top rail near the lock stile, which provides for minor clearance adjustments after installation. A hard-backed poly-pile weatherstrip shall be installed in both stiles of center hung single doors.

2.04 DOORS

- A. Basis of Design: Kawneer 350T Insulpour® Thermal Entrance. The door stile and rail face dimensions of the entrance door will be as follows:
 - 1) Vertical face dimension: 5"
 - 2) Top Rail: 5"
 - 3) Bottom Rail: 10"
- B. Door Hardware (Ea door leaf):

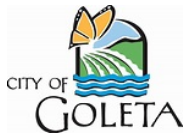
Refer to Door Hardware, Section 08 71 00.

Weatherstripping: Door manufacturer's Bottom door sweep.

2.05 FINISH

- A. Storefronts, doors and accessories shall be furnished with an organic finish applied over a five-stage aluminum pre-treatment. Finish shall be a two-coat PVDF fluorocarbon coating system with a minimum of 1.2 mil thickness and conforming to AAMA 2605. Color as selected by ARCHITECT.

2.06 LEED REQUIREMENTS



- A. IW/PS EDP: Products specified under this section must have a Type III Product Specific EPD or the company must be listed in the industry group responsible for the Industry Wide Externally Verified EPD.
- B. PS EPD: Products specified under this section must have a Type III Product Specific EPD.
- C. HPDs: Products specified under this section must have one of the following unexpired material ingredient reports compliant with LEEDv4.1 requirements and declared to 1000 ppm or less: Declare label, Health Product Declaration (HPD), Cradle to Cradle Certification, Cradle to Cradle Health Product Certificate, or UL Product Lens Certification.
- D. Interior Wet Applied Products: All wet-applied on-site paints, coatings, adhesives, and sealants products provided under Part 2 of this specification section must be compliant with the VOC limits outlined under IEQc2: Low Emitting Materials in Sustainable Design Requirements. In addition, all paints and coatings must be compliant with CDPH Standard Method v1.2-2017 emissions testing with proper unexpired CDPH testing certificates or acceptable third-party certification.

PART 3 - EXECUTION

3.01 EXAMINATION

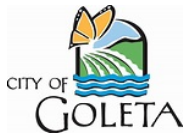
- A. Examine openings, substrates, structural support, anchorage, and conditions, for compliance with requirements for installation tolerances and other conditions affecting performance of work. Verify rough opening dimensions, levelness of sill plate and operational clearances. Examine wall flashings, air barriers, and other built-in components to ensure a coordinated, weather tight aluminum framed storefront installation.

3.02 INSTALLATION

- A. Install storefronts in accordance with approved shop drawings and manufacturers installation instructions. Installation shall be level, square, plumb and in proper relation to wall flashing and adjacent construction.
- B. Apply sealants to provide a weather tight installation at joints, intersections and opening perimeters. Tool sealants to fill the joint and provide a smooth finished surface.
- C. Install security glazing with Dow 795 sealant, as required by Section 08 8053, Security Glazing.

3.03 FIELD QUALITY CONTROL

- A. CONTRACTOR shall retain and pay a testing agency to conduct on-site air and water infiltration tests. On-site tests shall be conducted with CONTRACTOR, storefront manufacturer's representative, OWNE'S representative present. The Owner's representative will select units to be tested.
- B. Ten percent of installed storefront panels will be selected for air and water testing. If one or more windows fail, an additional ten percent of windows (not including the



ones previously tested) will be selected for further testing. Selection of additional ten percent of units and retesting will be performed until no leaks occur.

- C. Water-Infiltration Test: Test will be conducted according to requirements of ASTM E1105. No water leakage is permitted. Windows will be tested at 6 pounds per square foot test pressure differential.
- D. Air-Infiltration Test: Test will be conducted according to requirements of ASTM E783. Allowable infiltration shall not exceed 0.9 cfm/SF when tested at 6.24 pounds per square foot field test pressure differential.
- E. Windows within storefronts will be tested per the requirements of Section 08 5113, Aluminum Windows.
- F. Field Test report will be submitted to the OWNER, CONTRACTOR and ARCHITECT. Field Test report will include the following:
 - 1. Name of the testing agency and testing agency's credentials.
 - 2. Date of test.
 - 3. Standards complied with during testing.
 - 4. Number and locations of specimens tested.
 - 5. Thorough analysis of test result indicating passing or failing of specimens at pressures specified.
 - 6. Photos illustrating conditions of failed compliance at pressures required.
- G. Credit to the OWNER the cost of failed tests.

3.04 PROTECTION

- A. Protect the Work of this section until Substantial Completion.

3.05 CLEAN UP

- A. Remove rubbish, debris and waste materials and legally dispose of off the Project site.

END OF SECTION



SECTION 08 51 13

ALUMINUM WINDOWS

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

1. Aluminum framed, insulated glazing windows.

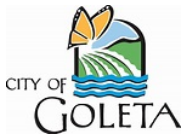
B. Related Requirements:

1. Division 01 - General Requirements.
2. Section 07 26 00 – Vapor Barrier.
3. Section 07 60 00 – Flashing and Sheet Metal.
4. Section 07 92 00 - Joint Sealants.
5. Section 08 41 13 - Aluminum Entrances and Storefront.
6. Section 08 80 00 - Glazing.
8. Section 09 29 00 - Gypsum Board

1.02 REFERENCE STANDARDS

A. ASTM International:

1. ASTM A36 - Standard Specification for Carbon Structural Steel.
2. ASTM A653 - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
3. ASTM C920 - Standard Specification for Elastomeric Joint Sealants.
4. ASTM E283 - Standard Test Method for Determining Rate of Air Leakage through Exterior Windows, Curtain Walls and Doors by Uniform or Cyclic Static Air Pressure Difference.
5. ASTM E330 - Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference.
6. ASTM E331 - Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference.



7. ASTM E547 - Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Cyclic Static Air Pressure Difference.
 8. ASTM E783 - Standard Test Method for Field Measurement of Air Leakage through Installed Windows and Doors.
 9. ASTM E972 - Standard Test Method for Solar Photometric Transmittance of Sheet Materials Using Sunlight.
 10. ASTM E1105 - Standard test Method for Field Determination of Water Penetration of Installed Exterior Windows, Curtain Walls and Doors by Uniform or Cyclic Static Air Pressure Difference.
 11. ASTM F588 - Standard Test Methods for Measuring the Forced Entry Resistance of Window Assemblies, Excluding Glazing Impact.
- B. American Architectural Manufacturers Association (AAMA):
1. AAMA/WDMA/CSA 101/I.S.2/A440 NAFS – North American Fenestration Standards / Specifications for Windows, Doors and Skylights.
 2. AAMA 502 - Voluntary Specification for Field Testing of Newly Installed Fenestration Products.
 3. AAMA 511 - Voluntary Guideline for Forensic Water Penetration Testing of Fenestration Products.
 4. AAMA 513 - Standard Laboratory Test Method for Determination of Forces and Motions Required to Activate Operable Parts of CW and AW Class Operable Windows, Sliding Glass Doors and Terrace Doors in Accessible Spaces.
 5. AAMA 609 - Cleaning and Maintenance Guide for Architecturally Finished Aluminum.
 6. AAMA 612 - Voluntary Specification, Performance Requirements, and Test Procedures Combined Coatings of Anodic Oxide and Transparent Organic Coatings on Architectural Aluminum.
 7. AAMA 701 / 702 – Voluntary Specification for Pile Weatherstripping and Replaceable Fenestration Weatherseals.
 8. AAMA 800 - Voluntary Specifications and Test Methods for Sealants.
 9. AAMA 803.3 - Narrow-Joint Seam Sealer.
 10. AAMA 902 - Voluntary Specification, Performance Requirements and Test Procedures for Sash Balances.
 11. AAMA 904.1 – Voluntary Specifications for Friction Hinges in Window Applications.



12. AAMA 910 - Voluntary Life Cycle Specifications and Test Methods for AW Class Architectural Windows and Doors.
 13. AAMA 1302.5 - Voluntary Specifications for Forced-Entry Resistant Aluminum Prime Windows.
 14. AAMA 2605 Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Architectural Extrusions and Panels.
- C. National Fenestration Rating Council (NFRC):
1. NFRC-100- Standard Procedure for Determining Fenestration Product U-factors.
 2. NFRC-200 - Procedure for Determining Fenestration Product Solar Heat Gain Coefficient and Visible Transmittance at Normal Incidence.
- D. Glass Association of North America (GANA):
1. GANA 01-0300 - Proper Procedures for Cleaning Architectural Glass Products.
- E. The Aluminum Association (AA):
1. AA DAF-45 – Designation System for Aluminum Finishes.
- 1.03 AAMA PRIMARY DESIGNATOR
- A. Primary Designator: Way in which compliant windows are identified by the American Architectural Manufacturers Association (AAMA). Consists of a four part code:
1. Performance Class: Is the likely target application for a door or window. Four classes are defined by the North American Fenestration Standards (NAFS) and corresponds to the first two letters of the designator. Only Performance Class AW is specified in this Section.
 - a. AW: Performance Class of windows commonly used in high-rise and mid-rise buildings to meet extreme loading requirements and limits on deflection.
 2. Performance Grade (PG): Corresponds to the digits of the designator and represents the Design Pressure, in pounds per square foot, a window specimen was tested to.
 3. Test Size: Is the maximum size tested to achieve this rating. Test Size is not used in the window designators specified in this Section.
 4. Product Type: Is the abbreviation for the window type specified, corresponds to the last two letters of the Primary Designator.
- 1.04 PERFORMANCE REQUIREMENTS



- A. Windows shall conform to AAMA/WDMA/CSA 101/I.S. 2/A440, Performance Class AW. Performance Grade shall be as indicated on Part 2 Products, for each specific manufacturer and each window type.
- B. Performance Requirements: Window manufacturer shall hold a current test report for a window specimen successfully tested to the gateway performance requirements of AAMA/WDMA/CSA 101/I.S. 2/A440, Performance Class AW.
 1. Life Cycle Testing: Tested in accordance with AAMA 910. There shall be no damage to fasteners, hardware parts, support arms, activating mechanisms, or any other damage that would cause the window to be inoperable.
 2. Structural Performance:
 - a. Uniform Load Deflection Test:
 - 1) With ventilators closed and locked, test unit in accordance with ASTM E330 at a static air pressure difference of 40 PSF, positive and negative pressure.
 - 2) No member shall deflect over $L/175$ of its span.
 - b. Uniform Load Structural Test:
 - 1) With ventilators closed and locked, test unit in accordance with ASTM E330 at a static air pressure difference of 60 PSF, both positive and negative.
 - 2) At conclusion of test there shall be no glass breakage, permanent damage to fasteners, hardware parts, support arms or actuating mechanisms, nor any other damage that would cause the window to be inoperable.
 3. Water Penetration Resistance: With ventilators closed and locked, test unit in accordance with ASTM E331 and/or ASTM E547 to twenty percent of the Design Pressure, without exceeding 12 PSF. There shall be no uncontrolled water leakage.
 4. Air Leakage Resistance: With ventilators closed and locked, test unit in accordance with ASTM E283 at a static air pressure difference of 6.24 PSF.
 - a. Single Hung, Double Hung Windows and Horizontal Sliding Windows: Air infiltration rate shall not exceed 0.30 cfm/SF.
 - b. Fixed, Awning, Hopper Casement and: Air infiltration rate shall not exceed 0.10 cfm/SF.
 5. Forced Entry Resistance: Test windows in accordance to ASTM F588 or AAMA 1302.5 and meet the requirements of performance level 40.

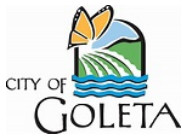
1.05 REGULATORY REQUIREMENTS



- A. Manufactured windows shall comply with the requirements of the California Energy Code, Section 110.6, Mandatory Requirements for Fenestration Products and Exterior Doors.
 - 1. Air Leakage: As indicated in Article 1.03, Performance Requirements.
 - 2. U-factor: Windows shall be rated in accordance with NFRC-100 or use the applicable default U-factor set forth in table 110.6-A.
 - 3. Solar Heat Gain Coefficient (SHGC): Window SHGC shall be rated in accordance with NFRC-200, or use the applicable SHGC set forth in table 110.6-A.
 - 4. Visible Transmittance (VT): The window VT shall be rated in accordance with NFRC-200 or ASTM E972.
 - 5. Labeling: Conform to Section 110.6 for temporary and permanent labels.

1.06 SUBMITTALS

- A. Shop Drawings: Submit Shop Drawings for the Work of this section including plans, elevations, window schedule, opening identification symbols, sizes, and complete details for materials, finishes, sizes, profiles, moldings, dimensioned locations of hardware items with reinforcement, methods of anchoring, size and spacing of anchors, assembly, erection, isolation, glazing procedure as well as re-glazing procedures, materials, caulking and sound transmission class.
- B. Product Data: Submit manufacturer's Product Data, recommendations and standard details for aluminum windows units, including independent laboratory certified tests as necessary to demonstrate compliance with specified requirements.
- C. Material Samples:
 - 1. Window Samples: Submit a window sample fabricated of the materials, finish, fasteners, glazing, panning and caulking system specified.
 - 2. Finish: When factory-finish color coating is specified, submit:
 - a. Five color charts of standard factory coatings.
 - b. Five coated six inch long sections of aluminum sheets finished with color selected by ARCHITECT.
- D. Certificates:
 - 1. AAMA Certified Test Reports: Window manufacturer shall affix AAMA Quality Certified label on every unit or shall submit a certified test report from an approved testing laboratory, certifying that the specified insulated glass window complies with ANSI/AAMA requirements.



2. Building Energy Efficiency Standards Certified Test Reports: Window manufacturer shall affix a clearly visible temporary label to the non-insulated glass windows or supply a project specific label certificate using NFRC CMA protocol, listing the U-Factors, solar heat gain coefficients (SHGC), visible transmittance (VT) and air leakage for the fenestration products to adhere to the prescriptive requirements of Title 24, CEC.
 3. Submit a certificate bearing official and legal signature of window supplier stating that the finish complies with AAMA 2605 for Organic Coatings and to AAMA 612 for Anodic Finish, as applicable.
 4. Submit a certificate bearing official and legal signature of window supplier stating that windows with security glazing had the glass installed in accordance with Section 08 8053, Security Glazing.
- B. Written statement signed by the sealant manufacturer or distributor stating that the sealant joints shown on the shop drawings have been reviewed and approved for adhesion and surfaces compatibility.
- C. LEED Submittals: Complete the LEED Material Buyout Form (MBoF) with all materials provided to the project. A complete submittal includes providing all material costs in the MBoF and all of the supporting documentation for the following credits:
1. MRc2 - Environmental Product Declarations (EPD): Provide Industry-Wide or Product-Specific EPD.
 2. MRc3 - Sourcing of Raw Materials - Recycled Content: Provide product data for pre- and post- consumer recycled content.
 3. MRc4 - Material Ingredients: Provide manufacturers Declare label, Health Product Declaration (HPD), Cradle to Cradle Certification, or Cradle to Cradle Health Product Certificate.
 4. IEQc2 - Low-Emitting Materials – Interior Wet Applied Products: For paints, coatings, adhesives and sealants applied on site or used for laminating off-site, include product data indicating the VOC content (g/L) and testing.

1.07 QUALITY ASSURANCE

- A. Regulatory Requirements:
1. Except for more stringent requirements specified in this Section, manufactured aluminum windows shall comply with the requirements of the CBC Part 6, California Energy Code, Section 110.6, Mandatory Requirements for Fenestration Products and Exterior Doors.
 2. Windows shall be designed to withstand the minimum loads prescribed in CBC Section 1609A.
- B. Field applied products that release VOC's, such as sealants, caulking, adhesives, primers and paints, shall be in compliance with Green Building Code requirements.



- C. Installer Qualifications:
 - 1. Minimum five year experience installing windows of the type specified by this Section.
 - 2. Installer shall be approved by the window manufacturer as an approved installer.
- D. Manufacturer Qualifications: Minimum 5 year experience in producing aluminum windows of the type specified. Window manufacturer technical representative shall provide field services to verify window installation is in accordance to manufacturer's written instructions.
- E. Pre-Installation Conference: CONTRACTOR shall coordinate and conduct pre-installation conference in accordance to Section 01 31 19, Project Meetings, to review the progress of construction activities and preparations for the installation of aluminum windows and other related work of this Section.

1.08 DELIVERY, STORAGE AND HANDLING

- A. Deliver materials in manufacturer's packaging to protect windows during transportation and storage.
- B. Store windows indoors in a clean ventilated area and stack vertically on edge with wood or plastic shims between components to provide water drainage and air circulation.
- C. Handle in a manner to evenly distribute material load and prevent twisting, ending and cracking of windows doors and associated parts.

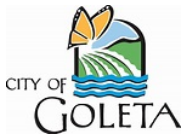
1.09 WARRANTY

- A. Window installation shall be warranted by CONTRACTOR against defects under normal use and service, for a period of two years.
- B. Windows shall be warranted by window manufacturer against defects in material and fabrication under normal use and service, for a period of five years.
- C. Pigmented organic finished window and related components shall be warranted for ten years against blistering, cracking, peeling or chipping or fading beyond AAMA 2605.
- D. Anodized finished window and related components shall be warranted for five years against blistering, cracking, peeling or chipping or fading beyond AAMA 612.
- E. Factory glazed insulated glass units shall be warranted to be free from obstruction of vision as a result of dust or film formation on the internal glass surfaces caused by failure of the hermetic seal due to defects in material and workmanship for a period of ten years.

PART 2 – PRODUCTS

2.01 MANUFACTURERS, SERIES AND AAMA PRIMARY DESIGNATORS

- A. Fixed Windows:



1. Arcadia.
2. EFCO.
3. Kawneer.
4. Peerless.
5. Equal.

2.02 FABRICATION

- A. Aluminum windows shall conform to AAMA/WDMA/CSA 101/I.S.2/A440.
- B. Window frames, sash members and muntin bars, shall be extruded aluminum sections of 6063-T5 or 6063-T6 alloy. Framing sections and dimensions shall be as indicated in drawings.
- C. Windows shall be factory fabricated for inside glazing, of the types and sizes indicated and specified, and shall include hardware, fastenings, clips, fins, anchors, glazing beads, and other appurtenances necessary for a complete installation and proper operation. Windows shall be fabricated for inside glazing.

2.03 GLAZING

1. Glazing shall be glazed type as shown in indicated with an extruded aluminum snap-on glazing bead at the interior. Sashes shall be factory glazed by the manufacturer to provide proper seal.
2. Glazing beads shall be extruded aluminum of window manufacturer's standard design, 5/8 inch minimum height, cut to proper length.
3. For glass and glass setting materials refer to Section 08 80 00, Glazing.
- D. Fasteners: Provide concealed anchors conforming to AAMA/WDMA/CSA 101/I.S.2/A440 of the type recommended by the window manufacturer for the specific type of construction. Anchors and fasteners shall be compatible with the aluminum window and the adjoining construction materials.

2.04 FINISH

- A. Organic finish applied over a five stage aluminum pre-treatment. Finish shall be a Two coat pigmented organic coating system applied over a five stage aluminum pre-treatment to a minimum of 1.2 mil thickness and conforming with AAMA 2605. Color shall be selected by the ARCHITECT.

2.05 SEALANTS

- A. Sealants shall be as scheduled and shall be of the type recommended by the window manufacturer.



- B. Sealants shall conform with AAMA 800 and shall be compatible with aluminum finish and adjacent materials.
- C. Sealants used to seal mechanically fixed joints, it shall conform to AAMA 800 or ASTM C920, Type S, Grade S, Class 25.
- D. Refer to Section 07 92 00, Joint Sealants, for additional information.

2.06 GLASS

- A. Refer to Section 08 80 00, Glazing.

2.07 LEED REQUIREMENTS

- A. IW/PS EDP: Products specified under this section must have a Type III Product Specific EPD or the company must be listed in the industry group responsible for the Industry Wide Externally Verified EPD.
- B. PS EPD: Products specified under this section must have a Type III Product Specific EPD.
- C. HPDs: Products specified under this section must have one of the following unexpired material ingredient reports compliant with LEEDv4.1 requirements and declared to 1000 ppm or less: Declare label, Health Product Declaration (HPD), Cradle to Cradle Certification, Cradle to Cradle Health Product Certificate, or UL Product Lens Certification.
- D. Interior Wet Applied Products: All wet-applied on-site paints, coatings, adhesives, and sealants products provided under Part 2 of this specification section must be compliant with the VOC limits outlined under IEQc2: Low Emitting Materials in 01 81 13 Sustainable Design Requirements. In addition, all paints and coatings must be compliant with CDPH Standard Method v1.2-2017 emissions testing with proper unexpired CDPH testing certificates or acceptable third-party certification.

PART 3- EXECUTION

3.01 EXAMINATION

- A. Verify that conditions of substrate are acceptable for aluminum window installation in accordance with manufacturer's written recommendations.
- B. Verify openings are dimensionally correct and within allowable tolerances, and substrates are plumb, level and clean.
- C. Verify that anchoring surface is in accordance with approved shop drawings.
- D. Inform OAR of unacceptable conditions immediately upon discovery.
- E. Proceed with installation only after unacceptable conditions have been remedied.



3.02 INSTALLATION

- A. Windows and operators shall be installed in accordance with the window manufacturer's printed instructions and details. Set windows plumb, square, level, and true within their respective openings. Adjoining units of windows or assembly of windows shall be installed in the same plane and with rails, muntins, and like members accurately aligned.
- B. Aluminum in contact with plaster, concrete or steel shall be separated from dissimilar materials as recommended in the Appendix to AAMA/WDMA/CSA 101/I.S.2/A440. Screws, rivets, bolts and other fastening devices shall be of aluminum, non-magnetic stainless steel or other non-corrosive materials compatible with aluminum.
- C. Apply sealant in conformance to Section 07 92 00, Joint Sealants, in sufficient quantity at joints and intersections to provide a weathertight seal between the window and surrounding construction. Wipe off excess and leave exposed sealant surfaces clean and smooth.
- D. Upon completion of the Work of this section, inspect windows and operating devices for proper installation and operation. Operate vents and hardware and adjust to ensure proper fitting and functioning and leave in smoothly operating condition. Lubricate hardware and operating parts as necessary.
- E. Where indicated on the Drawings a two piece snap together receptor shall be furnished to fasten windows in place. The receptor aluminum finish shall match the window frame. When snapped together, system shall fasten window securely in place with no water penetration at specified test pressure.
- F. Where indicated on the Drawings provide panning, which shall be either a receiver or attached type. The panning extrusions shall be field secured at the corners with stainless steel screws in integral screw ports with the joints back sealed to prevent water intrusion. Exposed screws or fasteners on the exterior of the panning are not permitted. Panning and trim shall be furnished in the same color and finish as window system frames.
- G. Limit the opening of windows without security screens to 6 inches where window sills are at a height of ten feet or more above grade, balconies, stairs or lower roofs.

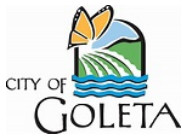
3.03 FIELD QUALITY CONTROL

- A. Conduct on-site tests in conformance with AAMA 502, with the OAR, ARCHITECT and CxSP present. The OAR will select units to be tested. Testing shall be performed by an AAMA accredited testing agency paid by the CONTRACTOR.
- B. Testing shall be performed as soon as possible after window installation and before drywall installation to allow visual access. AAMA 502 cannot be used for windows that have been installed for more than six months. In the case windows have been installed for more than six months the procedures of AAMA 511 shall be followed.
- C. Ten percent of installed windows shall be selected for testing. If one or more windows fail, additional ten percent of windows, not including the ones previously tested, will be



selected for further testing. Selection of additional ten percent of windows and retesting shall be performed until no leaks occur.

1. Air-Infiltration Test: Test set-up and equipment requirements for the test shall be in accordance to the requirements of ASTM E783. Windows shall be tested at 6.24 PSF field test pressure differential. Allowable rates for air leakage shall be 1.5 times the applicable AAMA/WDMA/CSA 101/I.S.2/A440 rate for AW performance class when testing according to AAMA 502, as follows:
 - a. Compression Seal and Fixed Windows: 0.15 cfm/ft².
 - b. Sliding Seal Windows: 0.45 cfm/ft².
 2. Water-Resistance Test: Test set-up and equipment requirements for the water penetration portion of the test shall be in accordance to the requirements of ASTM E1105, Method A, using a non-cyclic static pressure difference, and shall test the entire window assembly including perimeter joints. No water penetration is allowed.
 - a. The test pressure used shall be equal to two thirds of the tested and rated laboratory performance test pressure (twenty percent of the Performance Grade listed in Part 2 for each window type; however, shall not exceed twelve pounds per square feet.)
 - b. Windows with accessible hardware are permitted certain reductions in air infiltration and water resistance performance requirements in accordance with AAMA 513.
 - c. If water leakage occurs and source cannot be determined, a forensic evaluation using the procedures stated in AAMA 511 shall follow.
- D. Windows failing to meet specified air or water infiltration testing:
1. CONTRACTOR shall submit proposed remedial work to ARCHITECT for review.
 2. CONTRACTOR shall complete remedial work.
 3. When test results meet specified requirements, CONTRACTOR shall incorporate remedial work into other work on the Project.
- E. Field Test report shall be submitted to the OWNER, CONTRACTOR and ARCHITECT. Field Test report must include the following:
1. Name of the testing agency and testing agency's credentials.
 2. Date of test.
 3. Standards complied with during testing.
 4. Number and locations of specimens tested.



5. Thorough analysis of test result indicating passing or failing of specimens at pressures specified.
6. Photos illustrating conditions of failed compliance at pressures required.

3.03 CLEANING

- A. Clean interior and exterior surfaces of window frames of mortar, plaster, paint spattering spots, and other foreign matter in conformance with AAMA 609 and manufacturer's written recommendations.
- B. Clean glass using methods complying with GANA 01-0300.
- C. Touch-up, repair or replace damaged products before Substantial Completion.

3.04 CLEAN UP

- A. Remove rubbish, debris and waste materials and legally dispose of off the Project site.

3.05 PROTECTION

- A. Protect the Work of this section until Substantial Completion.

END OF SECTION



SECTION 08 63 23

METAL-FRAMED SKYLIGHTS AND SLOPED GLAZING

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

1. Metal-Framed Skylights and Sloped Glazing. Engineering, including structural calculations of the entire skylight system.
2. Fabrication and erection of skylight frames.
3. Fabrication and erection of the aluminum gutter system including, when applicable, insulation and pitched liners.
4. Applied finish of aluminum extrusions and sheet.
5. Impact Resistant Skylight glass and glazing.
6. Skylight related flashings.

B. Related Requirements:

1. Division 01 - General Requirement.
2. Section 07 22 00 – Roof Deck Insulation
3. Section 07 26 00 – Vapor Barriers
4. Section 07 60 00 - Flashing and Sheet Metal.
5. Section 07 92 00 - Joint Sealants.
6. Section 08 88 00 - Glazing
6. Section 26 31 00 – Photovoltaic System

1.02 SECTION DEFINITIONS

- ###### A.
- Water leakage is defined as any uncontrolled water that appears on any exposed interior surface that is not drained back to the exterior.

1.03 DESIGN REQUIREMENTS



- A. Drawings indicate sizes, locations, profiles, and general details of skylight construction and installation.
- B. The total deflection of rafters less than 20 feet in length shall not exceed 1/75 of that length or one inch, whichever is smaller, at design loading. Rafters 20 feet or greater shall not exceed 1/240.
- C. The deflection of a framing member in a direction parallel to the plane of the glass, when carrying its full load, shall not reduce the glass or panel bite below 75 percent of the design dimension.
- D. Framing members and the edge of glazing products shall have a 1/8 inch minimum clearance at maximum deflection.
- E. Deflections shall not impair the function of or damage joint seals or glazing.
- F. Vault rafter segments shall be moment connections. The skylight shall impose no lateral loads on the supporting structure other than wind and seismic loads.
- G. Glass Performance Requirements:
 - 1. Probability of breakage shall not exceed 1/1000 for sloped glass upon imposition of design wind and live loads for one minute.
 - 2. Probability of breakage due to anticipated thermal stress not to exceed 1/1000.
 - 3. Comply with CBC requirements.

1.04 SUBMITTALS

- A. Shop Drawings: Submit plans, elevations, details and calculations.
- B. Material Samples:
 - 1. Submit finish Samples for aluminum materials and flashings.
 - 2. Submit glass Samples, minimum 12-inch by 12-inch.
- C. Certificates:
 - 1. Certification that adhesion of sealant to samples of metal and glass is adequate when tested in accordance with ASTM C794
 - 2. Certification that materials in contact with sealant are compatible with sealant after being exposed to 2,000-4,000 micro watt ultra-violet radiation for twenty-one (21) days.
 - 3. Statement that stress on each detailed sealant joint will not exceed design stress of sealant when exposed to specified wind loads.



- D. Calculations: Submit structural calculations prepared, signed, and sealed by a structural engineer licensed in the State of California.
- E. Test Reports:
 - 1. The skylight manufacturer shall submit for review at least three test reports by a nationally recognized testing facility indicating that similar skylight products by the manufacturer have been tested according to the referenced standards and that the skylight passed those tests.
 - 2. Test data on adhesion to production samples of metal and glass, tested in accordance with ASTM C794.
- F. LEED Submittals: Complete the LEED Material Buyout Form (MBoF) with all materials provided to the project. A complete submittal includes providing all material costs in the MBoF and all of the supporting documentation for the following credits:
 - 1. MRc2 - Environmental Product Declarations (EPD): Provide Industry-Wide or Product-Specific EPD.
 - 2. MRc3 - Sourcing of Raw Materials - Recycled Content: Provide product data for pre- and post- consumer recycled content.
 - 3. MRc4 - Material Ingredients: Provide manufacturers Declare label, Health Product Declaration (HPD), Cradle to Cradle Certification, or Cradle to Cradle Health Product Certificate.
 - 4. IEQc2 - Low-Emitting Materials – Interior Wet Applied Products: For paints, coatings, adhesives and sealants applied on site or used for laminating off-site, include product data indicating the VOC content (g/L) and testing.

1.05 QUALITY ASSURANCE

- A. Comply with the following as a minimum requirement:
 - 1. AAMA 501.1 - Standard Test Method for Metal Curtain Walls for Water Penetration Using Dynamic Pressure.
 - 2. AAMA 501.2 - Field Check of Metal Curtain Walls for Leakage.
 - 3. AAMA 501.3 - Field Check of Water Penetration Through Installed Exterior Windows, Curtain Walls, and Doors by Uniform Air Pressure Difference.
 - 4. AAMA 603.8 - Performance Requirements and Test Procedures for Pigmented Organic Coatings on Extruded Aluminum.
 - 5. AAMA 2605 - Specification for High Performance Organic Coatings on Architectural Extrusions and Panels.
 - 6. AAMA 606.1 - Voluntary Guide Specification and Inspection Methods for Clear Anodic Finishes for Architectural Aluminum.



7. ANSI Z97.1 - Safety Glazing Materials Used in Buildings - Safety Performance Specifications and Methods of Test.
8. ASTM A193 - Alloy Steel and Stainless Steel Bolting Materials for High Temperature Service.
9. ASTM A307 - Carbon Steel Bolts and Studs, 60,000 psi Tensile Strength.
10. ASTM B209 - Aluminum and Aluminum-Alloy Sheet and Plate.
11. ASTM B211 - Aluminum and Aluminum-Alloy Bar, Rod and Wire.
12. ASTM B221 - Aluminum-Alloy Extruded Bars, Rods, Wires, Profiles and Tubes.
13. ASTM B316 - Specification for Aluminum and Aluminum-Alloy Rivet and Cold-Heating Wire and Rods.
14. ASTM C719 - Adhesion and Cohesion of Elastomeric Joint Sealants under Cyclic Movement (Hockman Cycle).
15. ASTM C794 - Adhesion-in-Peel of Elastomeric Joint Sealants.
16. ASTM C1036 - Flat Glass.
17. ASTM C1048 - Heat-Treated Flat Glass - Kind HS, Kind FT Coated and Uncoated Glass.
18. ASTM D395 - Rubber Property - Compression Set.
19. ASTM D412 - Vulcanized Rubber and Thermoplastic Rubbers and Thermoplastic Elastomers - Tension.
20. ASTM D1171 - Rubber Deterioration - Surface Ozone Cracking Outdoors or Chamber (Triangular Specimens).
21. ASTM D2240 - Rubber Property - Durometer Hardness.
22. ASTM E283 - Determining the Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen.
23. ASTM E330 - Structural Performance of Exterior Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference.
24. ASTM E331 - Water Penetration of Exterior Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference.
25. ASTM E2190 - Standard Specification for Insulating Glass Unit Performance and Evaluation.



26. ASTM E783 - Field Measurement of Air Leakage Through Installed Exterior Windows and Doors.
 27. GANA - Glazing Manual.
 28. US CPSC Standard 16 CFR 1202 - Architectural Glazing Standards and Related Material.
- B. Qualifications of Installer: Minimum 10 years experience installing work of similar scope and complexity.
- 1.06 WARRANTY
- A. Submit manufacturer's warranty certifying that skylight work was furnished and installed in accordance with the Contract Documents.
 - B. Certify that skylight frame is free of defects in design, material, and construction for a period of ten (10) years from the Date of Skylight Completion.
 - C. Warrant glass against defective materials, delamination, seal failure, and defects in manufacture per the glass manufacturer's standard warranties from date of manufacture.
 - D. Warrant structural sealant for a period of ten (10) years per sealant manufacturer's standard warranty of merchantable quality. Warranty shall certify that cured sealant:
 1. Will not become brittle or crack due to weathering or normal expansion and contraction of adjacent surfaces.
 2. Will not harden beyond a Shore A durometer of 50, nor soften below a minimum of 10 points.
 3. Will not change color significantly when used with compatible back-up materials.
 4. Will not bleed significantly.
 - E. Warrant finish per the manufacturer's standard warranties from date of application.
 - F. Optional extended warranties may be purchasable on some products at an additional cost.
 - G. Warranty service becomes effective only following payment in full for the contract amount.

PART 2 - PRODUCTS

2.01 MANUFACTURER



A. Basis of Design: Provide products and systems manufactured by Super Sky Products Enterprises, LLC; 110301 N. Enterprise Drive; Mequon, WI 53092; Phone (800) 558-0457, (262) 242-2000; Fax (262) 242-7409; www.supersky.com.

B. Or approved equal.

2.02 MATERIALS

A. Framework:

1. Principal supporting members: 0.125-inch minimum thickness extruded aluminum alloy 6063-T5 or 6061-T6 complying with ASTM B221. Sizes, shapes and profiles as per Super Sky Products standard components unless indicated otherwise in drawings.
2. Snap-on Covers and Miscellaneous Non-supporting Trim: .062-in. minimum thickness extruded aluminum, alloy 6063-T5 per ASTM B221.
3. Principal formed metal members: 0.125-inch minimum thickness aluminum alloy 5052 or 6061-T6 complying with ASTM B209.

B. Glazing Strips:

1. Extruded EDPM rubber designed to comply with the following specifications
 - a. Hardness: ASTM D2240 Type A 50 +5 Durometer.
 - b. Tensile Strength: ASTM D412 800 psi minimum.
 - c. Elongation: 300 percent minimum.
 - d. Color: As selected by the Architect.
2. Compression Set: ASTM D395, 22 hours at 212 degrees F.: 25 percent maximum.
3. Heat Aging Characteristics:
 - a. Seventy hours at 212 degrees F.
 - b. ASTM D2240 hardness change: +3 Durometer.
 - c. ASTM D412 tensile change: -10 percent.
 - d. ASTM D412 elongation change: -20 percent.
4. ASTM D1171 weather-resistance, one part ozone per million, 500 hours at 20 percent elongation to show no cracks.



5. This material shall have no visual checks, cracks or breaks after completion of tests.
- C. Setting Blocks: Extruded setting blocks shall be Type II silicone rubber designed to permit adhesion and complying with the following:
1. Hardness: ASTM D2240 Type A 80 + 5 Durometer.
 2. Color: Black.
- D. Fasteners:
1. Exterior cap retainers: ASTM A193 B8 300 series stainless steel.
 2. Framework connections: ASTM B211 2024-T4 aluminum, ASTM A193 B8 300 stainless steel, and ASTM B316 aluminum rivets as required.
 3. Anchoring to support structure: ASTM A 307 zinc-plated steel fasteners.
 4. Exposed stainless steel truss head mechanical fasteners are utilized in accordance with standard connection details.
- E. Flashing:
1. Flashing shall be preformed 20 gage 5005-H4 aluminum, 0.40-inch minimum thickness, finished to match the skylight rafter caps.
 2. Sheet metal flashings/closures/claddings are to be furnished shop formed to profile in min. 10-ft. lengths. When lengths exceed 10-ft., field trimming of the flashing and field forming the ends is necessary to suit as-built conditions. Sheet metal ends are to overlap 6-in. to 8-in. minimum, set in a full bed of sealant and riveted if required.
- F. Exposed metal finishes – exterior and interior:
1. Coat aluminum components with a PVDF coating system, conforming to AAMA 2605. Color as selected by Architect, from manufacturer's standard colors.
- G. Glass:
1. Standard Certification Requirements:
 - a. Heat Treated Glass: ASTM C1048, with surface stress of 5,000 (+/-) 1500 psi.
 - b. Laminated Glass: Two lites interleaved with polyvinyl butyral (PVB). Units must meet criteria of ANSI Z97.1- 1984 and CPSC 16 CFR 1201 for safety glazing. Provide PVB layer of 0.030-in. for all glass units



unless a coating, and/or frit is applied to the inside face of the laminate thereby necessitating a 0.060-in. PVB layer.

- c. Insulating Glass: CBA rated by the Insulating Glass Certification Council (IGCC) when tested in accordance with ASTM E773 and ASTM E774. Dual edge seals with the secondary seal being silicone. Exterior lite of fully tempered glass and interior lite of laminated glass.
2. Performance Requirements:
 - a. Probability of breakage not to exceed 8/1000 for vertical glass and 1/1000 for sloped glass upon first application of design wind and live load pressures. For glass selection, design wind pressure for a one minute duration. For loads of longer duration use standard engineering practices for glass selection.
 - b. Probability of breakage due to anticipated thermal stress not to exceed 8/1000 for vertical glass and 1/1000 for sloped glass.
 3. Glazing Unit Composition:
 4. Impact Resistant Skylights, special tested glass products are required for laminated and insulated glass. Evidence of tested system, including glass to be provided.
 5. Custom Patterned Glazing: As specified in Section 08 80 00, applied on one side of the exterior glazing.

G. Sealants:

1. Structural joints and non-structural seals shall be high performance silicone sealants installed in accordance with the manufacturer's written recommendations.
2. Non-structural Flush Glazed Joints and Weather Seal Joints: Silicone sealants applied in accordance with manufacturer's recommendations.
3. Structural Sealant Performance Requirements:
 - a. Hardness: ASTM D2240 Type A, 30 Durometer.
 - b. Ultimate tensile strength: ASTM D412, 170 psi.
 - c. Tensile strength at 150 percent elongation: ASTM D412; minimum 80 psi.
 - d. Joint movement capability after 14 day cure: ASTM C719, +50 percent.



e. Peel strength (aluminum, glass concrete) after 21 day cure: ASTM C794, 32 pounds per inch.

4. Structural silicone shall not support dead weight of vertical glass or panel.

2.03 FABRICATION

- A. Construct skylights using extruded aluminum members.
- B. Construct skylights using a continuous curb.
- C. Insofar as practicable, fit and assemble work in the manufacturer's shop. Work which cannot be permanently assembled shall be shop-assembled, marked, and disassembled before shipment to the jobsite.
- D. Design rafter bars for slide-in type spline glazing strips.
- E. Design glass retainer fasteners to resist uplift loadings. Spacing to be determined by structural calculations, when applicable.
- F. Use snap-on beauty caps to conceal glass retainers and glass retainer fasteners.
- G. Shop locate drill and bolt, or weld aluminum clips to framing members.
- H. Set glass with interior and exterior EDPM glazing strips.
- I. Use silicone setting blocks to support glass and to provide edge clearances and glass bites as outlined below, in accordance with FGMA recommendations:
 - 1. Set blocks not less than 6-in. from edge of glass for support unit.
 - 2. Glass Bite: Not less than 1/2-in. nor more than 5/8-in. on any side of glass unit.
 - 3. Maintain 1/4-in. edge clearance between glass and adjacent metal framework.
 - 4. Use rubber spacers to maintain separation of glass and adjacent metal framework.
- J. Locate weepholes in curb to positively drain condensation to exterior of skylight at each rafter connection.

2.05 LEED REQUIREMENTS

- A. IW/PS EDP: Products specified under this section must have a Type III Product Specific EPD or the company must be listed in the industry group responsible for the Industry Wide Externally Verified EPD.



- B. PS EPD: Products specified under this section must have a Type III Product Specific EPD.
- C. HPDs: Products specified under this section must have one of the following unexpired material ingredient reports compliant with LEEDv4.1 requirements and declared to 1000 ppm or less: Declare label, Health Product Declaration (HPD), Cradle to Cradle Certification, Cradle to Cradle Health Product Certificate, or UL Product Lens Certification.
- D. Interior Wet Applied Products: All wet-applied on-site paints, coatings, adhesives, and sealants products provided under Part 2 of this specification section must be compliant with the VOC limits outlined under IEQc2: Low Emitting Materials in 01 81 13 Sustainable Design Requirements. In addition, all paints and coatings must be compliant with CDPH Standard Method v1.2-2017 emissions testing with proper unexpired CDPH testing certificates or acceptable third-party certification.

PART 3 - EXECUTION

3.01 FABRICATION

- A. The skylights shall be fabricated with extruded aluminum members of alloys as specified.
- B. Rafter bars shall be of one piece construction.
- C. Rafter bars shall be designed for snap-in type glazing strips.
- D. Clips for the attachment of rafter bars shall be aluminum and shall be shop riveted, bolted, or welded to rafter bars.
- E. Welding shall be performed by the heliarc process. Exposed welds shall be ground flush and smooth.
- F. Waterproofing shall be furnished by means of continuous exterior silicon sealant beads. Seal horizontal flush joints with a continuous silicone sealant bead.
- G. Silicone setting blocks shall be furnished for support of glass and shall be sized and installed in accordance with glass manufacturers written recommendations.
- H. Skylights shall be furnished with weep holes located at lower portion of extruded aluminum curb bar at each rafter connection for drainage of condensation to exterior.
- I. Field cutting or trimming of rafter bars, caps, or glass light is not permitted.
- J. Pressure bars shall be furnished for snap-in type glazing strips and shall have snap-on covers, so no exterior fastener is exposed.



- K. Pressure bars shall be fastened with stainless steel fasteners into a system of alternate serrations. Fasteners shall be furnished so glazing strips are compressed to a predetermined amount of uniform compression. Fasteners shall be installed at 12 inches on center maximum.
- L. Glass shall be installed with exterior silicone glazing strips.
- M. Waterproofing shall be provided by means of continuous exterior silicon sealant beads. Horizontal flush joints require a continuous silicone sealant bead.

3.02 EXAMINATION

- A. Examine the Work to determine that structure and substrate to receive system are properly prepared and ready to receive the Work of this section. Do not proceed until unsatisfactory conditions are corrected.

3.03 PREPARATION

- A. Surfaces to be sealed shall be completely cleaned and dry. Verify and follow sealant manufacturer's written recommendations for proper cleaning, priming, and installation procedures.
- B. Temperatures of the glass and aluminum surfaces shall be above 40 degrees F, during glazing and curing. Temperature range shall not vary more than 10 degrees F during sealant installation and curing.
- C. Install components and glazing under direct observation of the skylight manufacturer's technical representative.

3.04 ISOLATION OF INCOMPATIBLE MATERIALS

- A. Incompatible materials, such as aluminum and steel, shall be isolated from each other. Aluminum shall be furnished with one coat of zinc chromate, one coat bituminous paint, and further protected where required with isolation tape to prevent contact with incompatible materials and metal.

3.05 FIELD QUALITY CONTROL

- A. Water flood test completed skylights in accordance with AAMA 501.1, 501.2 and 501.3.

3.06 CLEAN UP

- A. Remove rubbish, debris and waste materials and legally dispose of off the Project site.

3.07 PROTECTION

- A. Protect the Work of this section until Substantial Completion.



Department of Neighborhood Services and Public Safety
GOLETA TRAIN DEPOT PROJECT

END OF SECTION



SECTION 08 71 00

DOOR HARDWARE

PART 1 - GENERAL

1.01 SUMMARY

A. Section includes:

1. Mechanical and electrified door hardware
2. Electronic access control system components

B. Section excludes:

1. Windows
2. Cabinets (casework), including locks in cabinets
3. Signage
4. Toilet accessories
5. Overhead doors

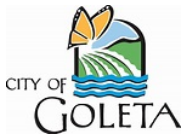
C. Related Sections:

1. Division 07 Section "Joint Sealants" for sealant requirements applicable to threshold installation specified in this section.
2. Division 08 Sections:
 - a. "Metal Doors and Frames"
 - b. "Flush Wood Doors"
 - c. "Interior Aluminum Doors and Frames"
 - d. "Aluminum-Framed Entrances and Storefronts"
 - e. "Special Function Doors"
 - f. "Entrances"
3. Division 26 "Electrical" sections for connections to electrical power system and for low-voltage wiring.
4. Division 28 "Electronic Safety and Security" sections for coordination with other components of electronic access control system and fire alarm system.

1.02 REFERENCES

A. UL LLC

1. UL 10B - Fire Test of Door Assemblies



2. UL 10C - Positive Pressure Test of Fire Door Assemblies
 3. UL 1784 - Air Leakage Tests of Door Assemblies
 4. UL 305 - Panic Hardware
- B. DHI - Door and Hardware Institute
1. Sequence and Format for the Hardware Schedule
 2. Recommended Locations for Builders Hardware
 3. Keying Systems and Nomenclature
 4. Installation Guide for Doors and Hardware
- C. NFPA – National Fire Protection Association
1. NFPA 70 – National Electric Code
 2. NFPA 80 – 2016 Edition – Standard for Fire Doors and Other Opening Protectives
 3. NFPA 101 – Life Safety Code
 4. NFPA 105 – Smoke and Draft Control Door Assemblies
 5. NFPA 252 – Fire Tests of Door Assemblies
- D. ANSI - American National Standards Institute
1. ANSI A117.1 – 2017 Edition – Accessible and Usable Buildings and Facilities
 2. ANSI/BHMA A156.1 - A156.29, and ANSI/BHMA A156.31 - Standards for Hardware and Specialties
 3. ANSI/BHMA A156.28 - Recommended Practices for Keying Systems
 4. ANSI/WDMA I.S. 1A - Interior Architectural Wood Flush Doors
 5. ANSI/SDI A250.8 - Standard Steel Doors and Frames
- E. 2019 California Building Code
1. Chapter 11B – Accessibility to Public Buildings, Public Accommodations, Commercial Buildings and Public Housing

1.03 SUBMITTALS

A. General:

1. Submit in accordance with Conditions of Contract and Division 01 Submittal Procedures.
2. Prior to forwarding submittal:
 - a. Review drawings and Sections from related trades to verify compatibility with specified hardware.
 - b. Highlight, encircle, or otherwise specifically identify on submittals: deviations from Contract Documents, issues of incompatibility or other issues which may detrimentally affect the Work.



B. Action Submittals:

1. **Product Data:** Submit technical product data for each item of door hardware, installation instructions, maintenance of operating parts and finish, and other information necessary to show compliance with requirements.
2. **Riser and Wiring Diagrams:** After final approval of hardware schedule, submit details of electrified door hardware, indicating:
 - a. **Wiring Diagrams:** For power, signal, and control wiring and including:
 - 1) Details of interface of electrified door hardware and building safety and security systems.
 - 2) Schematic diagram of systems that interface with electrified door hardware.
 - 3) Point-to-point wiring.
 - 4) Risers.
3. **Samples for Verification:** If requested by Architect, submit production sample of requested door hardware unit in finish indicated and tagged with full description for coordination with schedule.
 - a. Samples will be returned to supplier. Units that are acceptable to Architect may, after final check of operations, be incorporated into Work, within limitations of key coordination requirements.
4. **Door Hardware Schedule:**
 - a. Submit concurrent with submissions of Product Data, Samples, and Shop Drawings. Coordinate submission of door hardware schedule with scheduling requirements of other work to facilitate fabrication of other work critical in Project construction schedule.
 - b. Submit under direct supervision of a Door Hardware Institute (DHI) certified Architectural Hardware Consultant (AHC) or Door Hardware Consultant (DHC) with hardware sets in vertical format as illustrated by Sequence of Format for the Hardware Schedule published by DHI.
 - c. Indicate complete designations of each item required for each opening, include:
 - 1) Door Index: door number, heading number, and Architect's hardware set number.
 - 2) Quantity, type, style, function, size, and finish of each hardware item.
 - 3) Name and manufacturer of each item.
 - 4) Fastenings and other pertinent information.
 - 5) Location of each hardware set cross-referenced to indications on Drawings.
 - 6) Explanation of all abbreviations, symbols, and codes contained in schedule.
 - 7) Mounting locations for hardware.
 - 8) Door and frame sizes and materials.
 - 9) Degree of door swing and handing.



10) Operational Description of openings with electrified hardware covering egress, ingress (access), and fire/smoke alarm connections.

5. Key Schedule:

- a. After Keying Conference, provide keying schedule that includes levels of keying, explanations of key system's function, key symbols used, and door numbers controlled.
- b. Use ANSI/BHMA A156.28 "Recommended Practices for Keying Systems" as guideline for nomenclature, definitions, and approach for selecting optimal keying system.
- c. Provide 3 copies of keying schedule for review prepared and detailed in accordance with referenced DHI publication. Include schematic keying diagram and index each key to unique door designations.
- d. Index keying schedule by door number, keyset, hardware heading number, cross keying instructions, and special key stamping instructions.
- e. Provide one complete bitting list of key cuts and one key system schematic illustrating system usage and expansion. Forward bitting list, key cuts and key system schematic directly to Owner, by means as directed by Owner.
- f. Prepare key schedule by or under supervision of supplier, detailing Owner's final keying instructions for locks.

C. Informational Submittals:

1. Provide Qualification Data for Supplier, Installer and Architectural Hardware Consultant.
2. Provide Product Data:
 - a. Certify that door hardware approved for use on types and sizes of labeled fire-rated doors complies with listed fire-rated door assemblies.
 - b. Include warranties for specified door hardware.

D. Closeout Submittals:

1. Operations and Maintenance Data: Provide in accordance with Division 01 and include:
 - a. Complete information on care, maintenance, and adjustment; data on repair and replacement parts, and information on preservation of finishes.
 - b. Catalog pages for each product.
 - c. Final approved hardware schedule edited to reflect conditions as installed.
 - d. Final keying schedule
 - e. Copy of warranties including appropriate reference numbers for manufacturers to identify project.
 - f. As-installed wiring diagrams for each opening connected to power, both low voltage and 110 volts.

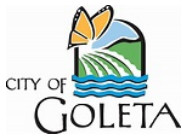


E. Inspection and Testing:

1. Submit written reports to the Owner and Authority Having Jurisdiction (AHJ) of the results of functional testing and inspection for:
 - a. Fire door assemblies, in compliance with NFPA 80.
 - b. Required egress door assemblies, in compliance with NFPA 101.

F. LEED Submittals: Complete the LEED Material Buyout Form (MBoF) with all materials provided to the project. A complete submittal includes providing all material costs in the MBoF and all of the supporting documentation for the following credits:

1. MRc2 - Environmental Product Declarations (EPD): Provide Industry-Wide or Product-Specific EPD.
2. MRc3 - Sourcing of Raw Materials - Recycled Content: Provide product data for pre- and post- consumer recycled content.
3. MRc4 - Material Ingredients: Provide manufacturers Declare label, Health Product Declaration (HPD), Cradle to Cradle Certification, or Cradle to Cradle Health Product Certificate.
4. IEQc2 - Low-Emitting Materials – Interior Wet Applied Products: For paints, coatings, adhesives and sealants applied on site or used for laminating off-site, include product data indicating the VOC content (g/L) and testing.



1.04 QUALITY ASSURANCE

A. Qualifications and Responsibilities:

1. Supplier: Recognized architectural hardware supplier with a minimum of 5 years documented experience supplying both mechanical and electromechanical door hardware similar in quantity, type, and quality to that indicated for this Project. Supplier to be recognized as a factory direct distributor by the manufacturer of the primary materials with a warehousing facility in the Project's vicinity. Supplier to have on staff, a certified Architectural Hardware Consultant (AHC) or Door Hardware Consultant (DHC) available to Owner, Architect, and Contractor, at reasonable times during the Work for consultation.
2. Installer: Qualified tradesperson skilled in the application of commercial grade hardware with experience installing door hardware similar in quantity, type, and quality as indicated for this Project.
3. Architectural Hardware Consultant: Person who is experienced in providing consulting services for door hardware installations that are comparable in material, design, and extent to that indicated for this Project and meets these requirements:
 - a. For door hardware: DHI certified AHC or DHC.
 - b. Can provide installation and technical data to Architect and other related subcontractors.
 - c. Can inspect and verify components are in working order upon completion of installation.
 - d. Capable of producing wiring diagram and coordinating installation of electrified hardware with Architect and electrical engineers.
4. Single Source Responsibility: Obtain each type of door hardware from single manufacturer.

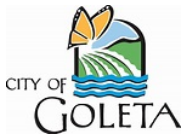
B. Certifications:

1. Fire-Rated Door Openings:
 - a. Provide door hardware for fire-rated openings that complies with NFPA 80 and requirements of authorities having jurisdiction.
 - b. Provide only items of door hardware that are listed products tested by UL LLC, Intertek Testing Services, or other testing and inspecting organizations acceptable to authorities having jurisdiction for use on types and sizes of doors indicated, based on testing at positive pressure and according to NFPA 252 or UL 10C and in compliance with requirements of fire-rated door and door frame labels.
2. Smoke and Draft Control Door Assemblies:
 - a. Provide door hardware that meets requirements of assemblies tested according to UL 1784 and installed in compliance with NFPA 105



- b. Comply with the maximum air leakage of 0.3 cfm/sq. ft. (3 cu. m per minute/sq. m) at tested pressure differential of 0.3-inch wg (75 Pa) of water.
 3. Electrified Door Hardware
 - a. Listed and labeled as defined in NFPA 70, Article 100, by testing agency acceptable to authorities having jurisdiction.
 4. Accessibility Requirements:
 - a. Comply with governing accessibility regulations cited in "REFERENCES" Section 08 71 00, herein for door hardware on doors in an accessible route. This project must comply with all Federal Americans with Disability Act regulations and all Local Accessibility Regulations.
- C. Pre-Installation Meetings
1. Keying Conference
 - a. Incorporate keying conference decisions into final keying schedule after reviewing door hardware keying system including:
 - 1) Function of building, flow of traffic, purpose of each area, degree of security required, and plans for future expansion.
 - 2) Preliminary key system schematic diagram.
 - 3) Requirements for key control system.
 - 4) Requirements for access control.
 - 5) Address for delivery of keys.
 2. Pre-installation Conference
 - a. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
 - b. Inspect and discuss preparatory work performed by other trades.
 - c. Inspect and discuss electrical roughing-in for electrified door hardware.
 - d. Review sequence of operation for each type of electrified door hardware.
 - e. Review required testing, inspecting, and certifying procedures.
 - f. Review questions or concerns related to proper installation and adjustment of door hardware.
 3. Electrified Hardware Coordination Conference:
 - a. Prior to ordering electrified hardware, schedule and hold meeting to coordinate door hardware with security, electrical, doors and frames, and other related suppliers.

1.05 DELIVERY, STORAGE, AND HANDLING



- A. Inventory door hardware on receipt and provide secure lock-up for hardware delivered to Project site. Promptly replace products damaged during shipping.
- B. Tag each item or package separately with identification coordinated with final door hardware schedule, and include installation instructions, templates, and necessary fasteners with each item or package. Deliver each article of hardware in manufacturer's original packaging.
- C. Maintain manufacturer-recommended environmental conditions throughout storage and installation periods.
- D. Provide secure lock-up for door hardware delivered to Project. Control handling and installation of hardware items so that completion of Work will not be delayed by hardware losses both before and after installation.
- E. Handle hardware in manner to avoid damage, marring, or scratching. Correct, replace or repair products damaged during Work. Protect products against malfunction due to paint, solvent, cleanser, or any chemical agent.
- F. Deliver keys to manufacturer of key control system for subsequent delivery to Owner.

1.06 COORDINATION

- A. Coordinate layout and installation of floor-recessed door hardware with floor construction. Cast anchoring inserts into concrete.
- B. Installation Templates: Distribute for doors, frames, and other work specified to be factory or shop prepared. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing door hardware to comply with indicated requirements.
- C. Security: Coordinate installation of door hardware, keying, and access control with Owner's security consultant.
- D. Electrical System Roughing-In: Coordinate layout and installation of electrified door hardware with connections to power supplies and building safety and security systems.

1.07 WARRANTY

- A. Manufacturer's standard form in which manufacturer agrees to repair or replace components of door hardware that fail in materials or workmanship within published warranty period.



1. Warranty does not cover damage or faulty operation due to improper installation, improper use or abuse.
2. Warranty Period: Beginning from date of Substantial Completion, for durations indicated in manufacturer's published listings.
 - a. Mechanical Warranty
 - 1) Locks
 - a) Schlage L Series: 3 years
 - 2) Exit Devices
 - a) Von Duprin: 3 years
 - 3) Closers
 - a) LCN 4000 Series: 30 years
 - 4) Automatic Operators
 - a) LCN: 2 years

1.08 MAINTENANCE

- A. Furnish complete set of special tools required for maintenance and adjustment of hardware, including changing of cylinders.
- B. Turn over unused materials to Owner for maintenance purposes.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Approval of manufacturers and/or products other than those listed as "Scheduled Manufacturer" or "Acceptable Manufacturers" in the individual article for the product category shall be in accordance with QUALITY ASSURANCE article, herein.
- B. Approval of products from manufacturers indicated in "Acceptable Manufacturers" is contingent upon those products providing all functions and features and meeting all requirements of scheduled manufacturer's product.
- C. Where specified hardware is not adaptable to finished shape or size of members requiring hardware, furnish suitable types having same operation and quality as type specified, subject to Architect's approval.

2.02 MATERIALS

- A. Fabrication



1. Provide door hardware manufactured to comply with published templates generally prepared for machine, wood, and sheet metal screws. provide screws according to manufacturer's recognized installation standards for application intended.
 2. Finish exposed screws to match hardware finish, or, if exposed in surfaces of other work, to match finish of this other work including prepared for paint surfaces to receive painted finish.
 3. Provide concealed fasteners wherever possible for hardware units exposed when door is closed. Coordinate with "Metal Doors and Frames", "Flush Wood Doors", "Stile and Rail Wood Doors" to ensure proper reinforcements. Advise the Architect where visible fasteners, such as thru bolts, are required.
- B. Provide screws, bolts, expansion shields, drop plates and other devices necessary for hardware installation.
1. Where fasteners are exposed to view: Finish to match adjacent door hardware material.
- C. Cable and Connectors:
1. Where scheduled in the hardware sets, provide each item of electrified hardware and wire harnesses with number and gage of wires enough to accommodate electric function of specified hardware.
 2. Provide Molex connectors that plug directly into connectors from harnesses, electric locking and power transfer devices.
 3. Provide through-door wire harness for each electrified locking device installed in a door and wire harness for each electrified hinge, electrified continuous hinge, electrified pivot, and electric power transfer for connection to power supplies.

2.03 HINGES

A. Manufacturers and Products:

1. Scheduled Manufacturer and Product:
 - a. Ives 5BB series

B. Requirements:

1. Provide hinges conforming to ANSI/BHMA A156.1.
2. Provide five knuckle, ball bearing hinges.
3. 1-3/4 inch (44 mm) thick doors, up to and including 36 inches (914 mm) wide:
 - a. Exterior: Standard weight, bronze or stainless steel, 4-1/2 inches (114 mm) high
 - b. Interior: Standard weight, steel, 4-1/2 inches (114 mm) high
4. 1-3/4 inch (44 mm) thick doors over 36 inches (914 mm) wide:
 - a. Exterior: Heavy weight, bronze/stainless steel, 5 inches (127 mm) high



- b. Interior: Heavy weight, steel, 5 inches (127 mm) high
5. 2 inches or thicker doors:
 - a. Exterior: Heavy weight, bronze or stainless steel, 5 inches (127 mm) high
 - b. Interior: Heavy weight, steel, 5 inches (127 mm) high
6. Adjust hinge width for door, frame, and wall conditions to allow proper degree of opening.
7. Provide three hinges per door leaf for doors 90 inches (2286 mm) or less in height, and one additional hinge for each 30 inches (762 mm) of additional door height.
8. Hinge Pins: Except as otherwise indicated, provide hinge pins as follows:
 - a. Steel Hinges: Steel pins
 - b. Non-Ferrous Hinges: Stainless steel pins
 - c. Out-Swinging Exterior Doors: Non-removable pins
 - d. Out-Swinging Interior Lockable Doors: Non-removable pins
 - e. Interior Non-lockable Doors: Non-rising pins
9. Provide hinges with electrified options as scheduled in the hardware sets. Provide with number and gage of wires enough to accommodate electric function of specified hardware. Locate electric hinge at second hinge from bottom or nearest to electrified locking component. Provide mortar guard for each electrified hinge specified.

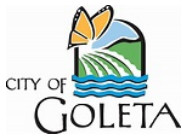
2.04 PIVOT SETS

A. Manufacturers:

1. Scheduled Manufacturer:
 - a. Ives

B. Requirements:

1. Provide pivot sets complete with oil-impregnated top pivot, unless indicated otherwise.
2. Where offset pivots are specified, Provide one intermediate pivot for doors less than 91 inches (2311 mm) high and one additional intermediate pivot per leaf for each additional 30 inches (762 mm) in height or fraction thereof. Intermediate pivots spaced equally not less than 25 inches (635 mm) or not more than 35 inches (889 mm) on center, for doors over 121 inches (3073 mm) high.
3. Provide appropriate model where pivot sets are scheduled at fire rated openings.



4. Provide pivots with electrified options as scheduled in the hardware sets. Provide with number and gage of wires enough to accommodate electric function of specified hardware. Locate electrified pivot nearest to electrified locking component. If manufacturer of electrified locking component requires another device for power transfer, then provide recommended power transfer device and appropriate quantity of pivots.
5. Provide mortar guard for each electric pivot specified, unless specified in hollow metal frame specification.

2.05 FLUSH BOLTS

A. Manufacturers:

1. Scheduled Manufacturer:
 - a. Ives

B. Requirements:

1. Provide automatic, constant latching, and manual flush bolts with forged bronze or stainless-steel face plates, extruded brass levers, and with wrought brass guides and strikes. Provide 12 inch (305 mm) steel or brass rods at doors up to 90 inches (2286 mm) in height. For doors over 90 inches (2286 mm) in height increase top rods by 6 inches (152 mm) for each additional 6 inches (152 mm) of door height. Provide dust-proof strikes at each bottom flush bolt.

2.06 COORDINATORS

A. Manufacturers:

1. Scheduled Manufacturer:
 - a. Ives

B. Requirements:

1. Where pairs of doors are equipped with automatic flush bolts, an astragal, or other hardware that requires synchronized closing of the doors, provide bar-type coordinating device, surface applied to underside of stop at frame head.
2. Provide filler bar of correct length for unit to span entire width of opening, and appropriate brackets for parallel arm door closers, surface vertical rod exit device strikes, or other stop mounted hardware. Factory-prepared coordinators for vertical rod devices as specified.

2.07 MORTISE LOCKS



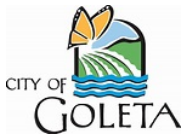
A. Manufacturers and Products:

1. Scheduled Manufacturer and Product:
 - a. Schlage L9000 series

B. Requirements:

1. Provide mortise locks conforming to ANSI/BHMA A156.13 Series 1000, Grade 1, and UL Listed for 3-hour fire doors.
2. Indicators: Where specified, provide indicator window measuring a minimum 2-inch x 1/2 inch with 180-degree visibility. Provide messages color-coded with full text and/or symbols, as scheduled, for easy visibility.
3. Provide locks manufactured from heavy gauge steel, containing components of steel with a zinc dichromate plating for corrosion resistance.
4. Provide lock case that is multi-function and field reversible for handing without opening case. Cylinders: Refer to "KEYING" article, herein.
5. Provide locks with standard 2-3/4 inches (70 mm) backset with full 3/4 inch (19 mm) throw stainless steel mechanical anti-friction latchbolt. Provide deadbolt with full 1-inch (25 mm) throw, constructed of stainless steel.
6. Provide standard ASA strikes unless extended lip strikes are necessary to protect trim. Provide electrified options as scheduled in the hardware sets. Where scheduled, provide switches and sensors integrated into the locks and latches.
7. Provide motor based electrified locksets that comply with the following requirements:
 - a. Universal input voltage – single chassis accepts 12 or 24VDC to allow for changes in the field without changing lock chassis.
 - b. Fail Safe/Fail Secure – changing mode between electrically locked (fail safe) and electrically unlocked (fail secure) is field selectable without opening the lock case.
 - c. Low maximum current draw – maximum 0.4 amps to allow for multiple locks on a single power supply.
 - d. Low holding current – maximum 0.01 amps to produce minimal heat, eliminate “hot levers” in electrically locked applications, and to provide reliable operation in wood doors that provide minimal ventilation and air flow.
 - e. Connections – provide quick-connect Molex system standard.
8. Lever Trim: Solid brass, bronze, or stainless steel, cast or forged in design specified, with wrought roses and external lever spring cages. Provide thru-bolted levers with 2-piece spindles.
 - a. Provide levers that return to within 1/2 inch (13 mm) of door face.
 - b. Vandlgard: Provide levers with vandal resistant technology for use at heavy traffic or abusive applications.
 - c. Lever Design: Per Schedule.

2.08 DEADBOLTS



A. Manufacturers and Products:

1. Scheduled Manufacturer and Product:
 - a. Schlage B600/B700/B800 Series

B. Requirements:

1. Provide grade 1 deadbolt series conforming to ANSI/BHMA A156.
2. Cylinders: Refer to "KEYING" article, herein.
3. Provide deadbolts with standard 2-3/4 inches (70 mm) backset. Provide 2-3/8 inches (60 mm) where noted or if door or frame detail requires. Provide deadbolt with full 1-inch (25 mm) throw, constructed of steel alloy.
4. Provide manufacturer's standard strike.

2.09 EXIT DEVICES

A. Manufacturers and Products:

1. Scheduled Manufacturer and Product:
 - a. Von Duprin 98/35A series

B. Requirements:

1. Provide exit devices tested to ANSI/BHMA A156.3 Grade 1 and UL listed for Panic Exit or Fire Exit Hardware.
2. Cylinders: Refer to "KEYING" article, herein.
3. Provide smooth touchpad type exit devices, fabricated of brass, bronze, stainless steel, or aluminum, plated to standard architectural finishes to match balance of door hardware.
4. Touchpad must extend a minimum of one half of door width. No plastic inserts are allowed in touchpads.
5. Provide exit devices with deadlatching feature for security and for future addition of alarm kits and/or other electrified requirements.
6. Provide exit devices with weather resistant components that can withstand harsh conditions of various climates and corrosive cleaners used in outdoor pool environments.
7. Provide flush end caps for exit devices.
8. Provide exit devices with manufacturer's approved strikes.
9. Provide exit devices cut to door width and height. Install exit devices at height recommended by exit device manufacturer, allowable by governing building codes, and approved by Architect.
10. Mount mechanism case flush on face of doors or provide spacers to fill gaps behind devices. Where glass trim or molding projects off face of door, provide glass bead kits.
11. Provide cylinder or hex-key dogging as specified at non fire-rated openings.



12. Removable Mullions: 2 inches (51 mm) x 3 inches (76 mm) steel tube. Where scheduled as keyed removable mullion, provide type that can be removed by use of a keyed cylinder, which is self-locking when re-installed.
13. Provide factory drilled weep holes for exit devices used in full exterior application, highly corrosive areas, and where noted in hardware sets.
14. Provide electrified options as scheduled.
15. Top latch mounting: double- or single-tab mount for steel doors, face mount for aluminum doors eliminating requirement of tabs, and double tab mount for wood doors.
16. Provide exit devices with optional trim designs to match other lever and pull designs used on the project.
 - a. Provide levers that return to within 1/2 inch (13 mm) of door face.
17. Accessibility: Require not more than 5 lb. to retract the latchbolt, per CBC 2019 11B-404.2.7 and 11B-309.4.
 - a. Mechanical method: Von Duprin AX feature, where touchpad directly retracts the latchbolt with 5 lb. or less of force. Provide testing lab certification confirming that the mechanical device is independent third-party tested to meet this 5 lb. requirement.
 - b. Electrical method: Von Duprin's RX-QEL feature, where lightly pressing the touchpad with 5 lb. or less of force closes an electric switch, activating quiet electric latch retraction.

2.10 KEYSWITCHES

A. Manufacturers and Products:

1. Scheduled Manufacturer and Product:
 - a. Schlage 650 series

B. Requirements:

1. Provide key switches capable of being configured to momentary or maintained action.
2. Provide key switches that accept a mortise cylinder. Cylinders: Refer to "KEYING" article, herein.

2.11 CYLINDERS

A. Manufacturers and Products:

1. Scheduled Manufacturer and Product:
 - a. Schlage Everest 29 S

B. Requirements:



1. Provide cylinders/cores compliant with ANSI/BHMA A156.5; latest revision; cylinder face finished to match lockset; manufacturer's series as indicated. Refer to "KEYING" article, herein.
2. Provide cylinders in the below-listed configuration(s), distributed throughout the Project as indicated.
 - a. Conventional Patented Open: cylinder with permanent core with open keyway.
 - b. Conventional Patented Open: cylinder with interchangeable core with open keyway.
3. Patent Protection: Cylinders/cores requiring use of restricted, patented keys, patent protected.
4. Nickel silver bottom pins.

2.12 KEYING

A. Scheduled System:

1. New factory registered system:
 - a. Provide a factory registered keying system, complying with guidelines in ANSI/BHMA A156.28, incorporating decisions made at keying conference.

B. Requirements:

1. Construction Keying:
 - a. Replaceable Construction Cores.
 - 1) Provide temporary construction cores replaceable by permanent cores, furnished in accordance with the following requirements.
 - a) 3 construction control keys
 - b) 12 construction change (day) keys.
 - 2) Owner or Owner's Representative will replace temporary construction cores with permanent cores.
2. Permanent Keying:
 - a. Provide permanent cylinders/cores keyed by the manufacturer according to the following key system.
 - 1) Master Keying system as directed by the Owner.
 - b. Forward biting list and keys separately from cylinders, by means as directed by Owner. Failure to comply with forwarding requirements will be cause for replacement of cylinders/cores involved at no additional cost to Owner.
 - c. Provide keys with the following features:
 - 1) Material: Nickel silver; minimum thickness of .107-inch (2.3mm)
 - 2) Patent Protection: Keys and blanks protected by one or more utility patent(s).
 - d. Identification:



- 1) Mark permanent cylinders/cores and keys with applicable blind code for identification. Do not provide blind code marks with actual key cuts.
 - 2) Identification stamping provisions must be approved by the Architect and Owner.
 - 3) Stamp cylinders/cores and keys with Owner's unique key system facility code as established by the manufacturer; key symbol and embossed or stamped with "DO NOT DUPLICATE" along with the "PATENTED" or patent number to enforce the patent protection.
 - 4) Failure to comply with stamping requirements will be cause for replacement of keys involved at no additional cost to Owner.
 - 5) Forward permanent cylinders/cores to Owner, separately from keys, by means as directed by Owner.
- e. Quantity: Furnish in the following quantities.
- 1) Change (Day) Keys: 3 per cylinder/core.
 - 2) Permanent Control Keys: 3.
 - 3) Master Keys: 6.

2.13 KEY CONTROL SYSTEM

A. Manufacturers:

1. Scheduled Manufacturer:
 - a. Telkee

B. Requirements:

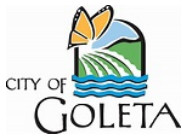
1. Provide key control system, including envelopes, labels, tags with self-locking key clips, receipt forms, 3-way visible card index, temporary markers, permanent markers, and standard metal cabinet, all as recommended by system manufacturer, with capacity for 150% of number of locks required for Project.
 - a. Provide complete cross index system set up by hardware supplier, and place keys on markers and hooks in cabinet as determined by final key schedule.
 - b. Provide hinged-panel type cabinet for wall mounting.

2.14 DOOR CLOSERS

A. Manufacturers and Products:

1. Scheduled Manufacturer and Product:
 - a. LCN 4040XP series

B. Requirements:



1. Provide door closers conforming to ANSI/BHMA A156.4 Grade 1 requirements by BHMA certified independent testing laboratory. ISO 9000 certify closers. Stamp units with date of manufacture code.
2. Provide door closers with fully hydraulic, full rack and pinion action with high strength cast iron cylinder, and full complement bearings at shaft.
3. Cylinder Body: 1-1/2-inch (38 mm) diameter piston with 5/8-inch (16 mm) diameter double heat-treated pinion journal. QR code with a direct link to maintenance instructions.
4. Hydraulic Fluid: Fireproof, passing requirements of UL10C, and requiring no seasonal closer adjustment for temperatures ranging from 120 degrees F to -30 degrees F.
5. Spring Power: Continuously adjustable over full range of closer sizes, and providing reduced opening force as required by accessibility codes and standards. Provide snap-on cover clip, with plastic covers, that secures cover to spring tube.
6. Hydraulic Regulation: By tamper-proof, non-critical valves, with separate adjustment for latch speed, general speed, and backcheck. Provide graphically labelled instructions on the closer body adjacent to each adjustment valve. Provide positive stop on reg valve that prevents reg screw from being backed out.
7. Provide closers with solid forged steel main arms and factory assembled heavy-duty forged forearms for parallel arm closers.
8. Pressure Relief Valve (PRV) Technology: Not permitted.
9. Finish for Closer Cylinders, Arms, Adapter Plates, and Metal Covers: Powder coating finish which has been certified to exceed 100 hours salt spray testing as described in ANSI Standard A156.4 and ASTM B117, or has special rust inhibitor (SRI).
10. Provide special templates, drop plates, mounting brackets, or adapters for arms as required for details, overhead stops, and other door hardware items interfering with closer mounting.

2.15 ELECTRO-MECHANICAL AUTOMATIC OPERATORS

A. Manufacturers and Products:

1. Scheduled Manufacturer and Product:
 - a. LCN Senior Swing

B. Requirements:

1. Provide low energy automatic operator units that are electro-mechanical design complying with ANSI/BHMA A156.19.
 - a. Opening: Powered by DC motor working through reduction gears.
 - b. Closing: Spring force.
 - c. Manual, hydraulic, or chain drive closers: Not permitted.
 - d. Operation: Motor is off when door is in closing mode. Door can be manually operated with power on or off without damage to operator. Provide variable adjustments, including opening and closing speed adjustment.



- e. Cover: Aluminum.
2. Provide units with manual off/auto/hold-open switch, push and go function to activate power operator, vestibule interface delay, electric lock delay, hold-open delay adjustable from 1 to 32 seconds, and logic terminal to interface with accessories, mats, and sensors.
3. Provide drop plates, brackets, and adapters for arms as required to suit details.
4. Provide motion sensors and/or actuator switches, and receivers for operation as specified. Provide weather-resistant actuators at exterior applications.
5. Provide key switches, with LED's, recommended and approved by manufacturer of automatic operator as required for function as described in operation description of hardware sets. Cylinders: Refer to "KEYING" article, herein.
6. Provide complete assemblies of controls, switches, power supplies, relays, and parts/material recommended and approved by manufacturer of automatic operator for each individual leaf. Actuators control both doors simultaneously at pairs. Sequence operation of exterior and vestibule doors with automatic operators to allow ingress or egress through both sets of openings as directed by Architect. Locate actuators, key switches, and other controls as directed by Architect.

2.16 DOOR TRIM

A. Manufacturers:

1. Scheduled Manufacturer:
 - a. Ives

B. Requirements:

1. Provide push plates, push bars, pull plates, pulls, and hands-free reversible door pulls with diameter and length as scheduled.

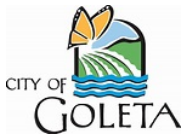
2.17 PROTECTION PLATES

A. Manufacturers:

1. Scheduled Manufacturer:
 - a. Ives

B. Requirements:

1. Provide protection plates with a minimum of 0.050 inch (1 mm) thick, beveled four edges as scheduled. Furnish with sheet metal or wood screws, finished to match plates.



2. Sizes plates 2 inches (51 mm) less width of door on single doors, pairs of doors with a mullion, and doors with edge guards. Size plates 1 inch (25 mm) less width of door on pairs without a mullion or edge guards.
3. At fire rated doors, provide protection plates over 16 inches high with UL label.

2.18 OVERHEAD STOPS AND OVERHEAD STOP/HOLDERS

A. Manufacturers:

1. Scheduled Manufacturers:
 - a. Glynn-Johnson

B. Requirements:

1. Provide overhead stop at any door where conditions do not allow for a wall stop or floor stop presents tripping hazard.
2. Provide friction type at doors without closer and positive type at doors with closer.

2.19 DOOR STOPS AND HOLDERS

A. Manufacturers:

1. Scheduled Manufacturer:
 - a. Ives

B. Provide door stops at each door leaf:

1. Provide wall stops wherever possible. Provide concave type where lockset has a push button or thumbturn.
2. Where a wall stop cannot be used, provide universal floor stops.
3. Where wall or floor stop cannot be used, provide overhead stop.
4. Provide roller bumper where doors open into each other and overhead stop cannot be used.

2.20 THRESHOLDS, SEALS, DOOR SWEEPS, AUTOMATIC DOOR BOTTOMS, AND GASKETING

A. Manufacturers:

1. Scheduled Manufacturer:
 - a. Zero International

B. Requirements:



1. Provide thresholds, weather-stripping, and gasketing systems as specified and per architectural details. Match finish of other items.
2. Smoke- and Draft-Control Door Assemblies: Where smoke- and draft-control door assemblies are required, provide door hardware that meets requirements of assemblies tested according to UL 1784 and installed in compliance with NFPA 105.
3. Provide door sweeps, seals, astragals, and auto door bottoms only of type where resilient or flexible seal strip is easily replaceable and readily available.
4. Size thresholds 1/2 inch (13 mm) high by 5 inches (127 mm) wide by door width unless otherwise specified in the hardware sets or detailed in the drawings.

2.21 SILENCERS

A. Manufacturers:

1. Scheduled Manufacturer:
 - a. Ives

B. Requirements:

1. Provide "push-in" type silencers for hollow metal or wood frames.
2. Provide one silencer per 30 inches (762 mm) of height on each single frame, and two for each pair frame.
3. Omit where gasketing is specified.

2.22 FINISHES

A. FINISH: BHMA 626/652 (US26D); EXCEPT:

1. Hinges at Exterior Doors: BHMA 630 (US32D)
2. Aluminum Geared Continuous Hinges: BHMA 628 (US28)
3. Push Plates, Pulls, and Push Bars: BHMA 630 (US32D)
4. Protection Plates: BHMA 630 (US32D)
5. Overhead Stops and Holders: BHMA 630 (US32D)
6. Door Closers: Powder Coat to Match
7. Wall Stops: BHMA 630 (US32D)
8. Latch Protectors: BHMA 630 (US32D)
9. Weatherstripping: Clear Anodized Aluminum
10. Thresholds: Mill Finish Aluminum

PART 3 - EXECUTION

3.01 EXAMINATION



- A. Prior to installation of hardware, examine doors and frames, with Installer present, for compliance with requirements for installation tolerances, labeled fire-rated door assembly construction, wall and floor construction, and other conditions affecting performance. Verify doors, frames, and walls have been properly reinforced for hardware installation.
- B. Examine roughing-in for electrical power systems to verify actual locations of wiring connections before electrified door hardware installation.
- C. Submit a list of deficiencies in writing and proceed with installation only after unsatisfactory conditions have been corrected.

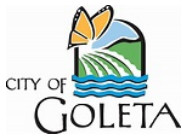
3.02 INSTALLATION

- A. Mount door hardware units at heights to comply with the following, unless otherwise indicated or required to comply with governing regulations.
 - 1. Standard Steel Doors and Frames: ANSI/SDI A250.8.
 - 2. Custom Steel Doors and Frames: HMMA 831.
 - 3. Interior Architectural Wood Flush Doors: ANSI/WDMA I.S. 1A
 - 4. Installation Guide for Doors and Hardware: DHI TDH-007-20
- B. Install door hardware in accordance with NFPA 80, NFPA 101 and provide post-install inspection, testing as specified in section 1.03.E unless otherwise required to comply with governing regulations.
- C. Install each hardware item in compliance with manufacturer's instructions and recommendations, using only fasteners provided by manufacturer.
- D. Do not install surface mounted items until finishes have been completed on substrate. Protect all installed hardware during painting.
- E. Set units level, plumb and true to line and location. Adjust and reinforce attachment substrate as necessary for proper installation and operation.
- F. Drill and countersink units that are not factory prepared for anchorage fasteners. Space fasteners and anchors according to industry standards.
- G. Install operating parts so they move freely and smoothly without binding, sticking, or excessive clearance.
- H. Hinges: Install types and in quantities indicated in door hardware schedule but not fewer than quantity recommended by manufacturer for application indicated.
- I. Lock Cylinders:



1. Install construction cores to secure building and areas during construction period.
 2. Replace construction cores with permanent cores as indicated in keying section.
 3. Furnish permanent cores to Owner for installation.
- J. Wiring: Coordinate with Division 26, ELECTRICAL and Division 28 ELECTRONIC SAFETY AND SECURITY sections for:
1. Conduit, junction boxes and wire pulls.
 2. Connections to and from power supplies to electrified hardware.
 3. Connections to fire/smoke alarm system and smoke evacuation system.
 4. Connection of wire to door position switches and wire runs to central room or area, as directed by Architect.
 5. Connections to panel interface modules, controllers, and gateways.
 6. Testing and labeling wires with Architect's opening number.
- K. Key Control System: Tag keys and place them on markers and hooks in key control system cabinet, as determined by final keying schedule.
- L. Door Closers: Mount closers on room side of corridor doors, inside of exterior doors, and stair side of stairway doors from corridors. Mount closers so they are not visible in corridors, lobbies and other public spaces unless approved by Architect.
- M. Closer/holders: Mount closer/holders on room side of corridor doors, inside of exterior doors, and stair side of stairway doors.
- N. Power Supplies: Locate power supplies as indicated or, if not indicated, above accessible ceilings or in equipment room, or alternate location as directed by Architect.
- O. Thresholds: Set thresholds in full bed of sealant complying with requirements specified in Division 07 Section "Joint Sealants."
- P. Stops: Provide floor stops for doors unless wall or other type stops are indicated in door hardware schedule. Do not mount floor stops where they may impede traffic or present tripping hazard.
- Q. Perimeter Gasketing: Apply to head and jamb, forming seal between door and frame.
- R. Meeting Stile Gasketing: Fasten to meeting stiles, forming seal when doors are closed.
- S. Door Bottoms and Sweeps: Apply to bottom of door, forming seal with threshold when door is closed.

3.03 ADJUSTING



- A. Initial Adjustment: Adjust and check each operating item of door hardware and each door to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate as intended. Adjust door control devices to compensate for final operation of heating and ventilating equipment and to comply with referenced accessibility requirements.
 - 1. Spring Hinges: Adjust to achieve positive latching when door can close freely from an open position of 30 degrees.
 - 2. Electric Strikes: Adjust horizontal and vertical alignment of keeper to properly engage lock bolt.
 - 3. Door Closers: Adjust sweep period to comply with accessibility requirements and requirements of authorities having jurisdiction.

- B. Occupancy Adjustment: Approximately three to six months after date of Substantial Completion, examine and readjust each item of door hardware, including adjusting operating forces, as necessary to ensure function of doors and door hardware.

3.04 CLEANING AND PROTECTION

- A. Clean adjacent surfaces soiled by door hardware installation.
- B. Clean operating items per manufacturer's instructions to restore proper function and finish.
- C. Provide final protection and maintain conditions that ensure door hardware is without damage or deterioration at time of Substantial Completion.

3.05 DOOR HARDWARE SCHEDULE

- A. The intent of the hardware specification is to specify the hardware for interior and exterior doors, and to establish a type, continuity, and standard of quality. However, it is the door hardware supplier's responsibility to thoroughly review existing conditions, schedules, specifications, drawings, and other Contract Documents to verify the suitability of the hardware specified.
- B. Discrepancies, conflicting hardware, and missing items are to be brought to the attention of the architect with corrections made prior to the bidding process. Omitted items not included in a hardware set should be scheduled with the appropriate additional hardware required for proper application.
- C. Hardware items are referenced in the following hardware schedule. Refer to the above specifications for special features, options, cylinders/keying, and other requirements.
- D. Hardware Sets:



Hardware Group No. 01

For use on Door #(s):

11 12 13

Provide each RU door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
1	EA	HYDRAULIC BI-FOLDING DOOR	HARDWARE BY MANUFACTURER			

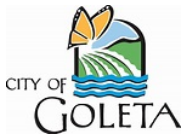
Hardware Group No. 02

For use on Door #(s):

10 14 23 24 25

Provide each PR door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
2	EA	PIVOT SET	7215 SET		626	IVE
2	EA	INTERMEDIATE PIVOT	7215 INT (AS REQ)		626	IVE
1	EA	PANIC HARDWARE	9847-EO		626	VON
1	EA	PANIC HARDWARE	9847-NL-OP-110MD		626	VON
1	EA	RIM CYLINDER	20-057 ICX		626	SCH
1	EA	FSIC CORE	23-030		626	SCH
2	EA	LONG DOOR PULL	9264F X 48"		630-316	IVE
2	EA	CONCEALED CLOSER	2035 BUMP		652	LCN
2	EA	FLOOR STOP	FS444/448 AS REQ		626	IVE
1	SET	SEALS	BY DOOR/FRAME MANUFACTURER			B/O
2	EA	DOOR SWEEP	BY DOOR/FRAME MANUFACTURER		A	B/O



Hardware Group No. 02A

For use on Door #(s):

15

Provide each PR door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
2	EA	PIVOT SET	7215 SET		626	IVE
2	EA	INTERMEDIATE PIVOT	7215 INT (AS REQ)		626	IVE
1	EA	PANIC HARDWARE	9847-EO		626	VON
1	EA	PANIC HARDWARE	9847-NL-OP-110MD		626	VON
1	EA	RIM CYLINDER	20-057 ICX		626	SCH
1	EA	FSIC CORE	23-030		626	SCH
2	EA	LONG DOOR PULL	9264F X 48"		630-316	IVE
2	EA	CONCEALED CLOSER	2035 BUMP		689	LCN
1	EA	FLOOR STOP	FS444/448 AS REQ		626	IVE
1	SET	SEALS	BY DOOR/FRAME MANUFACTURER			B/O
2	EA	DOOR SWEEP	BY DOOR/FRAME MANUFACTURER		A	ZER

Hardware Group No. 02B



For use on Door #(s):

08

Provide each PR door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
2	EA	PIVOT SET	7215 SET		626	IVE
2	EA	INTERMEDIATE PIVOT	7215 INT (AS REQ)		626	IVE
1	EA	PANIC HARDWARE	9847-EO		626	VON
1	EA	PANIC HARDWARE	9847-NL-OP-110MD		626	VON
1	EA	RIM CYLINDER	20-057 ICX		626	SCH
1	EA	FSIC CORE	23-030		626	SCH
2	EA	LONG DOOR PULL	9264F X 48"		630-316	IVE
1	EA	CONCEALED CLOSER	2035 HBMP		689	LCN
1	EA	CONCEALED CLOSER	2035 BUMP		689	LCN
1	SET	SEALS	BY DOOR/FRAME MANUFACTURER			B/O
2	EA	DOOR SWEEP	BY DOOR/FRAME MANUFACTURER		A	ZER
1	EA	THRESHOLD	103A		A	ZER



Hardware Group No. 03

For use on Door #(s):

01 17

Provide each PR door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
2	EA	PIVOT SET	7215 SET		626	IVE
2	EA	INTERMEDIATE PIVOT	7215 INT (AS REQ)		626	IVE
1	EA	PANIC HARDWARE	9847-EO		626	VON
1	EA	PANIC HARDWARE	9847-NL-OP-110MD		626	VON
1	EA	RIM CYLINDER	20-057 ICX		626	SCH
1	EA	MORTISE CYLINDER	20-061 ICX (@KEYSWITCH)		626	SCH
2	EA	FSIC CORE	23-030		626	SCH
2	EA	LONG DOOR PULL	9264F X 48"		630-316	IVE
1	EA	SURFACE AUTO OPERATOR	9553		ANCLR	LCN
4	EA	ACTUATOR, LOGO AND TEXT	8310-853T		630	LCN
1	SET	SEALS	BY DOOR/FRAME MANUFACTURER			B/O
2	EA	DOOR SWEEP	BY DOOR/FRAME MANUFACTURER		A	ZER
1	EA	KEY SWITCH	653-04 L2 12/24 VDC		630	SCE

CONDUIT, JUNCTION BOXES AND HIGH VOLTAGE WIRING AND LOW VOLTAGE ALL BY CONTRACTOR.

KEY SWITCH ENABLES/DISABLES AUTOMATIC OPERATOR. DURING OPERATING HOURS, AUTOMATIC OPERATOR IS ENABLED. DOORS ARE UNLOCKED VIA HEX KEY DOGGING BY STAFF. WHEN AUTOMATIC OPERATOR IS ENABLED AND DOORS ARE UNLOCKED, PRESSING AN ACTUATOR ON EITHER SIDE OF THE DOOR WILL OPEN IT.

ACTUATORS INSTALLED AT 2 INSIDE AND 2 OUTSIDE, 1 HIGH AND 1 LOW PER ADA REQUIREMENT, AT EACH LOCATION.



Hardware Group No. 04

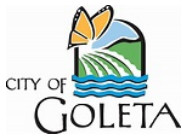
For use on Door #(s):

02 16

Provide each PR door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
2	EA	PIVOT SET	7215 SET		626	IVE
2	EA	INTERMEDIATE PIVOT	7215 INT (AS REQ)		626	IVE
1	EA	PANIC HARDWARE	9847-EO		626	VON
1	EA	PANIC HARDWARE	9847-NL-OP-110MD		626	VON
1	EA	RIM CYLINDER	20-057 ICX		626	SCH
1	EA	FSIC CORE	23-030		626	SCH
2	EA	LONG DOOR PULL	9264F X 48"		630-316	IVE
2	EA	CONCEALED CLOSER	2035 BUMP		689	LCN
2	EA	FLOOR STOP	FS444/448 AS REQ		626	IVE
1	SET	SEALS	BY DOOR/FRAME MANUFACTURER			B/O
2	EA	DOOR SWEEP	BY DOOR/FRAME MANUFACTURER		A	ZER

Hardware Group No. 06



For use on Door #(s):

06 21

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
4	EA	HINGE	5BB1 4.5 X 4.5		652	IVE
1	EA	CYLINDER DEADBOLT	B664		626	SCH
1	EA	FSIC CORE	23-030		626	SCH
1	EA	PUSH PLATE	8200 4" X 16" CFC		630	IVE
1	EA	LONG DOOR PULL	9264F X 24"		630-316	IVE
1	EA	SURFACE CLOSER	4040XP PROVIDE MOUNTING BRACKET, SPACER, PLATE AS REQUIRED		689	LCN
1	EA	MOP PLATE	8400 4" X 1" LDW B-CS		630	IVE
2	EA	KICK PLATE	8400 8" X 2" LDW B-CS		630	IVE
1	EA	FLOOR STOP	FS444/448 AS REQ		626	IVE
1	EA	GASKETING	488SBK PSA		BK	ZER

Hardware Group No. 07

For use on Door #(s):

07

Provide each PR door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
8	EA	HINGE	5BB1 4.5 X 4.5		652	IVE
2	EA	PUSH PLATE	8200 4" X 16"		630	IVE
2	EA	PULL PLATE	8303 8" 4" X 16" I		630	IVE
2	EA	SURFACE CLOSER	4040XP RW/PA PROVIDE MOUNTING BRACKET, SPACER, PLATE AS REQUIRED		689	LCN
2	EA	KICK PLATE	8400 10" X 1" LDW B-CS		630	IVE
1	EA	FLOOR STOP	FS444/448		626	IVE
1	EA	OVERHEAD STOP	100S		626	GLY
2	EA	SILENCER	SR64/65		GRY	IVE



Hardware Group No. 08

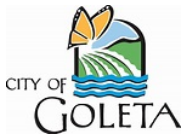
For use on Door #(s):

05

Provide each UEP door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
8	EA	HINGE	5BB1 4.5 X 4.5		652	IVE
1	EA	CONST LATCHING BOLT	FB51P		630	IVE
1	EA	DUST PROOF STRIKE	DP1/DP2 AS REQ		626	IVE
1	EA	STOREROOM LOCK	L9080T 17A		626	SCH
1	EA	FSIC CORE	23-030		626	SCH
1	EA	SURFACE CLOSER	4040XP HW/PA PROVIDE MOUNTING BRACKET, SPACER, PLATE AS REQUIRED		689	LCN
2	EA	KICK PLATE	8400 10" X 1" LDW B-CS		630	IVE
2	EA	SILENCER	SR64/65		GRY	IVE

TEMPLATE ACTIVE DOOR LEAF TO HOLD OPEN AT 120 DEGREES.
WALL STOP TO BE INSTALLED AT INACTIVE LEAF.



Hardware Group No. 09

For use on Door #(s):

04

Provide each PR door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
8	EA	HINGE	5BB1 4.5 X 4.5		652	IVE
1	EA	CONST LATCHING BOLT	FB51P		630	IVE
1	EA	DUST PROOF STRIKE	DP1/DP2 AS REQ		626	IVE
1	EA	OFFICE/ENTRY LOCK	L9050T 17A L583-363		626	SCH
1	EA	FSIC CORE	23-030		626	SCH
1	EA	COORDINATOR	COR X FL		628	IVE
2	EA	MOUNTING BRACKET	MB1/MB2 AS REQ		689	IVE
2	EA	SURFACE CLOSER	4040XP RW/PA ST-1755 PROVIDE MOUNTING BRACKET, SPACER, PLATE AS REQUIRED		689	LCN
2	EA	KICK PLATE	8400 10" X 1" LDW B-CS		630	IVE
2	EA	FLOOR STOP	FS436/438		626	IVE
2	EA	SILENCER	SR64/65		GRY	IVE



Hardware Group No. 10

For use on Door #(s):

03

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
4	EA	HINGE	5BB1 4.5 X 4.5		652	IVE
1	EA	OFFICE/ENTRY LOCK	L9050T 17A L583-363		626	SCH
1	EA	FSIC CORE	23-030		626	SCH
1	EA	SURFACE CLOSER	4040XP PROVIDE MOUNTING BRACKET, SPACER, PLATE AS REQUIRED		689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS		630	IVE
1	EA	FLOOR STOP	FS436/438		626	IVE
3	EA	SILENCER	SR64/65		GRY	IVE

Hardware Group No. 11

For use on Door #(s):

18 19 22

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
4	EA	HINGE	5BB1 4.5 X 4.5		652	IVE
1	EA	STOREROOM LOCK	L9080T 17A		626	SCH
1	EA	FSIC CORE	23-030		626	SCH
1	EA	SURFACE CLOSER	4040XP PROVIDE MOUNTING BRACKET, SPACER, PLATE AS REQUIRED		689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS		630	IVE
1	EA	MOP PLATE	8400 4" X 1" LDW B-CS		630	IVE
1	EA	FLOOR STOP	FS436/438		626	IVE
3	EA	SILENCER	SR64/65		GRY	IVE



Hardware Group No. 12

For use on Door #(s):

20

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
4	EA	HINGE	5BB1 4.5 X 4.5		652	IVE
1	EA	CORRIDOR LOCK	L9456P6 17A L583-363 L283-722		626	SCH
1	EA	FSIC CORE	23-030		626	SCH
1	EA	SURFACE CLOSER	4040XP PROVIDE MOUNTING BRACKET, SPACER, PLATE AS REQUIRED		689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS		630	IVE
1	EA	MOP PLATE	8400 4" X 1" LDW B-CS		630	IVE
1	EA	FLOOR STOP	FS444/448		626	IVE
1	EA	GASKETING	488SBK PSA		BK	ZER

Hardware Group No. 13

For use on Door #(s):

26 27 28 29

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
3	EA	HINGE	5BB1 4.5 X 4.5		630	IVE
1	EA	STOREROOM LOCK	L9080T 17A		626	SCH
1	EA	FSIC CORE	23-030		626	SCH
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS		630	IVE
1	EA	RAIN DRIP	142AA (FOR EXTERIOR DOORS)		AA	ZER
1	EA	GASKETING	488SBK PSA		BK	ZER
1	EA	DOOR SWEEP	39A		A	ZER
1	EA	THRESHOLD	545A (OR PER SILL DETAIL)		A	ZER



Hardware Group No. 14

For use on Door #(s):

09

Provide each PR door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
8	EA	HINGE	5BB1 4.5 X 4.5 NRP		630	IVE
1	EA	PANIC HARDWARE	9847-EO		626	VON
1	EA	PANIC HARDWARE	9847-L-NL-17		626	VON
1	EA	RIM CYLINDER	20-057 ICX		626	SCH
1	EA	FSIC CORE	23-030		626	SCH
2	EA	KICK PLATE	8400 10" X 1" LDW B-CS		630	IVE
1	EA	GASKETING	488SBK PSA		BK	ZER
2	EA	DOOR SWEEP	39A		A	ZER
1	EA	THRESHOLD	103A		A	ZER

Hardware Group No. 15

For use on Door #:

32

Provide door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
1	EA	PADLOCK	KS43D3200		BRASS	SCH

Provide each PR door with gate manufacturer/fabricator's installed hinges and other hardware and components required.

END OF SECTION



SECTION 08 80 00

GLAZING

PART 1 - GENERAL

1.01. SUMMARY

A. Section Includes:

1. Glass and glazing as indicated.

B. Related Requirements:

1. Division 01 - General Requirements.
2. Section 08 41 12 - Aluminum Entrances and Storefronts.
3. Section 08 51 13 - Aluminum Windows.
4. Section 08 71 00 - Door Hardware.

1.02. SUBMITTALS

A. Product Data: Submit manufacturer's descriptive literature and installation recommendations for glass, glazing, and accessories.

B. Material Samples: Submit 6-inch square units of each type of glass specified.

C. LEED Submittals: Complete the LEED Material Buyout Form (MBoF) with all materials provided to the project. A complete submittal includes providing all material costs in the MBoF and all of the supporting documentation for the following credits:

1. MRc2 - Environmental Product Declarations (EPD): Provide Industry-Wide or Product-Specific EPD.
2. MRc3 - Sourcing of Raw Materials - Recycled Content: Provide product data for pre- and post- consumer recycled content.
3. MRc4 - Material Ingredients: Provide manufacturers Declare label, Health Product Declaration (HPD), Cradle to Cradle Certification, or Cradle to Cradle Health Product Certificate.
4. IEQc2 - Low-Emitting Materials – Interior Wet Applied Products: For paints, coatings, adhesives and sealants applied on site or used for laminating off-site, include product data indicating the VOC content (g/L) and testing.

1.03. QUALITY ASSURANCE



- A. Labeling: Label each piece of glass and glazing and mirrors with manufacturer's name, and the grade or quality of the material. Labels shall be intact before and after installation. Fire-protection-rated glazing shall bear a label or other identification in accordance to the CBC.
- B. Comply with the following as a minimum requirement:
 - 1. ASTM C864 - Standard Specification for Dense Elastomeric Compression Seal Gaskets, Setting Blocks, and Spacers.
 - 2. ASTM C1036 - Standard Specification for Flat Glass.
 - 3. ASTM C1048 - Standard Specification For Heat-Strengthened and Fully Tempered Flat Glass.
 - 4. ASTM C1172 - Standard Specification for Laminated Architectural Flat Glass.
 - 5. CPSC 16 CFR 1201 - Safety Standards for Architectural Glazing Materials issued by the Consumer Products Safety Commission.
 - 6. ANSI Z97.1 – Safety Glazing Materials Used in Buildings.
 - 7. GANA - Glazing Manual.
- C. Qualifications of Installer: Minimum five years experience installing glass in projects of similar scope and complexity.

1.04. DELIVERY, STORAGE AND HANDLING

- A. Deliver glass and glazing materials with manufacturer's labels intact.
- B. Do not remove labels until glass has been installed and inspected by the Project Inspector.
- C. Protect glass from staining, marking, and damage.
- D. Putty and glazing compound shall be delivered to the Project site in manufacturer's original unbroken containers labeled to identify contents.

1.05. PROJECT CONDITIONS

- A. Perform glazing when ambient temperature is above 40 degrees F.
- B. Perform glazing on clean, dry surfaces only.

1.06. WARRANTY

- A. Manufacturer shall provide a five year material warranty.



- B. Manufacturer shall provide a five year material warranty for coatings and thermally or acoustically rated insulation units against deterioration in acoustic or thermal rating.
- C. Installer shall provide a three year fabrications and installation warranty.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS AND FABRICATORS

- A. To maximum extent possible, provide domestically manufactured and fabricated glass, and provide glass from one manufacturer.
- B. Types of glass specified or indicated shall be manufactured or fabricated by one of the following:
 - 1. Pilkington LOF.
 - 2. Visteon Float Glass Operations.
 - 3. Viracon.
 - 4. Southwest Technologies.
 - 5. Or approved equal.

2.02 GLASS MATERIALS

- A. General: Conform to ASTM C1036, ASTM C1048, ASTM C1172 and to ANSI Z97.1. Label factory cut panes.
- B. Float Glass: Type I, (transparent glass flat), Class 1 (clear), Quality q3, (glazing select), minimum 1/4 inch thickness unless otherwise indicated or required.
- C. Tinted Float Glass: Type I (transparent glass), Class 2 (tinted heat absorbing and light reducing), quality q3 (glazing select), manufactured by PPG or LOF, color as selected by Architect, minimum 1/4 inch thickness unless otherwise indicated or required.
- D. Tempered Glass: Condition A (uncoated surfaces), Type I or II, Class 1, Quality q3 (glazing select), Kind FT (fully tempered glass), match color of clear or tinted glass as applicable; fully thermal tempered, heat strengthening or chemical tempering is not permitted. Perform tempering by horizontal oscillating roller hearth or high speed roller hearth process. Do not permit fabrication processes leaving gripper or tong marks. Handle and size glass according to manufacturer's written instructions.
- E. Clear Laminated Glass: Two layers of 1/8 inch clear float glass with 0.030 inch thick high strength polyvinyl butyral laminating sheet.



- F. Tinted Laminated Glass: One layer of 1/8 inch clear float glass and one layer of tinted glass to match other windows, with 0.030 inch thick high strength polyvinyl butyral laminating sheet. Edges of laminated glass shall be treated with Argotec, Argo Edge Seal Plus, or equal, edge protection to prevent contact of laminating sheet with sealants.
- G. Low Emissivity Glass (Low E Glass): Provide units with thin metallic high-transmittance coating applied to the number 3 surface of the unit, unless otherwise indicated. The U-value for the IGU shall be no greater than 0.34, unless otherwise indicated.
- H. Unframed Mirrors: Category II safety backed mirror-quality float glass, 1/4 inch thick, , edges finished and polished, double silvered with electro-deposited copper coating plus an organic protective coating, equal to Palmer Products Mirro-Bac Paint. Include polished stainless steel edge channels at top and bottom edges, plus mirror adhesive bonding to wall.
- I. Framed Mirrors: Fabricated of one-piece Type 304 stainless steel angle frame, 3/4 inch by 3/4 inch, with continuous integral stiffener on sides and beveled front to hold frame tightly against mirror. Corners shall be heliarc welded, ground and polished smooth. Exposed surfaces shall have stain finish with vertical grain. Mirror shall be fabricated of 1/4 inch Category II safety backed mirror quality float glass, free from tong marks. Edges shall be protected by plastic filler strips. Full-size, shock-absorbing, water-resisting, non-abrasive 1/8 inch thick polyethylene padding shall protect backs of mirrors. Mirrors shall be provided with 24 gage galvanized steel back with integral hanging brackets for mounting on concealed, rectangular wall hangers, and shall be secured with concealed Phillips head locking screws on bottom of frame.
- J. Custom Patterned Glazing: Lumi Frit Projectable Surface 1 Frit Glass, Medium Dot as manufactured by "Bendheim Corporate".

2.03 GLASS SETTING MATERIALS

- A. Glazing materials and accessories shall be fully compatible with the materials and finishes with which they are in contact.
- B. Setting Blocks: ASTM C864, channel shape; having 1/4 inch internal depth, Shore A hardness of 80 to 90 Durometer. Blocks shall be a minimum 2 inch long. Block width shall be approximately 1/16 inch less than the full width of the rabbet. Block thickness shall be at least 3/16 inch, sized for rabbet depth as required.
- C. Spacers: ASTM C864, channel shape, with 1/4 inch internal depth, 3/32 inch flanges, eb, 1/8 inch thick, one to 3 inches long. Spacers shall provide Shore A hardness of 40 to 50 Durometer.
- D. Vinyl Glazing Channels: Profile compatible with framing system and designed to accommodate glass of specified thickness, light gray in color. Provide for dry glazing aluminum frames where indicated or permitted.



- E. Glazing Tape: Poly-isobutylene based sealant tape, conforming to AAMA 804.1, with adhesive one side protected by temporary paper cover, Extru-Seal manufactured by Pecora Corp., No. 303 by Protective Treatments, Inc., or equal.
- F. Spring Steel Spacers: Galvanized steel wire or strip designed to position glazing in channel or rabbet sash with stops.
- G. Glazing Clips: Galvanized steel spring wire designed to hold glass in position in rabbet sash without stops.
- H. Glazing Points (Sprigs): Pure zinc stock, thin, flat, triangular or diamond-shaped pieces, 1/4 inch minimum size.
- I. Glazing Sealants for Metal Sash: GE Silicones Silglaze II 2800, GE Silicones Silpruf, GE Silicones 1200 Silicone, and Dow Corning 999A. Polybutylene, oleoresinous, asphalt, and oil base sealants are not permitted. Provide sealant of same color as structural silicone sealant unless otherwise required.
- J. Glazing Compound for Wood Sash: Provide acrylic latex glazing compound for bedding and sealing glass in wood frames
- K. Glazing Compounds and Sealants for Thermoplastic: Provide silicone, butyl, or polysulfide glazing compound.
- L. Mirror Setting Materials: Manufactured by Palmer Products Corporation, or equal, for installation of mirrors, and as follows:
 - 1. Mirror backing paint: Mirro-Bac Paint, or equal, formulated to protect mirror silvering.
 - 2. Mirror bond coat: Mirro-Mastic Bond, or equal, formulated to isolate deleterious backing materials from mastic and mirror.
 - 3. Mirror mastic: Palmers Super Set Mirro-Mastic PM290.

2.04 SPEAK HOLES

- A. Speak holes shall be stock No. 444, 4 to 6-inch diameter for 1/4-inch tempered float glass, stainless steel as manufactured by Nissen and Co., N666 by C.R. Laurence Co., or equal.

PART 3 - EXECUTION

3.01 TOLERANCES



- A. Thickness indicated or specified are nominal within standard tolerances. Maximum size of vertical panes shall not exceed the following:

Float Thickness:	1/8 inch	3/16 inch	1/4 inch
Maximum Areas in Square Feet:	9	16	20

When exceeding these square foot measurements glass is to be safety glazed.

3.02 INSTALLATION, GENERAL

- A. Glazed cabinet doors, windows, transoms, and fixtures, not otherwise noted or indicated, shall be glazed with clear float glass. Room or entrance doors shall be glazed with clear wire glass with impact film.
- B. Obscure glass in exterior openings shall be installed with smooth side of glass to weather. Patterned glass shall be installed with pattern running vertically, unless otherwise indicated.
- C. Glazing tapes or sealants shall be installed wherever glass contacts wood or metal surfaces. Width of strips shall be as required.
- D. Glazing compound shall be neatly and cleanly installed in straight lines, even with inside edge of sash members. Thumb puttying is not permitted.
- E. Display Cases and Sliding Glass Doors in Casework: Glass in display cases shall be 1/4 inch clear laminated glass as indicated. Edges of glass shall be rounded and polished.
- F. Serving windows in cafeterias with speak holes shall be laminated safety glass.
- G. Glazing Aluminum Sash: Glazing material in aluminum sash shall be installed in compound and secured in place with aluminum glazing beads. In addition, horizontal beads shall be installed with 6-inch by 1 inch, type A, self-tapping, stainless steel, Phillips-head screws, installed into pre-drilled, counter-sunk holes and spaced 2 inches from each end and 9 inches on centers.
- H. Speak holes shall be installed according to glass manufacturer's written recommendations.

3.03 INSTALLATION OF GLASS

- A. Conform to requirements of GANA Glazing Manual.
- B. Provide edge blocking to comply with requirements of referenced glazing standard, except where otherwise required by glass unit manufacturer.
- C. Provide compressible filler rods or equivalent back-up material to prevent sealant from extruding into glass channel weep systems, from adhering to back surface of joints and to control depth of sealant for optimum performance.
- D. Force sealants into glazing channels, in manner to eliminate voids and to ensure complete bond of sealant to glass and channel surfaces.



- E. Tool exposed surfaces of sealants to provide for drainage away from glass. Install pressurized tapes and gaskets to protrude slightly out of channel to eliminate dirt and moisture pockets.
- F. Where dry glazing of aluminum frame is indicated or permitted, provide vinyl glazing channels installed in accordance with frame manufacturers written recommendations. Do not stretch channels. Miter corners.
- G. For tape glazing, furnish tape of thickness to provide approximately 30 percent compression. Cut tape to proper length and install to permanent stops, the entire length of the head and sill first, then to jambs. Butt tape together with no overlap and remove paper backing. Install glass on setting blocks at quarter points and maintain uniform glass edge clearance around entire perimeter of glass. Maintain manufacturer's recommended edge clearance and bite on glass. Install glass firmly into tape with a slight lateral movement to assure proper adhesion. Install tape to removable stop with evenly distributed firmness, smoothing out wrinkles in tape. Secure removable stop in proper position so tape makes contact with glass as stop is installed, forcing contact with glass and completely sealing joint. Remove excess tape from both sides at slight angle oversight line. Do not undercut.
- H. Glass in Wood Frames: Install glass with glazing points and setting blocks as required. Seal glass with glazing compound and secure with wood stops. Install stops with fine finishing nails and set for putty stopping.
- I. Patterned Glass: Install glass with one patterned smooth surface on the weather side.
- J. Wire Glass: Install glass for fire doors in accordance with installation requirements of NFPA 80.
- K. Laminated Glass: Sashes, which are to receive laminated glass, shall be weeped to the outside to permit water in the channel to drain from the frame.
- L. Unframed Mirrors: Walls shall be clean, dry, plumb, rigid and smooth. Install mirror backing paint to back of mirror and to edges. Install mirror bond coat over painted backing, wood backing, concrete and masonry to receive mirrors. Bond coat is not required over vitreous surfaces. Install sufficient mirror mastic coverage when mirror is installed. Mirror mastic will be applied 4 inches from edge and at a maximum of every 12 inches at the size of a golf ball. Install mirror into place, providing 3/16 inch clearance between mirror and substrate. Support mirrors with temporary edge channels to allow mastic set-up and provide permanent top and bottom edge channels.
- M. Framed Mirrors: Walls shall be clean, dry, plumb, rigid and smooth. Install mirrors with concealed mounting devices, and secure with concealed screws on bottom of mirror. Conform to manufacturers written recommendations.

3.04 PROTECTION AND CLEANING



- A. Protect exterior glass from breakage by furnishing crossed streamers attached to framing and away from glass surface. Do not directly install markers to glass surfaces. Remove non-permanent labels and clean surfaces.
- B. Protect glass from contact with contaminating substances resulting from construction operations. If, despite such protection, contaminating substances do come into contact with glass, remove immediately by method recommended by glass manufacturer.
- C. Examine glass surfaces adjacent to or below exterior concrete and other masonry surfaces at frequent intervals during construction, but not less often than once a month, for build-up of dirt, scum, alkali deposits or staining. When examination reveals presence of these forms of residue, remove by method recommended by glass manufacturer. Glazing, which cannot be cleaned to a required condition, shall be deemed defective Work.
- D. Remove and replace glass, which is broken, chipped, cracked, abraded, or damaged during construction.
- E. Remove protective covering from thermoplastic not more than 4 days before Substantial Completion, and immediately before cleaning. Methods of final cleaning and finishing shall be as prescribed by thermoplastic glazing publications referenced above.
- F. Wash glass on both faces not more than four days before Substantial Completion. Wash glass by method recommended by glass manufacturer. Do not furnish harsh cleaning agents, caustics, abrasives, or acids for cleaning. Polish glass both sides and leave free of soil, streaks, and labels.

3.05 CLEAN UP

- A. Remove rubbish, debris and waste materials and legally dispose of off the Project site.

3.06 PROTECTION

- A. Protect the Work of this section until Substantial Completion.

END OF SECTION



SECTION 09 22 16

NON-STRUCTURAL METAL FRAMING

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

1. Non-structural metal framing.
2. Slotted system for positive attachment of metal studs to fluted steel decks for head of wall expansion joint movement (cyclic).

B. Related Requirements:

1. Division 01 - General Requirements.
2. Section 05 41 00 - Structural Metal Stud Framing.
3. Section 09 24 23 - Cement Plaster and Metal Lath.
4. Section 09 29 00 - Gypsum Board.

1.02 PROJECT REQUIREMENTS

A. Regulatory Requirements: Comply with CBC requirements.

B. Design Requirements:

1. Metal Studs: Studs for interior partitions shall be roll-formed channel or C-shapes.
2. Track: Stud track for floor and ceiling anchorage shall be channel configuration, sized to fit studs. Galvanized steel as manufactured for installation with specified metal studs.
3. Design: Design is based on minimum 5 pounds per square foot load applied perpendicular to walls. Deflection shall not exceed 1/240 under design load.

B. Performance Requirements:

1. The top track fire-rated assembly, when incorporated into stud systems and tested in conjunction with products specified in Sections 07 8116 and/or 07 8413, shall exhibit the following performance characteristics:



- a. Cyclic System: When tested for cyclical movement, in accordance with UL 2079. Assembly shall achieve 500 cycles of wall movement at 35 to 40 cycles per minute.
- b. When subsequently tested for 1 and 2 hour fire-resistive rated construction, in accordance with ASTM E119 and ASTM E814, assembly shall conform to requirements for hose stream resistance.

1.03 SUBMITTALS

- A. Shop Drawings: Submit drawings showing framing, connection details, accessories and anchorage. Indicate location of assemblies and size and spacing of framing components.
- B. Product Data: Submit manufacturer's catalog data for each item proposed for installation.
- C. Certificates: Furnish manufacturer's certification that materials meet or exceed Specification requirements.
- G. LEED Submittals: Complete the LEED Material Buyout Form (MBoF) with all materials provided to the project. A complete submittal includes providing all material costs in the MBoF and all of the supporting documentation for the following credits:
 1. MRc2 - Environmental Product Declarations (EPD): Provide Industry-Wide or Product-Specific EPD.
 2. MRc3 - Sourcing of Raw Materials - Recycled Content: Provide product data for pre- and post- consumer recycled content.
 3. MRc4 - Material Ingredients: Provide manufacturers Declare label, Health Product Declaration (HPD), Cradle to Cradle Certification, or Cradle to Cradle Health Product Certificate.
 4. IEQc2 - Low-Emitting Materials – Interior Wet Applied Products: For paints, coatings, adhesives and sealants applied on site or used for laminating off-site, include product data indicating the VOC content (g/L) and testing.

1.04 DEFINITIONS

- A. Cyclic Anchoring Method: A system which provides for positive attachment (as described in ASTM C754) of studs to upper track, and of track to overhead fluted deck, while permitting up to 1-inch of vertical movement.
- B. System: The application of the above products in their entirety as tested. There can be no intermixing of components unless specifically outlined in the appropriate test reports.

1.05 QUALITY ASSURANCE

- A. Coordinate with related Work to provide blocking for items mounted on finished surfaces and to provide allowances for pipes and other items inside partitions and walls.



B. Comply with following as a minimum requirement:

1. American Welding Society (AWS): Structural Welding Code Steel (D1.1); and Structural Welding Code Sheet Steel (D1.3).
2. ASTM Standards:
 - a. ASTM A653 – Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc Iron Alloy-Coated (Galvannealed) by Hot-Dip Process.
 - b. ASTM A1003 – Standard Specification for Steel Sheet, Carbon, Metallic- and Nonmetallic-Coated for Cold-Formed Framing Members.
 - c. ASTM A641 – Standard Specification for Zinc Coated (Galvanized) Carbon Steel Wire.
 - d. ASTM C645 – Standard Specification for Non-Structural Steel Framing Members.
 - e. ASTM C955 – Standard Specification for Load Bearing (Transverse and Axial) Steel Studs, Runners (Tracks), and Bracing or Bridging, for Screw Application of Gypsum Panel Products and Metal Plaster Bases.
 - f. ASTM C954 – Standard Specification for Steel Drill Screws for Application of Gypsum Panel Products or Metal Bases to Steel Studs From 0.033 Inch to 0.112 Inch in Thickness.
 - g. ASTM E1190 – Standard Test Methods for Strength of Power-Actuated Fasteners Installed in Structural Members.

C. Tolerances: Install walls and partitions on straight lines, plumb, free of twists or other defects, and contacting a 10 foot straightedge for its entire length at any location within a 1/8 inch tolerance. Install horizontal framing level within a tolerance of 1/8 inch in 12 feet in any direction.

D. Manufacturers shall be members of Steel Stud Manufacturers Association (SSMA).

1.06 DELIVERY, STORAGE AND HANDLING

A. Materials shall be delivered in their original unopened packages and stored protected from damage. Do not store material directly on grade. Provide adequate support to prevent bowing of material prior to installation.

B. Store welding electrodes in accordance with AWS D12.1.

PART 2 – PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Non-structural metal framing:



1. ClarkWestern Building Systems, Inc.
2. Dietrich Industries, Inc.
3. Marino/Ware.
4. Cemco.
5. Equal.

B. Top Track Systems:

1. Sliptrack System by Dietrich Industries., Inc. or equal. Down-standing legs shall be nominally 2 1/2-inch and shall be provided with 1 1/2-inch slots at 1 inch on center.
2. VertiTrack or VertiClip System by The Steel Network, Inc. or equal. Pre-assembled track with clips installed to match stud spacing. Clips with attached bushing and screws to allow stud movement.
3. System must provide for minimum tested overall movement of 1 inch: 1/2 inch in each direction.
4. Track shall be provided in standard widths of 4 and 6 inches and in 16, 18, and 20 gage (54, 43, and 33 mil) sheet steel thickness, as required by Project conditions and detailed.

2.02 MATERIALS

A. Light Gage Metal Framing:

1. Metal framing shall be formed from corrosion resistant-steel conforming to requirements of ASTM A653, 33 ksi minimum.
2. Metal framing shall be zinc coated in conformance to requirements of ASTM A924, G60.
3. Metal framing shall be manufactured in conformance to ASTM C645.
4. Install metal framing according to ASTM C1007, Standard Specification for Installation of Load-Bearing (Transverse and Axial) Steel Studs and Related Accessories.

B. Studs: SSMA, ICC-ES ER-4943P, minimum yield 33 ksi, hot-dipped galvanized or electro galvanized sheet steel, G-60, C Stud type, punched web (except tracks and joists), C-shaped, sizes required to conform to details and scheduled wall thicknesses. Studs shall be rolled from new steel sheet and shall not be produced from re-rolled steel. Stud flanges shall not be less than 1 5/16-inch wide; track flanges, not less than 1 1/4-inch wide.

1. Wall Framing and Furring for Plaster and Mortar Beds: Studs and tracks shall be 18 gage (43 mil) minimum, unless otherwise indicated.



2. Wall Framing and Furring for Gypsum Wallboard: Studs and tracks shall be 20 gage (33 mils) minimum, unless otherwise indicated.
 3. Load-Bearing Studs: Studs and members thicker than 18 gage (43 mil) shall conform to requirements of Section 05 4100 - Structural Metal Stud Framing.
 4. Stud gages indicated on Drawings or specified are the minimum. Where required stud height and/or loads exceed code requirements or manufacturer's recommendations, provide heavier gage studs and/or decrease stud spacing as necessary to conform to code requirements.
- C. Suspended and Furred Ceiling Systems and Wall Furring: Suspended ceiling framing system shall support finished ceiling, light fixtures, air diffusers, and accessories, as required. Suspension system shall provide a maximum deflection of L/240. Carrying channels shall be fabricated from minimum 0.0548 inch thick cold-rolled steel, 1 ½-inch wide by 7/16 inch deep. Carrying channels for supports under ducts shall be 2 inches in size as specified. Carrying channels shall be fabricated from hot-dip galvanized coated sheet.
1. Plaster Ceilings: Cross furring members shall conform to ASTM C 645, and shall be fabricated from cold-rolled steel, 3/4 inch wide by 7/16 inch deep. Furring members shall be fabricated from hot-dip galvanized coated sheet.
 2. Gypsum Wallboard Ceilings: Furring members shall be fabricated from cold-rolled steel, 7/8 inch by 2 9/16-inch. Furring members shall be fabricated from hot-dip galvanized coated sheet.
- D. Framed Ceilings: Framed ceiling framing system shall support finished ceiling, light fixtures, air diffusers, and accessories, as required. Suspension system shall provide a maximum deflection of L/240.
1. Plaster and Gypsum Wallboard Ceilings: Ceiling joists shall conform to ASTM C645, hot-dip galvanized coated steel, C-shaped, unpunched, 20 gage (30 mil) minimum, unless noted otherwise.
- E. Shaft Wall Framing Members: CH studs and J runners, 20 gage (30 mil) minimum for 2, 4 or 6 inch studs, conforming to ASTM C645, fabricated of steel conforming to ASTM A653, hot-dip galvanized.
- F. Framing Accessories: Provide standard related accessories including floor and ceiling tracks, clips, web stiffeners, anchors, and similar items, of same manufacture as each type of stud specified, and as required for a complete installation.
- G. Splay Wires and Compression Struts: Approved manufacturers acceptable to manufacturer of ceiling grids, gages and types as required by building codes for ceiling types and weights specified.
- H. Wires: Soft-annealed galvanized steel wire, 8 gage for hanger wires and 16 gage for framing unless otherwise specified.



- I. Fasteners: Wafer-head screws, self-drilling type for 20 gage (30 mil) metal and heavier. ASTM C954 self-drilling, self-tapping screws, Type S-12 pan head, ½ inch long.
- J. Fire Rated Acoustical Foam Tape: Compressible, closed cell polyvinyl chloride foam with pressure sensitive adhesive, in rolls with protective release liner on non-adhesive face, 6 pounds per cubic foot density, 1 inch wide x not less than 1/4 inch thick, self-extinguishing, UL 94 recognized, Norseal V740FR, manufactured by Norton Performance Plastics Corporation, or equal.
- K. Acoustical Sealant: Permanently resilient type, non-hardening, as specified in Section 07 92 00.
- L. Zinc-Rich Paint: Conform to Fed Spec DOD-P-21035A, Z.R.C. "Cold Galvanizing Compound", manufactured by ZRC Products Company, or equal. Provide for touch-up of galvanized surfaces.
- M. Steel Backing Plates: Provide a minimum 4 inch wide by 16 gage (54 mil) steel, or sections of studs and stud track welded or fastened to web of studs, except as otherwise indicated. Apply shop coat of metal primer.
- N. Anchorage Devices Powder Actuated: Minimum 0.177 inch diameter by 1-7/16 inch long fasteners in regular concrete and 0.145 inch diameter by 1 1/8-inch long fasteners in lightweight concrete. Allowable shear and tension values as permitted in ICC ES reports shall be reduced to 80 percent.
- O. Anchorage Devices, Drilled Expansion Anchors: Minimum 3/8 inch diameter with 2-1/4 inch embedment. Allowable shear and tension values as permitted in ICC ES reports shall be reduced to 80 percent.
- P. Top Track System Materials:
 1. Forming steel shall be mill certified prime steel:
 - a. For 0.064 inch sections, conform to ASTM A1011, Grade 50 with a minimum yield point of 50,000 psi.
 - b. For 0.048 and 0.036 inch sections, conform to ASTM A1008, Grade C, with a minimum yield point of 33,000 psi.
 - c. Formed steel shall be provided with galvanizing in accordance with ASTM A653 for a Class G90 zinc coating.
 2. Fasteners:
 - a. For attachment of steel studs to slotted track or deflection clip, minimum No.8 corrosion resistant by ½ inch waferhead screws.
 - b. For attachment of track system to overhead structural element or metal decking, as provided for by the structural details affecting the Work.



3. Dry Method.
 - a. Dry mineral wool and sealant system shall use only such products as are represented to have been fully tested and approved under UL 2079 and as specified in Section 07 84 13 - Penetration Firestopping.
 - b. Mineral wool shall be compressed to the degree as used on approval fire and hose stream test.
 - c. The system supplier shall provide a measuring device capable of determining compression to determine compliance with required density.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Verify that overhead or concealed Work is completed, tested, inspected, and finished as required before starting Work of this section.

3.02 INSTALLATION

A. Walls and Partitions:

1. Fasten floor runners for exterior walls and interior partitions to concrete slab with required power driven fasteners. Spacing of fasteners not to exceed 24 inches on center. Fasten ceiling runners to structure as by top track system manufacturer.
2. Sound insulated walls and partitions: Embed floor runner tracks in two beads of acoustical sealant or two runs of compressible tape seal. Install top track nested into slotted track system, in same manner for full height of walls. Where wall ends abutting concrete, masonry, or steel set end studs in two beads of acoustical sealant or two tape seals and secure at 4-foot centers vertically.
3. Space studs not over 16 inch on center unless indicated otherwise. Studs shall be located approximately 2 inches from door frame jambs, abutting partitions and partition corners, except those providing support for door and window openings.
4. Furnish and install manufacturer's standard floor track. Fasten track to floor by means of 1/4 inch by 1 1/4-inch Star "Dryvin" hammer drive anchors or 3/16 inch by 1 inch round head, "Rawl-Drives" one-piece expansion bolts spaced not to exceed 3 feet, and installed in drilled holes in slab, or to wood joist with nails as indicated. Track may be fastened to concrete floor slabs with, power-driven fasteners.



5. Studs shall be seated squarely in track with stud web and flanges abutting track web, plumbed and securely fastened with sheet metal screws, to flanges or web of both floor and top tracks. Provide 4 screws per stud.
6. Where there is no suspended ceiling, tops of stud walls shall be provided with track and shoes and be fastened as specified for floors. Welding of studs to ceiling track will not be permitted except where bearing studs are installed.
7. Over metal doorframes, install a cut-to-length section of runner track, with flanges slit and web-bent to allow flanges to overlap adjacent vertical studs, and securely fasten to studs. At doorjamb, extend studs continuous to structure above.
8. Bridging, or horizontal bracing of 1 1/2-inch, cold-rolled channels shall be fastened in a manner to prevent stud rotation. Bridging shall be furnished as follows: walls up to 10 feet high, one row at mid-height; walls exceeding 10 feet high, bridging or bracing rows spaced not to exceed 5 feet on center.
9. Wind bracing shall be fastened where indicated on Drawings. Minimum size of strap shall be as indicated on Drawings. Track where strap terminates shall be anchored as indicated on Drawings.

B. Plaster Ceiling Suspension System:

1. Provide horizontal furring in accordance with CBC Section 2507.
2. Hanger Wires:
 - a. Hanger wires for ceilings suspended from wood frame construction shall be installed in accordance per CBC and shall be fastened with stem lag screws in bottom edge of joists or rafters. Wire shall be looped through hole in stem lag screw and then wrapped twice around it. Stem lag screws shall be "Stanlag Screws" by Stanline, Inc., or equal, of type and penetration as follows:

Type Size	Hanger Wire	Screw Penetration, Minimum
Stanlag #SLS-3	#12 & #10 (0.104 and 0.128 inch diameter)	1 1/4-inch
Stanlag #SLS-375	#9 & #8 (0.144 and 0.160 inch diameter)	1 1/2-inch

- b. Hanger wire shall be wrapped twice around runner channel, drawn up taut, and wrapped twice around itself.
3. Runner channels shall be installed 6 inches maximum from walls, parallel to runners. Splices in runner channels shall be provided at hangers only, by lapping channels not less than 12 inches and tying channels together at 2 points with a double wrap of tie wire twisted up taut.
4. Ends of runner channels abutting concrete or masonry surfaces shall be 1 1/4-inch clear and shall be tied to wall or partition with 3/4 inch channel brackets



providing a 4-inch right angle bend secured with two 1/4 inch by 1 inch power-driven fasteners. Brackets shall extend from face of surface not less than 8 inches and shall be tied to runner channels at two points with double wrap of tie wire twisted up taut.

5. Securely saddle-tie furring channels to runner channels at each crossing with 16 gage (0.064 inch diameter) tie wire twisted up taut, and with wings left uncut and bent back.

C. Gypsum Wallboard Ceiling Suspension and Framing: Suspended ceiling system framing shall be installed in accordance with ASTM C754, and as follows.

1. Hangers shall be spaced not more than 48 inches along runner channels and 36 inches in other direction or 42 inches in both directions unless otherwise indicated. Locations of hanger wires shall be coordinated with other Work. Hangers at ends of runner channels shall be located not more than 6 inches from walls. Hanger wire shall be fastened to structural elements with required fasteners. Sags or twists, which develop in suspended system, shall be adjusted. Damaged or faulty parts shall be replaced.
2. Main Runners: Hanger wires shall be double strand saddle-tied to runner channels and ends of hanger wire shall be twisted three times around itself. Main runners shall be located to within 6 inches of parallel wall to support ends of cross furring. Main runners shall not come in contact with abutting masonry or concrete walls. Where main runners are spliced, ends shall be overlapped 12 inches with flanges of channels interlocked, and shall be securely tied at each end of splice with wire looped twice around channels.
3. Furring channels shall be fastened to runner channels and to structural supports at each crossing with tie wire, hairpin clips, or required fastenings. Furring channels shall be located within 2 inches of parallel walls and beams, and shall be cut 1/2 inch short of abutting walls.
4. Ceiling Openings: Support members shall be provided as required at ceiling openings for access panels, recessed light fixtures, and air supply or exhaust. Support members shall be not less than 1 1/2-inch main runner channels and vertically installed suspension wires or straps shall be located to provide at least minimum support specified for furring and wallboard attachment. Intermediate structural members not a part of structural system, shall be provided for attachment or suspension of support members.
5. Light fixtures and air diffusers shall be supported directly from suspended ceiling runners. Wires shall be provided at required locations to support weight of recessed or surface mounted light fixtures and air diffusers.
6. Control Joints: Ceiling control joints for expansion and contraction shall be located where indicated on drawings. A control joint or intermediate blocking shall be installed where ceiling framing members change direction.
 - a. Interior Ceilings with Perimeter Relief: Control joints shall be installed so linear dimensions between control joints shall not exceed 50 feet in either direction or more than 2,500 square feet in area.



- b. Interior Ceilings without Perimeter Relief: Control joints shall be installed so linear dimensions between control joints shall not exceed 30 feet in either direction nor more than 900 square feet in area.

- D. Splay Wires and Compression Struts: Install as detailed and as required to prevent upward and sideward motion under seismic conditions, as required by code.
- E. Suspension Under Ducts: For hangers spaced at 4 to 5 ½-foot centers, provide 6 gage (0.192 inch diameter) hanger wires with minimum 2 inch runner channels spaced at maximum 48 inch centers. For greater spans, design system for live load of 10 pounds per square foot of area plus dead load and provide a detail in Shop Drawings.
- F. Furring: Provide framing for horizontal furring as shown or required. Conform to above requirements as applicable.

3.03 CONNECTIONS TO METAL DECKING

- A. Provide pre-molded neoprene filler strips matching flute profile for non-fire-rated walls and partitions covered on one or both sides up to metal decking.
- B. The top runner track of fire-rated partitions shall be a minimum of 20 gage (33 mils) and fastened to metal deck with required fasteners at spacing required for fire rating, but in no case over 16 inches on center. Neither wallboard nor metal studs shall be fastened to top runner to allow for slab deflection. Areas above runner shall be friction fit with a minimum depth of 2 1/2-inch of 4 pounds per cubic foot mineral wool insulation. A minimum of 1/2 inch of firestopping compound shall be installed to each side of mineral wool insulation for 1-hour system, and 1 inch of firestopping for a 2-hour system. Install required special tracks, angles, fasteners and strips of gypsum wallboard as required to achieve required fire resistance rating.
- C. Proprietary fire-rated top tracks are installed in accordance with manufacturer's recommendations and fire rating approval requirements.

3.04 CLEANING

- A. Remove debris, rubbish, and waste material and legally dispose of off Project site.

3.03 PROTECTION

- A. Protect Work of this section until Substantial Completion.

END OF SECTION



SECTION 09 24 00

PORTLAND CEMENT PLASTER ON MASONRY WALLS

PART 1- GENERAL

1.01 SUMMARY

- A. Section Includes: Work includes all labor, materials, and equipment necessary to install all aspects of a Portland cement plaster assembly.
- B. Related Sections
 - 1. Section 03 00 00 - Concrete
 - 2. Section 04 22 00 - Concrete Unit Masonry

1.02 REFERENCES

- A. ASTM C150 – Portland Cement
- B. ASTM C847 – Standard Specification for Metal Lath
- C. ASTM C1032 - Woven Wire Plaster Base
- D. ASTM C933 - Welded Wire Lath
- E. ASTM C144/C897 – Aggregate for Job-Mixed Portland Cement-Based Plaster
- F. ASTM C926 – Application of Portland Cement-Based Plaster
- G. ASTM C1063 – Installation of Lathing and Furring for Portland Cement Based Plaster
- H. PCA (Portland Cement Association) – Plaster (Stucco) Manual
- I. SMA Details and Technical Bulletins

1.03 ASSEMBLY DESCRIPTION

- A. General: Portland cement plaster over masonry with brown coat, and a finish coat. Nominal thickness is ½ to 5/8 inch.
- B. Application Methods: The plaster may be applied by hand tools or machine pumps but must be applied with sufficient pressure to adhere to the substrate.
- C. Masonry and concrete shall be sound, free of coatings, cured minimum 28 days.
- D. Thickness of plaster is considered maximum nominal measurements.

1.04 SUBMITTALS



- A. Product Data: All product data sheets, evaluation reports, details, and warranty information that pertain to the project in accordance with Submittal Procedures.
- B. Samples of the finish coat shall be of an adequate size as required to represent each color and texture to be utilized on the project and produced using the same techniques and tools required to complete the project. No sample shall be less than 12” by 12”.
- C. Retain approved samples at the construction site throughout the application process.

1.05 QUALITY ASSURANCE

- A. Qualifications:
 - 1. Plastering Contractor: Shall specialize in lath and plaster contracting with documented experience of at least 5 years in business.
 - 2. Provide proof of current contractor’s license and bond where required.
- B. On-Site Mock-Ups: Produced upon request.
- C. Mock-up shall represent construction using the same quality/techniques to be utilized on the project.
- D. Retain approved mock-up at job site throughout the application process.
 - 1. Where acceptable to the Architect, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Delivery: Deliver all materials to the construction site in their original, unopened packaging with labels intact.
 - 1. Inspection: Inspect the materials upon delivery to assure that specified product have been received. Report defects or discrepancies to the responsible party according to the construction documents; do not use reported material for application.
 - 2. Storage: Store all products per manufacturer’s recommendations. Generally, store materials in a cool, dry location; away from direct contact with the ground and/or concrete; out of direct sunlight; and protect from weather and other damage.

1.06 PROJECT CONDITIONS



- A. Environmental Requirements: Follow product manufacturer's recommendations for environmental conditions and surface preparation.
- B. Temperatures: Before, during and following the application of the Portland cement plaster, the ambient and surface temperatures must remain above 40 degrees F (4 C) for a minimum period of 24 hours. Protect stucco from uneven and excessive evaporation, especially during hot, dry and/or windy weather. Protect the portland cement plaster from freezing for a period of not less than 24-hours after set has occurred.
- C. Substrates: Prior to installation, inspect the wall for surface contamination, bond breakers, or other defects that may adversely affect the performance of the materials, and shall be free of foreign matter. Do not apply the Portland cement plaster to substrates with temperatures less than 40 degrees F (4 C) or that contain frost or ice.
- D. Inclement Weather: Protect applied material from deleterious effects until cured or dry.

1.07 SEQUENCING AND SCHEDULING

- A. Sequencing: Coordinate the installation of the lath and Portland cement plaster with all other construction trades. To reduce stucco cracking, insure the concrete/masonry substrate is cured a minimum of 28 days and not saturated prior to plastering.
- B. Plastering contractor shall request and attend a pre-installation meeting with general contractor and architect to advise architect of any control/expansion joint layout concerns. There shall be no cost to the owner for moving one-piece control joints prior and up to this meeting date, additional lineal footage of control joints from plans shall warrant a change order.
- C. Staffing: Provide sufficient manpower and proper supervision to ensure continuous operation, free of cold joints, scaffolding lines, curing, variations in texture, etc.

1.08 WARRANTY

- A. Warranty: Submit documentation on all products. At completion of work, contractor shall provide written warranty documentation for the assembly and products used.
- B. Warranty Length: Shall start at the time of substantial completion.

1.09 MAINTENANCE

- A. The following materials shall be presented to the owner following the application of the work:
 - 1. One container of finish for each color and texture utilized on the project.
 - 2. Supply a maintenance program for Owners O&M manual as required.



PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Manufacturers:

1. BMI
2. Dryvit
3. Parex
4. La Habra
5. California Stucco
6. Shamrock Stucco
7. Quikrete/Specmix
8. Merlex
9. El Rey Stucco
10. Omega Products
11. CalPortland/Riverside Cement
12. Mission Stucco
13. Sacramento Stucco
14. Cemex
15. BMI/SIKA
16. Amermix/Old Castle

2.02 BROWN COAT (BASECOAT)

A. Cement: A portland cement complying with ASTM C150.

B. Sand:

1. Field mixes shall comply with ASTM C-926 and must have sand that is clean and free from deleterious amounts of loam, clay, silt, soluble salts and organic matter. Sampling and testing shall comply with ASTM C144 or C897.
2. An “engineered performance mix” by an SMA manufacturer is acceptable with appropriate approvals (ICC ES, IAPMO or Interek report) .

C. Water: Clean and potable without foreign matter.

2.03 ACCESSORIES

A. Sealants: Polyurethane, polyurethane modified, polysulfide, or silyl-terminated polyether elastomeric sealant complying with ASTM C920 or 100% silicone.



- B. Fasteners: Nails, staples, or screws used to rigidly secure lath and associated accessories shall be corrosion-resistant and meet the minimum requirements of ASTM C1063.
- C. Zinc and Zinc-Coated (Galvanized) Accessories: The following accessories shall be fabricated from zinc-coated (galvanized) steel.
 - 1. Corner Aid: Minimum 26-gauge thick; expanded flanges shaped to permit complete embedding in plaster; minimum 2 in. wide; Square-edge style; use unless otherwise indicated. for extra corrosion protection , trims can be double zinc dipped, extra charges will occur, specify PVC nose for acrylic finish coats.
 - 2. Casing Bead: Minimum 26-gauge thick; thickness governed by plaster thickness; maximum possible lengths; expanded metal flanges, with square edges.

2.04 FINISHES

- A. Portland cement-based blended stucco finish
- B. Color and Texture: Manufacturer, color and finish texture shall be as approved by the Architect.

2.05 MIXES

- A. Portland Cement Plaster Basecoats:
 - 1. Prescriptive Method: Ratios and Mix Design shall be per ASTM C926. Contractor shall select one of the following mixes (sand is per combined volume of cements), lime is cement:
 - a. Portland Cement 1 part
Masonry Cement 1 part
Sand 3 ½ to 4 ½ parts per Cement
Fibers Maximum 3 oz per batch
 - b. Portland Cement 1 part
Lime (type S) ¼ to ½ part
Sand 3 to 4 parts per cement & Lime
Fibers Maximum 3 oz per batch
 - c. Plastic Cement 1 part
Sand 3 ½ to 4 ½ parts per cement
Fibers Maximum 3 oz per bag plastic cement



- B. Finish Coats: Mixing and tinting instructions are contained in the appropriate product data sheets by the Manufacturer.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Prior to the application of the Portland cement plaster basecoat the plastering contractor shall ensure that:
 - 1. Surface and site conditions are ready to receive work.
 - 2. Grounds and Blocking: Verify that the items within the walls for other sections of work have been installed.
 - 3. Notify architect/owner of any defects that may impact the finished assembly. Proceed as directed.
- B. Substrates:
 - 1. Acceptable substrates must be sound, secure and suitable for lath (if applicable) and plaster.
 - 2. Substrates and adjacent materials must be dry and clean. Substrate surface must be flat, free of protrusions or planar irregularities greater than 1/4-inch in 10-feet (6mm in 3m).
- C. Flashings/Sealant joints: All flashing or sealant joints around windows, at deck attachments, utility penetrations, roof lines, etc. and all kick-out flashing must be properly installed prior to application of Portland cement plaster. Notify owner if flashings are missing, proceed as directed.
- D. Casing bead shall be applied around all penetrations with a minimum 1/4 inch to maximum 3/4 inch gap to receive a backer rod and sealant and where cement plaster terminates at horizontal and vertical. Gap width will depend on conditions.
- E. Unsatisfactory conditions or concerns shall be reported to the general contractor and/or builder and/or architect and/or owner. Do not proceed until directed in writing by architect or general contractor.

3.02 PREPARATION

- A. Substrate: inspect all work prior to starting lath and plastering. Notify architect of any issues impacting performance, proceed as directed.
- B. Surrounding Areas: Protect surfaces near the work of this section from damage, disfiguration, and overspray. Mask off all dissimilar materials.

3.03 INSTALLATION



- A. General Installation: Refer to, ASTM C926, ASTM C1063, and/or the appropriate manufacturer's product data sheet for additional installation requirements and recommendations of the manufacturer.
- B. All trims shall be securely fastened to prevent movement or shifting during plastering.
- C. Per ASTM C926, apply Portland cement plaster by hand-troweling or machine-spraying to a nominal thickness of 3/8-inch (9.5 mm) brown coat. Total basecoat shall be 1/2 inch for direct application to masonry substrates.
- D. Apply brown coat to fill and complete basecoat. When excess moisture leaves brown coat, hard float to provide densification per ATSM.
- E. Moist Curing: Provide sufficient moisture by fog or moist curing to permit proper hydration of the cementitious materials. The length of time and most effective procedure for curing will depend on climatic and job conditions.

3.04 INSTALLING FINISH COAT

- A. General: Mix and apply per manufacturer's product data sheet.
- B. Do not apply to soft, contaminated or frozen basecoat.
- C. Avoid applying to excessively hot walls.
- D. Fog coat (cement finish only) as needed to blend color variations
- E. Finish coat shall be free of eye catching imperfections.

3.05 CLEANING/PATCHING/TOLERANCE

- A. Cleaning: Remove any and all materials used, overspray from adjacent surfaces, and all protective masking.
- B. Patch and repair as needed, including but not limited to fog coating, imperfections and blisters.
- C. The basecoat of plaster shall be in tolerance:
 - 1. Not to exceed 1/4 inch in ten (10) feet
- D. Eye catching variations in color or texture pattern will not be accepted.

3.06 PROTECTION

- A. Protect applied material from inclement weather until dry and prevent it from freezing for a minimum of 24-hours after set and/or until dry. Refer to manufacturer's product data sheet for additional requirements.



Department of Neighborhood Services and Public Safety
GOLETA TRAIN DEPOT PROJECT

END OF SECTION



SECTION 09 24 00

PORTLAND CEMENT PLASTER

PART 1- GENERAL

1.01 SUMMARY

- A. Section Includes: Work includes all labor, materials, and equipment necessary to install all aspects of a Portland cement plaster assembly.

1.02 RELATED SECTIONS

- A. Section 05 41 00 – Cold Formed Framing
- B. Section 06 16 00 – Sheathing
- C. Section 07 90 00 – Joint Sealers

1.03 REFERENCES

- A. ASTM C150 – Portland Cement
- B. ASTM C847 – Standard Specification for Metal Lath
- C. ASTM C933 - Welded Wire Lath
- D. ASTM C144/C897 – Aggregate for Job-Mixed Portland Cement-Based Plaster
- E. ASTM C926 – Application of Portland Cement-Based Plaster
- F. ASTM C1063 – Installation of Lathing and Furring for Portland Cement Based Plaster
- G. PCA (Portland Cement Association) – Plaster (Stucco) Manual
- H. ICC-ES Acceptance Criteria for Weather-resistive Barriers (AC308)

1.04 ASSEMBLY DESCRIPTION

- A. General: Portland cement plaster is comprised of a water-resistive barrier, optional sheathing, lath, scratch, brown coats, and a finish coat. Minimum nominal $\frac{3}{4}$ inch cement thickness.
- B. Application Methods: The plaster may be applied by hand tools or machine pumps but must have sufficient force to adhere to the substrate.
- C. Framing shall have a deflection of L/360 or stiffer
- D. Fire Rated assemblies shall be per the test report or special instructions.

1.05 SUBMITTALS

- A. Product Data: All product data sheets, evaluation reports, details, and warranty information that pertain to the project in accordance with Section 01 30 00 Submittal Procedures.



- B. Samples: Submitted upon request.
- C. Samples of the finish coat shall be of an adequate size as required to represent each color and texture to be utilized on the project and produced using the same techniques and tools required to complete the project. No sample shall be less than 12” by 12”.
- D. Retain approved samples at the construction site throughout the application process.
- E. Submit a unit square foot price for a “ Stucco Crack Reduction System”

1.06 QUALITY ASSURANCE

- A. Plastering Contractor: Shall specialize in lath and plaster contracting, document experience of at least 5 years.
- B. Provide proof of current contractor’s license and bond where required.
- C. On-Site Mock-Ups: Produced upon request.
- D. Prior to commencement of work, provide an on- site mock-up.
- E. Mock-up shall represent construction using the same quality/techniques to be utilized on the project.
- F. Retain approved mock-up at job site throughout the application process.
- G. Where acceptable to the Architect, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Delivery: Deliver all materials to the construction site in their original, unopened packaging with labels intact.
- B. Inspection: Inspect the materials upon delivery to assure that specified products have been received. Report defects or discrepancies to the responsible party according to the construction documents; do not use reported material for application.
- C. Storage: Store all products per manufacturer’s recommendations. Generally, store materials in a cool, dry location; away from direct contact with the ground and/or concrete; out of direct sunlight; and protect from weather and other damage.

1.08 PROJECT CONDITIONS

- A. Environmental Requirements: Follow product manufacturer's recommendations for environmental conditions and surface preparation.
- B. Temperatures: Before, during and following the application of the Portland cement plaster, the ambient and surface temperatures must remain above 40 degrees F (4 C) for a minimum period of 24 hours. Protect stucco from uneven and excessive evaporation, especially during hot, dry and/or windy weather. Protect the Portland cement plaster from freezing for a period of not less than 24-hours after set has occurred.



- C. Substrates: Prior to installation, inspect the wall for surface contamination or other defects that may adversely affect the performance of the materials, and shall be free of residual moisture. Do not apply the Portland cement plaster to substrates whose temperature are less than 40 degrees F (4 C) or contain frost or ice.
- D. All wood based products covered shall be dry and have a moisture content below 19% .
DO NOT COVER WET FRAMING.
- E. Inclement Weather: Protect applied material from deleterious effects until cured or dry.
- F. Existing Conditions:
Contractor shall walk the project prior to starting work and notify the architect or owner's representative of any deficiencies that will negatively impact the plaster assembly. **DO NOT** proceed until remedied.
- G. Contractor shall advise architect of any horizontal surfaces with inadequate slope.

1.09 SEQUENCING AND SCHEDULING

- A. Sequencing: Coordinate the installation of the lath and Portland cement plaster with all other construction trades. To reduce stucco cracking, apply plaster only after the building is 90 percent dead loaded and the interior gypsum has been installed.
- B. Plastering contractor shall request and attend a pre-installation meeting with general contractor and architect prior to the framing being completed. Plastering contractor shall advise architect of control/expansion joint layout concerns. There shall be no cost to the owner for moving one-piece control joints prior and up to this meeting date, additional lineal footage of control joints from plans shall warrant a change order.
- C. Staffing: Provide sufficient manpower and proper supervision to ensure continuous operation, free of cold joints, scaffolding lines, curing, variations in texture, etc.

1.10 WARRANTY

- A. Warranty: Submit documentation on all products. At completion of work, contractor shall provide a written warranty documentation for the assembly and products used.
- B. Warranty Length: Shall start at the time of substantial completion.

1.11 MAINTENANCE

- A. The following materials shall be presented to the owner following the application of the work:
 - a. One container of finish for each color and texture utilized on the project.
 - b. Supply a maintenance program for Owners O&M manual as required.

PART 2 - PRODUCTS

2.01 SCRATCH AND BROWN COAT (BASECOAT)



- A. Cement: A Portland cement complying with ASTM C150.
- B. Sand:
 - 1. Field mixes shall comply with ASTM C-926 and must have sand that is clean and free from deleterious amounts of loam, clay, silt, soluble salts and organic matter. Sampling and testing shall comply with ASTM C144 or C897.
- C. Water: Clean and potable without foreign matter.

2.02 WATER-RESISTIVE BARRIER

- A. Over Wood-based Sheathing:

Two layers of D kraft building paper , minimum 30 minute, complying with UBC Standard 14-1.

2.03 LATH

- A. Expanded Lath: Nominal 3.4 lb/yd² weight, galvanized steel complying with ASTM C847.

2.04 SHEATHING

- A. Wood-based Structural Panels: 1/2 inch-thick plywood or as indicated in Structural drawings. Plywood shall be exterior grade.

2.05 ACCESSORIES

- A. Sealants: 100% silicone.
- B. Flashing (by others) : Flashing complying with IBC Section 1405.4 (2013) or IRC Section R703.8, as applicable, WRB must integrate in a “Shingle Fashion ” with flashings.
- C. Fasteners: Nails, staples, or screws used to rigidly secure lath and associated accessories shall be corrosion-resistant and meet the minimum requirements of ASTM C1063.
- D. Zinc and Zinc-Coated (Galvanized) Accessories: The following accessories shall be fabricated from galvanized) steel.
- E. Corner Aid: Minimum 26-gauge thick; expanded flanges shaped to permit complete embedding in plaster; minimum 2 in. wide; Square-edge style; use unless otherwise indicated.
- F. Strip Mesh: Metal Lath, 3.4 lb/yd² expanded metal; 6 in. wide x 18 in. long.
- G. Vent Screenshot: Minimum 26-gauge thick; thickness governed by plaster thickness; minimum 4-inch (102 mm) width, double “V” profile, with perforated expanse between “V’s” of longest possible lengths.
- H. Casing Bead: Minimum 26-gauge thick; thickness governed by plaster thickness; maximum possible lengths; expanded metal flanges, with square edges.



- I. Drip Screed: Minimum 26-gauge thick, depth governed by plaster thickness, minimum 3-1/2 in. high flange, maximum possible lengths.
- J. Control and Expansion Joints: Depth to conform to plaster thickness; use maximum practical lengths.
- K. Control Joints: One-piece-type, folded pair of unperforated screeds in M-shaped configuration; removable protective tape on plaster face of control joint.
- L. Expansion Joints: [Two-piece-type formed to produce a slip-joint.] [Pair of casing beads with sealant between.]
- M. Expansion Joints: Two-piece-type formed to produce a slip-joint.

2.06 FINISHES

- A. Portland cement-based blended stucco finish.
- B. Color and Texture: Color and finish texture shall be as selected by the Architect.

2.07 MIXES

A. Portland Cement Plaster Basecoats:

- 1. Prescriptive Method: Ratios and Mix Design shall be per ASTM C926. Contractor shall select one of the following mixes (sand is per combined volume of cements):

- a. Portland Cement 1 part
Masonry Cement 1 part
Sand 3 ½ to 4 ½ parts per Cement
Fibers Maximum 3 oz per batch
- b. Portland Cement 1 part
Lime (type S) ¼ to ½ part
Sand 3 to 4 parts per cement & Lime
Fibers Maximum 3 oz per batch
- c. Plastic Cement 1 part
Sand 3 ½ to 4 ½ parts per cement
Fibers Maximum 3 oz per bag plastic cement

- B. Finish Coats: Mixing and tinting instructions are contained in the appropriate product data sheets by the Manufacturer.

PART 3 - EXECUTION

3.01 EXAMINATION



- A. Prior to the application of the Portland cement plaster basecoat the plastering contractor shall ensure that:
- B. Surface and site conditions are ready to receive work.
- C. Grounds and Blocking: Verify that the items within the walls for other sections of work have been installed.
- D. Notify architect/owner of any defects that may impact the finished assembly. Proceed as directed.
- E. Substrates:
 - 1. Acceptable substrates must be sound, secure and suitable for lath and plaster.
 - 2. Substrates and adjacent materials must be dry and clean. Substrate surface must be flat, free of protrusions or planar irregularities greater than ¼-inch in 10-feet (6mm in 3m).
- F. Flashings: All flashing around windows, at deck attachments, utility penetrations, roof lines, etc. and all kick-out flashing must be properly installed prior to application of Portland cement plaster. Notify owner if flashings are missing, proceed as directed.
- G. Unsatisfactory conditions or concerns shall be reported to the general contractor and/or builder and/or architect and/or owner. Do not proceed until directed in writing by architect or general contractor.

3.02 PREPARATION

- A. Substrate/Framing: inspect all work prior to starting lath and plastering. Notify architect of any issues impacting performance, proceed as directed.
- B. Surrounding Areas: Protect surfaces near the work of this section from damage, disfiguration, and overspray. Mask off all dissimilar materials.

3.03 INSTALLATION, GENERAL

- A. General Installation: Refer to ASTM C926, ASTM C1063, and/or the appropriate manufacturer's product data sheet for additional installation requirements and recommendations.

3.04 INSTALLING WEATHER PROTECTION

- A. Water-Resistive Barrier: Apply water-resistive barrier complying California Building Code. Start at base of wall and overlap flashing flanges and in a "shingle-fashion" by a minimum of two (2) inches horizontal and six (6) inches vertical. Integrate with flashings to insure incidental moisture drains down and weeps out. Reverse laps shall not be allowed.
- B. Window Flashing: Contractor shall inspect and verify the flashing between the window/door and the cement plaster is appropriate for the condition. Notify architect of any concerns.
- C. Flashing: Install flashing and trim per current California Building Code.



3.05 INSTALLING LATH/TRIMS

- A. General: Installed per ASTM C1063 or per Architect's direction. Trims shall be full length and installed plumb/level to within 1/8 inch in eight (8) feet.
- B. Weep screed shall be installed at the base of all framed walls.
- C. Trims shall be attached per the trim manufacturer's instructions; however do not exceed 24 inches on center spacing.
- D. Apply lath per manufacturer's recommendations. Laps shall occur at horizontal and vertical joints. Attach lath six (6) to seven (7) inches on center along framing supports (studs). Fastener shall penetrate wood by a minimum 3/4 inch, penetration of wood based sheathing shall count as 50% of dimensional lumber. Metal framing by a minimum of three (3) full threads and engage the lath.
- E. Lath shall lap the flange of accessories by more than 50%.
- F. Control Joints: Installed per Architects direction. Single-piece control joint may be installed over continuous lath if approved by Building Official and/or Architect. If lath is discontinuous, framing shall support lath terminations. Notify architect of issues or changes.
- G. Expansion Joints: Install per Architect's direction. Two piece joints (expansion) must have lath terminate each side.
- H. Contractor shall honor control or expansion joints in substrates.
- I. Do not mix lath products on same wall.
- J. Avoid excessive laps with expanded metal lath
- K. Do not use rib lath on walls
- L. Use wire nose corner for cement finish, PVC nose for acrylic finish
- M. Lath shall cover more than 75% of solid flanges.

3.06 INSTALLING PORTLAND CEMENT PLASTER

- A. Per ASTM C926, apply Portland cement plaster by hand-troweling or machine-spraying to a nominal thickness of 3/8-inch (9.5mm) for scratch coat. Then apply a second coat to a nominal thickness of 3/8-inch (9.5 mm) brown coat. Total basecoat shall be a nominal 3/4 inch thickness.
- B. Scratch coat shall substantially cover the lath and be applied with sufficient pressure to encase the lath in cement. Slickers to apply cement plaster are prohibited. Score in a horizontal pattern.
- C. Allow to cure 48 hours, or until sufficiently rigid to accept a brown coat.
- D. Apply brown coat to fill and complete basecoat. Nominal 3/4 inch thickness. Rod to a flat plane. Do not apply to frozen or soft scratch coat. When excess moisture leaves brown coat,



hard float to provide densification per ATSM. Hard floating procedure may be omitted if the “Base coat and Mesh or Stucco crack reduction system” is selected.

- E. Moist Curing: Provide sufficient moisture by fog or moist curing to permit proper hydration of the cementitious materials. The length of time and most effective procedure for curing will depend on climatic and job conditions.

3.07 INSTALLING FINISH COAT

- A. General: Mix and apply per manufacturer’s product data sheet.
- B. Do not apply to soft, contaminated or frozen basecoat.
- C. Avoid applying to excessively hot walls.
- D. Verification: Verify the desired color, material and texture to match the approved sample and/or mock-up prior to installation.
- E. Avoid scaffold lines and cold joints
- F. Fog coat (cement finish only) as needed to blend color variations
- G. Finish coat shall be free of eye catching imperfections.

3.08 CLEANING/PATCHING/TOLERANCE

- A. Cleaning: Remove any and all materials used, overspray from adjacent surfaces, and all protective masking.
- B. Patch and repair as needed, including but not limited to fog coating, imperfections and blisters.
- C. The basecoat of plaster shall be in tolerance:
 - 1. Not to exceed ¼ inch in ten (10) feet
- D. Eye catching variations in color or texture pattern will not be accepted.

3.09 PROTECTION

- A. Protection: Protect applied material from inclement weather until dry and prevent it from freezing for a minimum of 24-hours after set and/or until dry. Refer to manufacturer’s product data sheet for additional requirements.

END OF SECTION



SECTION 09 29 00

GYPSUM BOARD

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

1. Gypsum board wall and ceiling systems.
2. Fiberglass-mat faced, moisture and mold resistant gypsum sheathing.
3. Cement Tile Backer Board.

B. Related Requirements:

1. Division 01 - General Requirements.
2. Section 05 41 00 – Cold Formed Metal Framing.
3. Section 07 92 00 - Joint Sealants.
4. Section 09 22 16 - Non-Structural Metal Framing.
5. Section 09 90 00 - Painting and Coating.

1.02 PROJECT REQUIREMENTS

- A. Design Requirements: Provide systems capable of resisting deflection as required by CBC and authorities having jurisdiction.
- B. Regulatory Requirements: Comply with CBC requirements for design and installation.

1.03 SUBMITTALS

- A. Shop Drawings: Submit Shop Drawings indicating complete suspension system including connections, anchorage, and trim features.
- B. Material Samples: Submit 18 inch by 18 inch Samples of the texture coat of gypsum board panels with edges taped.
- C. Product Data: Submit manufacturer's catalog data for each product proposed for installation.



- D. LEED Submittals: Complete the LEED Material Buyout Form (MBoF) with all materials provided to the project. A complete submittal includes providing all material costs in the MBoF and all of the supporting documentation for the following credits:
1. MRc2 - Environmental Product Declarations (EPD): Provide Industry-Wide or Product-Specific EPD.
 2. MRc3 - Sourcing of Raw Materials - Recycled Content: Provide product data for pre- and post- consumer recycled content.
 3. MRc4 - Material Ingredients: Provide manufacturers Declare label, Health Product Declaration (HPD), Cradle to Cradle Certification, or Cradle to Cradle Health Product Certificate.
 4. IEQc2 - Low-Emitting Materials – Interior Wet Applied Products: For paints, coatings, adhesives and sealants applied on site or used for laminating off-site, include product data indicating the VOC content (g/L) and testing.

1.04 QUALITY ASSURANCE

- A. Comply with following as a minimum requirement:
1. ASTM C475 – Standard Specification for Joint Compound and Joint Tape for finishing Gypsum Board.
 2. ASTM C840 - Standard Specification for Application and Finishing of Gypsum Board.
 3. ASTM C919 - Standard Practice for Use of Sealants in Acoustical Applications.
 4. ASTM C1002 - Standard Specification for Steel Self-Piercing Tapping Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs.
 5. ASTM C1047 - Standard Specification for Accessories for Gypsum Wallboard and Gypsum Veneer Base.
 6. ASTM C1177 Standard Specification for Glass Mat Gypsum Substrate for Use as Sheathing.
 7. ASTM C1280 Standard Specification for Application of Gypsum Sheathing.
 8. ASTM C1325 - Standard Specification for Non-Asbestos Fiber-Mat Reinforced Cementitious Backer Units.
 9. ASTM C1396 - Standard Specification for Gypsum Board.
 10. ASTM C1629 - Standard Classification for Abuse-Resistant Nondecorated Interior Gypsum Panel Products and Fiber-Reinforced Cement Panels.



11. ASTM D3273 - Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber.
 12. ASTM D3274 – Standard Test Method for Evaluating Degree of Surface Disfigurement of Paint Films by Microbial (Fungal or Algal) Growth or Soil and Dirt Accumulation.
 13. Underwriters Laboratories (ULI) requirements and listings for fire-rated materials and products classification.
 14. GA 214 - Gypsum wallboard finish shall conform to requirements of GA 214, Application and Finishing of Gypsum Panel Products, published by the Gypsum Association, and as specified herein.
 15. GA 600 - Gypsum wallboard shall conform to requirements of GA 600 Fire Resistance Design Manual, published by the Gypsum Association.
 16. American National Standards for the Installation of Ceramic Tile.
 17. ANSI A118.9 - Specification for Cementitious Backer Units.
- B. Gypsum Association (GA): GA-253 Application of Gypsum Sheathing, ASTM C1280 and the manufacturer’s recommendations.
- C. Qualifications: Installer shall have a minimum 5 years experience in installing and finishing gypsum board.
- D. CHPS Low-Emitting Materials table: Materials submitted must meet the CHPS Low-Emitting criteria and be listed as Low-Emitting on the following web site: www.CHPS.net or be listed on UL website Greenguard.org as Greenguard Gold Certified
- 1.05 DELIVERY, STORAGE AND HANDLING
- A. Deliver materials in original, factory sealed packages, containers or bundles bearing brand name and name of manufacturer.
 - B. Materials shall be kept dry. Gypsum wallboard shall be neatly stacked flat; avoid sagging and damage to edges, ends, and surfaces.
 - C. Fire-rated materials shall have fire classifications numbers attached and legible.
 - D. Provide all means necessary to protect gypsum board systems before, during, and after installation.
 - E. Gypsum wallboard showing any evidence of water damage shall not be installed. Gypsum wallboard showing evidence of water damage after installation shall be removed and replaced.

PART 2 – PRODUCTS



2.01 ACCEPTABLE MANUFACTURERS

- A. Georgia-Pacific.
- B. National Gypsum Co.
- C. U.S. Gypsum Co.
- D. Or equal.

2.02 MATERIALS

- A. Gypsum Board Type X (fire-resistant) or Type C or Type ULIX as required by fire rated design and acoustic requirements: 5/8 inch thick, 4-foot wide and up to 16-foot long conforming to ASTM C1396 with long edges tapered.
- B. Impact Resistant Gypsum Board, Type X (fire-resistant): 5/8 inch thick or Type C as required by fire rated design and acoustic requirements, 4-foot wide and up to 16-foot long complying with the following:
 - 1. Fire resistant rated gypsum core with additives to enhance impact resistance, faced with moisture and mold resistant paper and reinforcing fiber mesh. Comply with ASTM C1629 level 3 hard body impact resistance.
- C. Mold and Water Resistant Gypsum Board, Type X (fire-resistant): 5/8 inch thick 4-foot wide, up to 16-foot long conforming to ASTM C1396 with long edges tapered.
 - 1. Resistance to Mold Growth: Minimum score of “10” when tested in accordance to ASTM D3273 and evaluated in accordance with ASTM D3274.
- D. Fire-Rated Fiberglass-Mat Faced Gypsum Sheathing: Type X; 5/8” inch thick 4-foot wide, up to 16 foot long (if available), square edge, conforming to ASTM C1177. Used for building exterior sheathing.
 - 1. Basis of Design: GP Densglass.
 - 2. Resistance to Mold Growth: Minimum score of “10” when tested in accordance to ASTM D3273.
- E. Cement Tile Backer Board: In addition to manufacturers listed in Article 2.01, James Hardie Building Products Inc.
 - 1. Water resistant panels, 1/4 inch thick on horizontal and ½ inch thick on vertical surfaces, 4-foot wide and up to 8-foot long conforming to one of the following requirements:
 - a. Aggregated Portland cement board with polymer-coated, woven glass-fiber mesh embedded in front and back surfaces.
 - b. Cementitious board surfaced with fiberglass reinforcing mesh on front and back and complying with ANSI A118.9 and ASTM C1325.



2. Tile backer boards shall meet the following requirements:
 - a. Resistance to Mold Growth: Minimum score of “10” when tested in accordance to ASTM D3273 and evaluated in accordance with ASTM D3274.
- A. Metal Trim: Paper-faced metal drywall beads and trim meeting ASTM C1047, as manufactured by USG/Beadex, or equal. Trim units shall be of size and type to fit gypsum board construction and shall include corner beads, casings, edge trim and other shapes indicated and required. Provide 30 year warranty against edge cracking.
- B. Joint Compound for gypsum board products: meeting the following requirements:
 1. Shall conform to ASTM C475.
 2. In areas subject to moisture after installation such as bathrooms and locker areas use setting type joint compound.
 3. Interior areas not subject to moisture after installation use drying Type Joint compound.
- C. Joint Tapes for gypsum boards: Shall conform to ASTM C475.
- D. Joint Tapes for exterior gypsum sheathing: Approved for exterior application or as recommended by gypsum sheathing manufacturer.
- E. Joint mortar and Tape for Cement board.
 - a. Use type as recommended by cement board manufacturer
 - b. Fiberglass tape: Durock brand tile backer tape
 - c. Joint Mortar: Meet ANSI 118.4
- F. Finishing Materials: Texture coat finish material shall be manufactured by U.S. Gypsum, Hamilton, or Highland Stucco and Lime Products, Inc., or equal.
- G. Acoustical Sealant: Non-hardening, non-shrinking, for use in conjunction with gypsum board, as recommended by Board Manufacturer and conforming to ASTM C919. Sealant shall maintain fire and sound rating assembly.
- H. Fasteners:
 1. Self-drilling, self-tapping bugle-head drywall screws; in conformance to ASTM C1002. No. 6 Type S or S12, 1 5/8-inch long for metal framing,
 2. Wood framing: Screws: Type W 1 5/8-inch minimum length for single-layer panels. Screws shall be furnished with a corrosion-resistant treatment.
 3. Adhesive: as recommended by board manufacturer and in compliance to ASTM C557.



2.03 LEED REQUIREMENTS

- A. IW/PS EDP: Products specified under this section must have a Type III Product Specific EPD or the company must be listed in the industry group responsible for the Industry Wide Externally Verified EPD.
- B. PS EPD: Products specified under this section must have a Type III Product Specific EPD.
- C. HPDs: Products specified under this section must have one of the following unexpired material ingredient reports compliant with LEEDv4.1 requirements and declared to 1000 ppm or less: Declare label, Health Product Declaration (HPD), Cradle to Cradle Certification, Cradle to Cradle Health Product Certificate, or UL Product Lens Certification.
- D. Interior Wet Applied Products: All wet-applied on-site paints, coatings, adhesives, and sealants products provided under Part 2 of this specification section must be compliant with the VOC limits outlined under IEQc2: Low Emitting Materials in 01 81 13 Sustainable Design Requirements. In addition, all paints and coatings must be compliant with CDPH Standard Method v1.2-2017 emissions testing with proper unexpired CDPH testing certificates or acceptable third-party certification.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Metal Trim:
 - 1. Provide corner beads at outside corners and angles, metal casing where gypsum board terminates at uncased openings, metal edge trim where board edges abut horizontal and vertical surfaces of other construction.
 - 2. Install trim in accordance with manufacturer's directions with appropriate joint compound. Install trim in longest practical pieces.
- B. Gypsum Board:
 - 1. Install gypsum board in conformance with ASTM C840, fire rated design, and sound rating.
 - 2. Gypsum board shall be cut by scoring and breaking or by sawing, working from face side. Where board meets projecting surfaces it shall be scribed and neatly cut. Unless conditions require otherwise, gypsum board shall be installed first to ceilings, then to walls. End joints shall occur over a support. Install panels of maximum practical length so a minimum number of end joints occur.



3. End joints shall be staggered and joints on opposite sides of a partition shall be arranged to occur on different studs. Joint layout at openings shall be installed so no end joints will align with edges of openings.
 4. Except where specified otherwise, fasteners shall be spaced not less than 3/8 inch from edges and ends of gypsum board. Do not stagger fasteners at adjoining edges and ends.
 5. Install gypsum board vertically or horizontal as permitted by specific UL Design at walls. Fasten board with drywall screws spaced not to exceed 8 inches on centers around perimeter of boards and 8 inches on centers on intermediate studs. Space screws at 8 inches on centers along top and bottom runners. Screws shall be driven to provide screwhead penetration just below gypsum board surface without breaking surface paper. Where electrical outlet and switch boxes are indicated, provide adjustable attachment brackets between studs.
 6. Install gypsum board to ceiling framing with long dimension at right angles to furring channels, or wood framing members, and fasten with specified drywall screws or nails spaced 6 inches to 7 inches on centers across board. Screws or nails shall be not less than 1/2 inch from side joints and 3/8 inch from butt end joints. Abutting end joints shall occur over furring channels and end joints of boards shall be staggered. Support cutouts or openings in ceilings with furring channels.
 7. Install access doors, furnished under another section, in correct location, plumb, or level, flush with adjacent construction, and securely fastened to framing.
- C. Fire-Rated Fiberglass-Mat Faced Gypsum Sheathing:
1. General: Installation shall be in accordance with GA-253, ASTM C1280 and the manufacturer's recommendations.
 2. Edges of gypsum sheathing joints shall be covered with a water-resistive barrier or shall be sealed.
- D. Cement Board Backer System:
1. In shower areas, install water barrier in shingle-like manner to prevent water infiltration into stud cavity. Pre-cut all board to required sizes and make necessary cut-outs.
 2. Install cement board in accordance with UL Design and SA-932. Install Cement board plumb and flat. Shim behind board as required.
 3. Fasten cement board to steel studs spaced max. 16" o.c. and bottom runners with cement board fasteners spaced 8" o.c. maximum with perimeter fasteners at least 3/8" and less than 5/8" from ends and edges. Studs shall be not less than 20 gage.



4. Tape joints with cement board tape and joint mortar. Finished surface shall be level within 1/8" in 10".

3.02 TOLERANCES

- A. System shall appear flat and monolithic with no exposed joints.

3.03 JOINT TREATMENT AND FINISHING

*At completion of specified taping and finishing, install one coat of drywall primer as specified hereafter

- B. Levels: Install tape bedding compound, tape, and finishing cement on joints in wallboard as required for specified levels of finish.

- C. Levels 2 through 5:

1. Install joint cement and finishing cement over screw heads. Treat all inside corners with joint cement, tape, and finishing cement. Treat outside corners with corner beads and finishing cement.
2. Provide metal casing beads at all edges of gypsum wallboard, which abut ceiling, wall, or column finish, and elsewhere as required, such as openings, offsets, etc. Install all exposed joints, trims, and attachments non-apparent following installation of paint or other finishes. If joints and fasteners are visibly apparent, correct defects as required.
3. Seal raw edges of plumbing openings and boards that have been cut to fit with sealing compound brushed on.
4. When entire installation is completed, correct and repair broken, dented, scratched or damaged wallboard before installation of finish materials by other trades.

- D. Levels 3 and 4: Install one coat of drywall primer over entire surface prior to painting.

- E. Level 5: Install one coat of skim coat over entire surface, followed by one coat of drywall primer over entire surface prior to painting.

3.04 REQUIRED LEVELS OF FINISH

- A. Finishes shall conform to GA 214

- B. Unless otherwise indicated or specified, levels of finish required shall be as follows:

1. Level 1: Plenum areas above ceilings, insides of shafts, and other concealed areas. Taping to be as required for fire rated assemblies.
2. Level 2: Water-resistant wallboard backing for high moisture areas to be covered with a water resistant surface other than tile, vinyl or paint, i.e stainless steel cladding etc.



3. Level 3: Backing for vinyl wall covering and adhered acoustic tile. Also, provide where textured finish is indicated.
4. Level 4: Exposed painted wallboard in classrooms, utility rooms, and similar spaces not requiring Level 5 finish.
5. Level 5: Exposed, painted wallboard in offices and corridors.

3.05 CLEAN-UP

- A. Remove rubbish, debris, and waste materials and legally dispose of off Project site.

3.06 PROTECTION

- A. Protect Work of this section until Substantial Completion.

END OF SECTION



SECTION 09 30 13

TILING

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

1. Ceramic tile, waterproof membrane for tile, stone thresholds, thin set mortar, and mortar setting beds for floor and wall tile.

B. Related Requirements:

1. Division 01 - General Requirements.
2. Section 03 30 00 - Cast-In-Place Concrete.
3. Section 07 92 00 - Joint Sealants.
4. Section 08 11 13 – Hollow Metal Doors Frames.
5. Section 08 31 16 – Access Panels and Frames.
6. Section 09 29 00 - Gypsum Board.

1.02 SUBMITTALS

A. Product Data: Manufacturer's product data, standard specifications, Safety Data Sheets, and other technical information for each product specified.

B. Material Samples: Manufacturer's standard palette, indicating full range of tile colors, textures, and grout colors.

C. Mock-Ups: For each type, color, and texture, minimum one foot square or three full tile courses, on Plexiglas to demonstrate proper bond mortar and coverage; grout color, hardness and depth.

D. Manufacturer's Instructions:

1. Manufacturer's preparation and installation instructions.
2. Maintenance instructions.

E. Product Certificates: Signed by manufacturer certifying that products furnished comply with requirements of this Specification.



- F. LEED Submittals: Complete the LEED Material Buyout Form (MBoF) with all materials provided to the project. A complete submittal includes providing all material costs in the MBoF and all of the supporting documentation for the following credits:
1. MRc2 - Environmental Product Declarations (EPD): Provide Industry-Wide or Product-Specific EPD.
 2. MRc3 - Sourcing of Raw Materials - Recycled Content: Provide product data for pre- and post- consumer recycled content.
 3. MRc4 - Material Ingredients: Provide manufacturers Declare label, Health Product Declaration (HPD), Cradle to Cradle Certification, or Cradle to Cradle Health Product Certificate.
 4. IEQc2 - Low-Emitting Materials – Interior Wet Applied Products: For paints, coatings, adhesives and sealants applied on site or used for laminating off-site, include product data indicating the VOC content (g/L) and testing.

1.03 REFERENCES

- A. American National Standards Institute (ANSI)
1. A108, Specifications for the Installation of Ceramic Tile.
 2. ANSI A118, Ceramic Tile Installation Materials.
 3. ANSI A137.1, Standard Specifications for Ceramic Tile.
- B. ASTM International:
1. ASTM A1064 - Standard Specification for Carbon Steel and Welded Wire Reinforcement, Plain and Deformed, for Concrete.
 2. ANSI A326.3 - Test Method for Dynamic Coefficient of Friction of Hard Surface Flooring Materials.
 1. ASTM C185 - Standard Test Method for Air Content of Hydraulic Cement Mortar.
 2. ASTM C144 - Standard Specification for Aggregate for Masonry Mortar.
 3. ASTM C150 - Standard Specification for Portland Cement.
 4. ASTM C206 - Standard Specification for Finishing Hydrated Lime.
 5. ASTM C207 - Standard Specification for Hydrated Lime for Masonry Purposes.
 6. ASTM C241 - Standard Test Method for Abrasion Resistance of Stone Subjected to Foot Traffic.
 7. ASTM C503 - Standard Specification for Marble Dimension Stone.



8. ASTM C920 - Standard Specification for Elastomeric Joint Sealants
 9. ASTM D226 - Standard Specification for Asphalt-Saturated Organic Felt Used in Roofing and Waterproofing.
- C. Tile Council of North America (TCNA) – Current edition of “Handbook for Ceramic, Glass and Stone Tile installation”.
- D. CHPS Low-Emitting Materials Table: Materials submitted for tile assemblies shall be listed as low emitting on the CHPS website www.CHPS.net.
- 1.04 QUALITY ASSURANCE
- A. Qualifications:
1. Tile Manufacturer: Company specializing in ceramic tile, mosaics, pavers, trim units, and thresholds with five years minimum experience.
 2. Installation System Manufacturer: Company specializing in installation systems/ mortars, grouts/ adhesives with ten years minimum experience.
 3. Installer: Company specializing in installation of ceramic tile, mosaics, pavers, trim units and thresholds with five years experience with installations of similar scope, materials, and design.
- E. Environmental Requirements: Adhesives, primers, caulk, sealants and liquid applied products shall be approved by the City, acceptable to the SB County Department of Public Health, and meet the technical requirements specified in this Section.
- F. Grade Certificate and Labeling: With each delivery of tile, furnish manufacturer’s “Master Grade Certificate” to the OAR.
- B. Source of Materials: Provide materials obtained from one source for each type and color of tile, grout, and setting materials.
- C. Consistent Quality: Products shall be consistent in appearance and physical properties.
- D. Comply with requirements of California Building Code and ADAAG.
- 1.05 PRE-CONSTRUCTION MEETINGS:
- A. Prior to start of Work of this section and after approval of submittals, schedule an on-site meeting between CONTRACTOR, OAR, Project Inspector, and representatives of the material manufacturer and tile installer to review construction conditions and Drawings for conformance with the requirements of this Section for each substrate.
- 1.06 DELIVERY, STORAGE AND HANDLING



- A. Deliver tile and other materials in sealed containers, with manufacturer's labels intact.
- B. Store materials in clean, dry and secure areas.

1.07 MAINTENANCE

- A. Extra Materials: Provide the following in labeled manufacturers' cartons:
 - 1. Five percent of each type and color of tile installed.
 - 2. Ten linear feet of coved base and bullnose tile for each color installed.
 - 3. Six units of each type and color of corner pieces.

1.08 WARRANTY

- A. Manufacturer shall provide a five year material warranty. Installer shall provide a five year installation warranty.
- B. For waterproofing, manufacturer shall provide a 10 year material warranty for waterproofing installation, tile setting, and grouting materials.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Tile: Standard Grade Products from the following manufacturers conforming to ANSI A137.1:
 - 1. Dal-Tile Corporation.
 - 2. American Olean Company.
 - 3. Florida Tile, Inc.
 - 4. Equal.
- B. Installation Materials: Products and methods of the following manufacturers conforming to ANSI A137.1:
 - 1. Laticrete International, Inc.
 - 2. Custom Building Products.
 - 3. MAPEI.
 - 4. Siena Tile and Stone Installation Products.



5. Equal.

2.02 MATERIALS

- A. Colors, Textures, and Patterns: Tile shall be from manufacturer's standard product line as selected by Architect. Tile trim and accessories shall match adjoining tile. Grout color shall match tile unless otherwise indicated.
- B. Tile sizes: Tile sizes specified are modular dimensions unless otherwise indicated.
- C. Portland cement mortar bed for floor, walls and shower areas:
 - 1. Laticrete International, Inc., 3701 Fortified Mortar.
 - 2. Custom Building Products, Quickrete Floor Mud.
 - 3. MAPEI, Modified Mortar Bed.
- D. Latex Portland cement bond mortar thin-set for tiles under 15" in one dimension on floor installations:
 - 1. Laticrete International, Inc., 254 Platinum.
 - 2. Custom Building Products, Porcelain Tile Professional Thin Set Mortar.
- E. Latex Portland cement bond mortar thin-set for tiles over 15" in one dimension on floors. For all tile on wall installations:
 - 1. Laticrete International, Inc., Tri-Lite.
 - 2. Custom Building Products, ProLite Premium LFT Mortar.
 - 3. MAPEI, UltraLite Mortar.
- F. Waterproof Membrane: Cold-applied, single component liquid with embedded reinforcing fabric where recommended by manufacturer: Laticrete International, Inc. Hydro Ban Waterproof Membrane, Custom Building Products Red Guard Waterproof Membrane, or MAPEI Mapelastix Aqua Defense.
- G. Reinforcing Wire Fabric: 2-inch by 2-inch, 16 by 16 gage, galvanized electrically welded wire reinforcing, per ASTM A1064.
- H. Latex Portland Cement Grout: Laticrete International, Inc. Sanded Grout (1500 Series), Custom Polyblend Sanded Grout, Laticrete International, Inc. Unsanded Grout 1600 Series (for joints smaller than 1/8"), Custom Polyblend Unsanded Grout, or MAPEI Ultracolor Plus FA.



- I. Cleavage Membrane and Wall Backing Paper: Cleavage membrane shall be 15-pound asphalt-saturated felt manufactured according to ASTM D226 Standard Specification for Asphalt-Saturated Organic Felt Used in Roofing and Waterproofing.
- J. Separation Material (for all sealed joints including perimeters): Quality Foam, QF 200 white, 3/8 inch wide by 5-inch high.
- K. Backer Rod for sealants (for ceramic mosaic fields): Polyethylene foam, closed-cell, flexible and compressible, 3/16 inch diameter.
- L. Cleaner and Sealer:
 1. Cleaner and sealer shall be from one manufacturer, acceptable to tile and grout manufacturers. To establish quality, the Specification is based on Aqua Mix Inc. Equivalent products from Miracle Sealants Co., Watco Tile and Brick, MAPEI, or equal may be provided.
 2. Cleaner: Aqua Mix Concentrated Tile Cleaner, neutral phosphate-free cleaner, Custom Building Products Tile Lab Concentrated Tile and Stone Cleaner, or Mapei Ultracare cleaner.
 3. Sealer: Aqua Mix Penetrating Sealer, fungus- and bacteria-resistant, stain-resistant, and slip-resistant as specified for tile, Custom Building Products Tile Lab Surface Gard, Mapei Ultracare, or equal.
- M. Sealants:
 1. Sealant and primer shall be from one manufacturer, acceptable to tile and grout manufacturers. See Section 07 9200 - Joint Sealants.
 2. Ceramic Mosaic Tile: One-Part, Mildew-Resistant Silicone Sealant: ASTM C920; Type S; Grade NS; Class 25; Uses NT, G, A, and, as applicable to nonporous joint substrates indicated, O; formulated with fungicide, intended for sealing interior ceramic tile joints and other nonporous substrates that are subject to in-service exposures of high humidity and extreme temperatures.

2.03 TILE

- A. Unglazed Porcelain Floor Tile:
 1. Size: As indicated in drawings.
 2. Colors and patterns as selected by Architect from price groups specified.
 3. Slip Resistance: Resistant to slipping appropriate to the installed conditions of use, as required by the California Building Code, ADAAG, ANSI 137.1 and TCNA.



- B. Wall Tile:
 - 1. Size: As indicated in drawings
 - 2. Colors and patterns as selected by Architect from price groups specified.
- C. Trim:
 - 1. Integral bullnose at external corners.
 - 2. Provide bullnose where tile projects from jamb.
 - 3. Tile base with wall tile above
 - 4. Bullnose at wainscot.
- D. Stone Thresholds:
 - 1. Exterior installation: Marble thresholds with minimum abrasive hardness value of 10 tested in accordance with ASTM C241.
 - 2. White honed marble complying with Marble Institute of America Group "A," unless other color indicated and ASTM C503.
 - 3. Size and profile shaped to provide transition between tile surfaces and adjoining finished floor surfaces, or as indicated. Width not less than 4 inches. Edges beveled on a slope of no greater than 1:2. Cut to fit door frame profile.

2.04 LEED REQUIREMENTS

- A. IW/PS EDP: Products specified under this section must have a Type III Product Specific EPD or the company must be listed in the industry group responsible for the Industry Wide Externally Verified EPD.
- B. PS EPD: Products specified under this section must have a Type III Product Specific EPD.
- C. HPDs: Products specified under this section must have one of the following unexpired material ingredient reports compliant with LEEDv4.1 requirements and declared to 1000 ppm or less: Declare label, Health Product Declaration (HPD), Cradle to Cradle Certification, Cradle to Cradle Health Product Certificate, or UL Product Lens Certification.
- D. Interior Wet Applied Products: All wet-applied on-site paints, coatings, adhesives, and sealants products provided under Part 2 of this specification section must be compliant with the VOC limits outlined under IEQc2: Low Emitting Materials in 01 81 13 Sustainable Design Requirements. In addition, all paints and coatings must be



compliant with CDPH Standard Method v1.2-2017 emissions testing with proper unexpired CDPH testing certificates or acceptable third-party certification

PART 3 - EXECUTION

3.01 EXAMINATION AND PREPARATION

- A. Examine substrates and conditions for compliance with installation requirements. Verify that all penetrations through substrate have been installed. Proceed with Work only after all conditions are in compliance.
- B. Substrates shall be firm; dry; clean and within flatness tolerances required by relevant ANSI A108 tile installation standards. Prepare surfaces as follows:
 - 1. Concrete Floors: Allow concrete floors to cure for 28 days minimum before beginning tile and grout installation. Remove laitance, sand, dust, and loose particles.
- C. Substrates to receive wall tile and base shall be:
 - 1. Scratch coat of cement plaster, as specified in Section 09 24 23 - Cement Plaster and Metal Lath (required in restrooms, showers and locker rooms).
 - 2. Cementitious backing panels, as specified in Section 09 29 00 - Gypsum Board.
- D. Verify that installation of grounds, anchors, recessed frames, electrical and mechanical items of Work, and similar items located in or behind tile has been completed before installing tile.
- E. Verify that joints and cracks in tile substrates are coordinated with caulked-joint locations; if not coordinated, adjust as required by the ARCHITECT.
- F. Do not install tile until construction in spaces is completed and ambient temperature and humidity conditions are maintained in compliance with referenced standards and manufacturer's written instructions.
- G. Protect adjacent surfaces during progress of Work of this section.

3.02 TILE INSTALLATION, GENERAL

- A. Install tile in grid pattern, unless otherwise indicated. Align joints when adjoining tiles on floor, base, walls, and trim are same size. Center the tile fields in both directions for each space or on each wall area. Adjust to minimize tile cutting. Provide uniform joint widths, unless otherwise indicated.



- B. For tile mounted in sheets: Joints between tile sheets shall be the same width as joints within tile sheets.
- C. Extend Work into recesses and under or behind equipment and fixtures to form a complete covering without interruptions, unless otherwise indicated. Terminate Work neatly at obstructions, edges, and corners without disrupting pattern or joint alignments.
- D. Accurately form intersections and returns. Perform cutting and drilling of tile without damaging tile. Carefully grind the cut edges of tile abutting trim, finish, or built-in items. Fit tile closely to electrical outlets, piping, fixtures, and other penetrations so plates, collars, or covers overlap tile.
- E. Locate joints, directly above joints in concrete substrates, at horizontal and vertical changes in plane, or where indicated during installation of mortar beds. Provide 3/8-inch wide foam at joints. Do not saw-cut joints after installing tiles.
- F. Prepare and clean joints to be sealed. Apply sealants to comply ASTM C920 with requirements of Section 07 9200 - Joint Sealants.
- G. Conform to manufacturers printed instructions, and applicable requirements of ANSI and TCNA Standards.

3.03 TILE INSTALLATION, FLOOR

- A. Install reinforcing and latex Portland-cement mortar setting bed over cured concrete slab or cleavage membrane on plywood floor. Lap reinforcing at least one full mesh, and support or lift so that it is approximately in the middle of mortar bed. Do not abut against vertical surfaces. Install foam separation material at perimeters and expansion joint locations for caulked joints.
- B. Mix setting mortar in accordance with ANSI recommendations and ASTM C185.
- C. Once begun, mortar installation shall continue until room is completed. Discard any batch not floated and finished within ½ hour of mixing. Firmly compact before screeding. Screed to true plane and pitch as indicated. Slope mortar bed sufficiently that water flows to drain and no puddling will occur. Slope mortar down to floor drains for proper installation of waterproof membrane. After screeding, firmly rub down with steel or wood float.
- D. Cure mortar bed with a light fog spray of water and cover with 6-mil Visqueen for 72 hours.
- E. Install tile on floors with the following joint widths:
 - 1. Ceramic Mosaic Tile: 1/16 to 1/8 inch.
 - 2. Paver Tile: 3/16 to 3/8 inch.



3.04

TILE INSTALLATION, WALLS

- A. Install wall mortar beds before floor mortar beds.
- B. On plaster walls, clean scratch coat surface of loose or foreign materials, fog spray with water, and install brown coat mortar bed over scratch coat to a thickness not less than 3/8 inch and not greater than 3/4 inch. Once started, wall mortar installation shall continue until wall is completely floated. Discard any batch not floated and finished within a half an hour of mixing. As soon as wall mortar is dried to sufficient hardness, but still plastic, firmly rub with wood float.
- C. Cover cure with 40-weight Kraft paper for 72 hours minimum.
- D. Install tile over properly cured setting bed, waterproof membrane, or cementitious backing panels utilizing "thin-set" method with latex portland cement bond mortar, in accordance with manufacturer's printed instructions and ANSI A108.5. Confirm substrate is completely clean and free of dust. Ensure that bond coats do not intrude into joints to be caulked.
- E. Minimum coverage of bond mortar shall be 80 percent except 95 percent in shower areas or exterior installations. Set and test as specified for floors.
- F. Lay out Work so tiles will be centered on each wall or section of wall in order to minimize tile cuts. Lay out tile wainscots to next full tile beyond dimensions indicated. Spot setting bed with mortared tile, set plumb and true, accurately indicate plane of finished tile surfaces.
- G. Install tile on walls with following joint widths:
 - 1. Glazed Wall Tile: 1/16 inch.
 - 2. Ceramic Mosaic Tile: 1/16 to 1/8 inch.
 - 3. Special Large Tile: 3/16 to 3/8 inch.
- H. Horizontal joints shall be level, vertical joints plumb with surfaces true and plumb, edges of tiles flushed.
- I. Rub exposed cuts smooth with a fine stone; no cut edge shall be set against a fixture or adjoining surface without a 1/16 inch joint to be caulked.
- J. Install access doors where required, furnished under another section, in correct location, plumb or level, flush with adjacent construction, and securely fastened to framing.

3.05

THIN SET METHOD

- A. Confirm substrate is completely clean and free of dust. Cut foam at floor perimeters flush with top of mortar bed. Ensure that bond coats do not intrude into joints to be



sealed. Install tile over properly cured setting bed or waterproof membrane utilizing "thin-set" method with latex portland cement bond mortar, in accordance with manufacturer's printed instructions and ANSI A108.5.

- B. Minimum coverage of bond mortar shall be 80 percent except 95 percent in shower areas and exterior installations. Place tile into fresh mortar press tile to ensure full contact. Before setting proceeds, set and remove three tiles or sheets of tiles to confirm specified coverage of bond mortar. If coverage is insufficient, utilize a larger toothed trowel or back butter tiles until proper coverage is provided.

3.06 GROUTING

- A. Prior to starting, ensure that all tile surfaces are clean and excessive bond mortar is scraped and vacuumed from joints (approximately 2/3 depth of tile should be open for grouting). Follow manufacturer's instructions for mixing grout. Once grout Work commences, proceed until complete wall or floor area is finished utilizing one batch of grout.
- B. Latex portland cement grouting: Dampen tile surface and joints with water using sponge but leaving no puddles in joints. Force grout into joints using sufficient pressure on rubber float so as to fill joints completely and scrape excess grout off tile surface with rubber float. Smooth or tool grout to uniform joint finish. Do not over water.
- C. Curing latex Portland cement grout: Remove final grout haze with clean soft cloth, and cover with 40-weight Kraft paper to cure. Leave paper in place for protection. Cover wall surfaces with 40-weight Kraft paper for 72 hours.

3.07 CLEANING AND SEALING

- A. If grout scum is not visible on tile surface after curing, clean tile surface with clear water. Remove and replace cracked, broken or defective Work with proper material.
- B. If, when curing membrane is removed, grout scum is visible on tile surface, use the following cleaning method:
 - 1. Immediately recover floor with paper or felt and allow to continue curing for a minimum of 14 days; uncover floor and maintain entire tile surface saturated with clean cool water for not less than two hours.
 - 2. Utilize a neutral cleaner acceptable to manufacturers of tile and grout and follow manufacturer's instruction. Do not provide generic acid cleaners.
 - 3. Wet tile floors and apply cleaning solution to floor surface, then scrub with a brush. Rinse area several times with clean water to flush solution off floor surface.



- C. Apply penetrating sealer in accordance with manufacturer's instructions utilizing a dense sponge applicator, paint pad, sprayer or brush. Avoid overlapping, puddling, and rundown. Completely wipe surface dry within 3 to 5 minutes using cotton or paper towels; do not allow sealer to dry on tile. After two hours, test surface by applying water droplets to surface. If water is absorbed, apply a second coat. Avoid surface traffic for 24 hours.

3.08 SEALANTS

- A. Ensure joints to be sealed are free of setting and grouting materials and construction debris. Do not permit any foot traffic on installed sealants for a minimum of 48 hours or protect with hardboard strips.
- B. Install in accordance with Section 07 92 00 - Joint Sealants.

3.09 PROTECTION

- A. Admit no traffic where tile is installed until mortar and grout has set for a minimum of 72 hours.
- B. Protect Work of this section until Substantial Completion.

3.10 CLEAN UP

- A. Remove rubbish, debris, and waste material and legally dispose of off the Project site.

END OF SECTION



SECTION 09 51 13

ACOUSTICAL PANEL CEILINGS

PART 1 – GENERAL

1.01 SUMMARY

A. Section Includes:

1. Lay-in acoustical ceiling systems and metal suspension system.

B. Related Requirements:

1. Division 01 - General Requirements.
2. Section 09 22 16 - Non-Structural Metal Framing.
3. Section 09 29 00 - Gypsum Board.
4. Division 23 - HVAC.
5. Division 26 - Electrical.

1.02 QUALITY ASSURANCE

- A. Ceiling systems shall consist of lay-in acoustical ceiling panels by a single manufacturer and suspension systems by a single manufacturer for the entire project.

- B. Qualifications of Installer: Minimum five years experience in installing acoustical ceiling systems of the types specified.

C. Design Criteria:

1. Deflection of finished surface to 1/360 of span or less.
2. 1/8 inch maximum permissible variation from true plane measured from 10 foot straightedge placed on surface of finished acoustical fiber units.

D. Requirements of Regulatory Agencies:

1. Conform to CBC requirements and UL - Tunnel Test for Fire Hazard Classification of Building Materials.
2. CISCA: Acoustical Ceilings Use and Practice.
3. Division of the State Architect: Comply with requirements of IR 25-2.10.

E. American Society for Testing and Materials (ASTM):

1. ASTM A641 - Standard Specification for Zinc-Coated (Galvanized) Carbon Steel Wire.



2. ASTM A653 - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
 3. ASTM C423 - Standard Test Method for Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method.
 4. ASTM C635 - Standard Specification for the Manufacture, Performance, and Testing of Metal Suspension Systems for Acoustical Tile and Lay-in Panel Ceilings.
 5. ASTM C636 - Standard Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-In Panels.
 6. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
 7. ASTM E580 – Standard Practice for Installation of Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels in Areas Subject to Earthquake Ground Motions.
 8. ASTM E1264 - Standard Classification for Acoustical Ceiling Products.
 9. ASTM E1414 - Standard Test Method for Airborne Sound Attenuation Between Rooms Sharing a Common Ceiling Plenum.
 10. ASTM E1477 - Standard Test Method for Luminous Reflectance Factor of Acoustical Materials by Use of Integrating-Sphere Reflectometers.
- F. American Society of Civil Engineers (ASCE):
1. ASCE 7 - Minimum Design Loads for Buildings and Other Structures, as amended by CBC 1615A.1.16.
- G. CHPS Low-Emitting Materials Table: Materials submitted must be listed as low emitting on the CHPS website, www.CHPS.net,

1.03 SUBMITTALS

- A. Samples:
1. Lay-in panels of each specified type, 6-inch by 6-inch minimum size.
 2. Suspension System: 12-inch long samples of suspension system members, connections, moldings and wall angles, for each color specified.
- B. Shop Drawings:
1. Indicate complete plan layouts and installation details.
 2. Indicate related Work of other sections which is installed in, attached to, or penetrates ceiling areas, such as air distribution and electrical devices.
- C. Product Data:



1. Suspension System for Lay-in Ceiling: Printed data for suspension system components, including load tests, indicating conformance to specified tests and standards.
 2. Acoustical units: Printed data indicating conformance to specified tests and standards.
- D. Maintenance Materials: Provide extra panels equal to 1 percent of the area of each typical module size of acoustical panel, but not less than 8 of each specified size, style and color.
- E. LEED Submittals: Complete the LEED Material Buyout Form (MBoF) with all materials provided to the project. A complete submittal includes providing all material costs in the MBoF and all of the supporting documentation for the following credits:
1. MRc2 - Environmental Product Declarations (EPD): Provide Industry-Wide or Product-Specific EPD.
 2. MRc3 - Sourcing of Raw Materials - Recycled Content: Provide product data for pre- and post- consumer recycled content.
 3. MRc4 - Material Ingredients: Provide manufacturers Declare label, Health Product Declaration (HPD), Cradle to Cradle Certification, or Cradle to Cradle Health Product Certificate.
 4. IEQc2 - Low-Emitting Materials – Interior Wet Applied Products: For paints, coatings, adhesives and sealants applied on site or used for laminating off-site, include product data indicating the VOC content (g/L) and testing certificates or third party certification demonstrating compliance with California Department of Public Health (CDPH) v1.2-2017 emissions testing.
 5. IEQc2 - Low-Emitting Materials – Ceilings: Provide testing certificates or third-party certification demonstrating compliance with CDPH v1.2-2017 emissions testing.

1.04 DELIVERY, STORAGE AND HANDLING

- A. Deliver materials to the Project site in original sealed packages.
- B. Storage: Store materials in building area where they will be installed, in original package. Keep clean and free from damage due to water or deteriorating elements.
- C. Handle in a manner to prevent damage during storage and installation.

1.05 PROJECT CONDITIONS

- A. Installation of acoustical ceiling system shall not begin until the building is enclosed, permanent heating and cooling is in operation, and residual moisture from plaster and concrete work has dissipated. Building areas to receive ceilings shall be free of construction dust and debris.
- B. Environmental Requirements: Maintain temperature in space at 55 degrees F or above for 24 hours before, during, and after installation of materials.



C. Scheduling:

1. Before concealing Work of other sections, verify required tests and inspections have been completed.
2. Coordinate with related Work of other sections. Coordinate location and symmetrical placement of air distribution devices, electrical devices, and penetrations with related Work section.

1.06 WARRANTY

- A. Manufacturer shall provide a 10 year material warranty.
- B. Installer shall provide a two year fabrication and installation warranty.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. USG Corporation.
- B. Armstrong World Industries.
- C. CertainTeed Ceilings Corp.
- D. Equal.

2.02 SUSPENSION SYSTEM

- A. Metal suspension system for acoustical lay-in tile shall be hot-dipped galvanized steel conforming to ASTM A653. Main beams and cross tees shall be double-web steel construction with exposed flange design, with factory punched cross tee slots, hanger holes and integral couplings.
- B. Metal suspension system for acoustical lay-in tile shall conform with ASTM C635, C636 and E580 and section 13.5.6 of ASCE 7, as amended by CBC Section 1615A.1.16, for installation in high seismic areas.
- C. Structural classification of suspension systems shall be heavy-duty in conformance to ASTM C635.
- D. Vertical Strut: USG Donn Compression Post, or equal, or as indicated; types and designs complying with requirements of authorities having jurisdiction and seismic Zones D, E and F requirements. Provide base attachment clip for connection of vertical strut to main beams.
- E. Wall Molding: Fabricated from galvanized steel with 2-inch horizontal leg and hemmed edges, same finish as main and cross tees.



- F. Spacer/Stabilizer Bars: Provide for tying together the ends of main runners and cross tees that are not attached to wall molding.
- G. Hanger Wire: 0.106 inch diameter (0.144 inch diameter for pendant fixtures), galvanized soft annealed mild steel wire as defined in ASTM A641, Class 1 coating.
- H. Provide attachment devices and any other required accessories for a complete suspended ceiling system installation.

2.03 ACOUSTICAL CEILING PANELS

- A. Acoustical ceiling panels shall be class A in accordance to ASTM E1264.
- B. Acoustical panels shall meet the following surface-burning characteristics when tested in accordance to ASTM E84 for Class A materials:
 - 1. Maximum Flame Spread: 25.
 - 2. Maximum Smoke Developed: 50.
- C. Mold and Mildew Resistance: Panels and faces shall be treated with a biocide paint additive or an antimicrobial solution to inhibit mold and mildew.

2.04 CEILING TYPES

- A. ACT 1:
 - 1. Acoustical Ceiling Panels:
 - a. Panel Name: Armstrong Ultima 1912 USG Mars ClimaPlus 86985, CertainTeed Symphony M #1222BF-OVT-1, or equal.
 - b. Panel Size: 2-foot by 2-foot.
 - c. Panel Thickness: 3/4 inch.
 - d. Edge Detail: Beveled tegular.
 - e. Light Reflectance: 0.89 minimum, in accordance with ASTM E1477.
 - f. CAC: Minimum 35, UL Classified, complying with ASTM E1414.
 - g. NRC: Minimum 0.70, UL Classified, complying with ASTM C423.
 - h. Color: White.
 - i. Recycled Content: 74 percent minimum.
 - 2. Suspension System:
 - a. Suspension System Name: Silhouette XL by Armstrong, Fineline by USG, 4500 Ultraline Series by Chicago Metallic Corporation, or equal.
 - b. Color: White.

2.03 LEED REQUIREMENTS



- A. IW/PS EDP: Products specified under this section must have a Type III Product Specific EPD or the company must be listed in the industry group responsible for the Industry Wide Externally Verified EPD.
- B. PS EPD: Products specified under this section must have a Type III Product Specific EPD.
- C. HPDs: Products specified under this section must have one of the following unexpired material ingredient reports compliant with LEEDv4.1 requirements and declared to 1000 ppm or less: Declare label, Health Product Declaration (HPD), Cradle to Cradle Certification, Cradle to Cradle Health Product Certificate, or UL Product Lens Certification.
- D. Interior Wet Applied Products: All wet-applied on-site paints, coatings, adhesives, and sealants products provided under Part 2 of this specification section must be compliant with the VOC limits outlined under IEQc2: Low Emitting Materials in 01 81 13 Sustainable Design Requirements. In addition, all paints and coatings must be compliant with CDPH Standard Method v1.2-2017 emissions testing with proper unexpired CDPH testing certificates or acceptable third-party certification.
- E. Ceiling: All ceiling products provided under this specification section must be compliant with CDPH Standard Method v1.2-2017 emissions testing with proper unexpired CDPH testing certificates or acceptable third-party certification.

PART 3 - EXECUTION

3.01 PREPARATION

- A. Furnish layouts for inserts, clips or other supports and struts required to be installed by the Work of other trades that depend on the suspended ceiling system for support.
- B. Coordinate related Work to ensure completion prior to installation of clips or fasteners.
- C. Compare layouts with construction conditions. Tile shall be spaced symmetrically about the centerlines of the room or space, and shall start with a tile or joint line as required to avoid narrow tiles at the finish edges unless indicated otherwise. Joints shall be tight with joint lines straight and aligned with the walls. Ceiling moldings shall be provided where tile abuts wall with matching caulking to eliminate any space.

3.02 INSTALLATION OF SUSPENSION SYSTEMS

- A. General:
 - 1. Install suspension system in accordance with ASTM C636 and ASTM E580.
 - 2. System shall be complete; with joints neatly and tightly joined and securely fastened; suspension members shall be installed in a true, flat, level plane.
 - 3. Hanger Wires: 0.106 inch diameter minimum; larger sizes as indicated or required.



- a. Fasten wires to panel points and structure above per most stringent requirements of fabricator and CBC and as indicated on Drawings.
 - b. Wires exceeding 1:6 out-of-plumb shall be braced with counter-sloping wires.
 - c. Maintain wires at least 6 inches from non-braced ducts, pipes, conduits, and other items.
 - d. Install wire along main runners at 4 feet on center. Terminal ends of each main runner and cross tee must be supported within 8 inches of each wall with a perimeter wire or within one-fourth (1/4) of the length of the end tee, whichever is least, for the perimeter of the ceiling area.
 - e. Where obstructions prevent direct suspension, provide trapezes or equivalent devices; 1 1/2-inch minimum cold rolled channels back to back may be installed for spans to 6 feet maximum.
 - f. Wire shall be straight, without extraneous kinks or bend. Hanger wire connections must be capable of carrying a 200 - pound pull without stretching or shifting the suspension clip.
4. Bracing Wires to Resist Seismic Forces: 0.106 inch diameter minimum, larger sizes as indicated or required.
- a. System for Bracing Ceilings: Lay-In Ceiling Systems: Install one four-wire set of sway-bracing wires and a vertical strut for each 144 square feet maximum of ceiling area. Locate wire-sets and struts at 12 feet maximum on center. At ceiling perimeters, wire-sets shall be installed within 6 feet of walls.
 - b. Install four-wire sets and struts within 2 inches of cross-runner intersection with main runner; space wires 90 degrees from each other.
 - c. Do not install sway bracing wires at an angle greater than 45 degrees with the ceiling plane.
 - d. Wires shall be tight, without causing ceiling to lift.
 - e. Fasten struts in accordance with CBC requirements.
 - f. Maintain wires at least 6 inches from non-braced ducts, pipes, conduit, and other items.
5. Provide additional wires, 0.106 inch diameter minimum, necessary to properly support suspension at electrical devices, air distribution devices, vertical soffits, and other concentrated loads.
6. Suspension:
- a. Suspension members shall be fastened to two adjacent walls per ASTM 580; but shall be at least 3/4 inches minimum clear of other walls.



- b. Any suspension members not fastened to walls shall be interconnected to prevent spreading, near their free end, with a horizontal metal strut or stabilizer bar or 0.064 inch diameter taut tie wire.
 - c. Provide additional tees or sub-tees to frame openings for lights, air distribution devices, electrical devices, and other items penetrating through ceiling, which do not have an integral flange to support and conceal cut edges of acoustic panels. Provide cross bracing necessary to securely support any surface mounted fixtures or other items.
7. Attachment of Wires:
- a. To Metal Deck or Steel Framing Members: Install as required by current code.
 - b. To Suspension Members: Insert through holes in members or supporting clips.
 - c. Wires shall be fastened with three tight turns minimum for hanger wires and four tight turns minimum bracing wires. Turns shall be made in a 1 ½-inch maximum distance.
- B. Suspension System for 2-foot by 4-foot Lay-in Acoustical Ceilings:
1. Main Runners: Install main runners 48 inches apart; 0.106 inch diameter hanger wires space 48 inches on center maximum along runners, and within 8 inches of ends.
 2. Install wall moldings with fasteners to studs. Install corner caps at molding intersections.
 3. Cross-Tees: Install between main runners in a repetitive pattern of 2-foot spacings.
 4. Sub-Tees: Install at edges of penetrations.

3.03 INSTALLATION OF ACOUSTICAL PANELS

- A. Install panels into suspension system. Partial panels shall be neatly cut and fitted to suspension and around penetrations and/or obstructions. Duplicate tegular edges at partial panels; cuts to be straight. Repaint cut tiles to match color or as directed by manufacturer for mylar facing at visually exposed conditions or as required by the Architect.
- B. Penetrations through the ceilings for sprinkler heads and other similar devices that are not integrally tied to the ceiling system in the lateral direction shall have a 2 inch oversized ring, sleeve or adapter through the ceiling tile to allow free movement of one inch in horizontal directions. Alternatively per ASTM E580, a flexible sprinkler hose fitting that can accommodate one inch of ceiling movement shall be permitted to be used in lieu of the oversized ring, sleeve or adapter.



- 3.04 AIR DISTRIBUTION DEVICES
- A. Refer to and coordinate with Division 23 - HVAC.
 - B. Install air distribution grilles and other devices into suspension system. Install 4 taut wires, each 0.106 inch diameter minimum, to each device within 3 inches of device corners, to support their weight independent of the suspension system.
- 3.05 LIGHT FIXTURES
- A. Refer to and coordinate with Division 26 - Electrical.
 - B. Fixtures weighing less than 56 pounds: Install fixtures into suspension systems and fasten earthquake clips to suspension members. Install minimum 2 slack safety wires, each 0.106 inch diameter minimum, to each fixture at diagonally opposite corners, to support their weight independent of the system.
 - C. Fixtures weighing 56 Pounds or more: Install fixtures into suspension system and fasten earthquake clips to suspension system members as required by the Drawings and/or code. Install not less than 4 taut 0.106 inch diameter wires capable of supporting four times the fixture load.
 - D. Support pendant-mounted light fixtures directly from the structure above with hanger wires or cables passing through each pendant hanger and capable of supporting two times the weight of the fixture. Brace the pendant-mounted light fixtures by either a bracing assembly at the ceiling penetration or below the ceiling to the walls, as indicated in the drawings.
- 3.06 CLEANING
- A. General: After installation of acoustical material has been completed, clean surfaces of the material, removing any dirt or discolorations. Replace panels as required.
 - B. Acoustical Panels: Minor abraded spots and cut edges shall be touched up with the same paint as was used for factory applied finish of the lay-in panels.
 - C. Remove and replace work that can not be successfully cleaned and repaired to eliminate evidence of damage.
- 3.07 CLEAN UP
- A. Remove rubbish, debris, and waste materials and legally dispose off of the Project site.
- 3.08 PROTECTION
- A. Protect the Work of this section until Substantial Completion.



Department of Neighborhood Services and Public Safety
GOLETA TRAIN DEPOT PROJECT

END OF SECTION



SECTION 09 51 26

LINEAR VENEERED CEILING PANELS

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

1. Linear Veneered Ceiling Panels
2. Exposed grid suspension system.
3. Wire hangers, fasteners, main runners, cross tees, wall angle moldings and accessories.

B. Related Sections:

1. Section 09 22 16 - Non-Structural Metal Framing
2. Section 09 29 00 - Gypsum Board
3. Section 09 51 13 - Acoustical Panel Ceiling
4. Divisions 23 - HVAC
5. Division 26 - Electrical Work

1.02 REFERENCES

A. American Society for Testing and Materials (ASTM):

1. ASTM A 641 Standard Specification for Zinc-Coated (Galvanized) Carbon Steel Wire.
2. ASTM A 653 Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) by the Hot- Dip Process.
3. ASTM A 1008 Standard Specification for Steel, Sheet, and Cold Rolled Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability.
4. ASTM C 635 Standard Specification for Metal Suspension Systems for Acoustical Tile and Lay-in Panel Ceilings.
5. ASTM C 636 Recommended Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels.
6. ASTM E 84 Standard Test Method for Surface Burning Characteristics of Building Materials.



7. ASTM E 580 Application of Ceiling Suspension Systems for Acoustical Tile and Lay-In Panels in Areas Requiring Seismic Restraint.
8. ASTM C 423 Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method.
9. ASTM E 1264 Classification for Acoustical Ceiling Products.
10. Hardwood Plywood & Veneer Association (HPVA)
11. International Building Code
12. ASHRAE Standard 62.1-2004 Ventilation for Acceptable Indoor Air Quality
13. NFPA 70 National Electrical Code
14. ASCE 7 American Society of Civil Engineers, Minimum Design Loads for Buildings and Other Structures
15. International Code Council-Evaluation Services - AC 156 Acceptance Criteria for Seismic Qualification Testing of Non-structural Components
16. International Code Council-Evaluation Services Report - Seismic Engineer Report
 - a) ESR 1308 - Armstrong T-Bar or Dimensional Suspension
17. California Air Resources Board (CARB) compliant
18. LEED - Leadership in Energy and Environmental Design is a set of rating systems for the design, construction, operation, and maintenance of green buildings

1.03 SUBMITTALS

- A. Shop Drawings: Layout and details of ceilings. Show locations of items that are to be coordinated with or supported by the ceilings.
- B. Installation Instructions: Submit manufacturer's installation instructions as referenced in Part three, Installation.
- C. Product Data: Submit manufacturer's technical data for each type of ceiling unit and suspension system required.
- D. Samples: Real Wood Veneer on fire rated particle board – Semi-gloss tinted topcoat – Clear Finish
- E. Certifications: Manufacturer's certifications that products comply with specified requirements, including laboratory reports showing compliance with specified tests and standards.
- F. Non-Conformance: All products not conforming to the requirements of this specification and or the manufacturer's published values are to be disposed. The Contractor performing the work will replace with approved product at their expense.



1.04 QUALITY ASSURANCE

- A. Single-Source Responsibility: Provide ceiling panel units and grid components by a single manufacturer.
- B. Fire Performance Characteristics: Identify ceiling components with appropriate markings of applicable testing and inspecting organization.
 - 1. Surface Burning Characteristics: As follows, tested per ASTM E-84 and complying with ASTM E 1264 for Class A products.
 - 2. HPVA (Hardwood Plywood and Veneer Association) certification and audit program per ASTM E-84 tunnel test.
- C. Woodworking Standards: Manufacturer must comply with specified provisions of Architectural Woodworking Institute quality standards.
- D. Coordination of Work: Coordinate ceiling work with installers of related work including, but not limited to building insulation, gypsum board, light fixtures, mechanical systems, electrical systems, and sprinklers.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Store ceiling components in a dry interior location in their cartons prior to installation to avoid damage. Store cartons in a flat, horizontal position. The protectors between the panels should not be removed until installation.
- B. Do not store in unconditioned spaces with humidity greater than 55 percent or lower than 25 percent relative humidity and temperatures lower than 50 degrees F or greater than 86 degrees F. Panels must not be exposed to extreme temperatures, for example, close to a heating source or near a window with direct sunlight.
- C. Handle ceiling units carefully to avoid chipped edges or damage to units in any way.

1.06 PROJECT CONDITIONS

- A. Wood ceiling materials should be permitted to reach room temperature and have a stabilized moisture content for a minimum of 72 hours before installation. (Remove plastic wrap to allow panels to climatize).
- B. The wood panels should not be installed in spaces where the temperature or humidity conditions vary from the temperatures and conditions that will be normal in the occupied space.
- C. As interior finish products, the veneered panels are designed for installation in temperature conditions between 50 degrees F and 86 degrees F, in spaces where the



building is enclosed, and HVAC systems are functioning and will be in continuous operation. Relative humidity should not fall below 25 percent or exceed 55 percent.

1.07 WARRANTY

- A. Veneered Wood Panel: Submit a written warranty executed by the manufacturer, agreeing to repair or replace panels that fail within the warranty period. Failures include, but are not limited to:
 - 1. Veneered Wood Panels: Defects in materials or factory workmanship.
 - 2. Grid System: Rusting and manufacturing defects.
- B. Warranty Period:
 - 1. Veneered Wood panels: One (1) year from date of installation.
 - 2. Grid: Ten years from date of installation.
- C. The Warranty shall not deprive the Owner of other rights the Owner may have under other provisions of the Contract Documents and will be in addition to and run concurrent with other warranties made by the Contractor under the requirements of the Contract Documents.

1.08 MAINTENANCE

- A. Extra Materials: Deliver extra materials to Owner. Furnish extra materials described below that match products installed. Packaged with protective covering for storage and identified with appropriate labels.
 - 1. Ceiling Units: Furnish quality of full-size units equal to 2.0 percent of amount installed.
 - 2. Exposed Suspension System Components: Furnish quantity of each exposed suspension component equal to 1.0 percent of amount installed.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Basis of Design: WoodWorks Linear Veneered Panels:
 - 1. Armstrong World Industries, Inc.
- B. Suspension Systems:
 - 1. Armstrong World Industries, Inc.



2.02 WOOD CEILING UNITS

A. Ceiling Panels Type AP-1:

1. Surface Texture: Smooth
2. Composition: Real wood veneer on fire rated particle board
3. Finish(s): Real Wood Veneer
 - a) Plain Slice Maple (NMP) – Natural Variations™
4. Plank Width:
 - a) 4” Plank Modules (Nominal) Width: 4.05-inch (Actual)
Panel Width:
 - a) 4” Plank Module Panel Width: 24-inch (Nominal): 23-1/4-inch (Actual)
 - a) 4” Plank Module Panel Length: 96-inch (Nominal): 95-1/4-inch (Actual) - With 3/4” reveal panel to panel @ length & Width
5. Acoustical Performance Infill Options:
 - 1) Fiberglass Infill Panel – Item 8200T10
6. Flame Spread:
 - a. Class A: ASTM E84 surface burning characteristics. Flame Spread Index 25 or less. Smoke Developed Index 50 or less.
 - b. CAN/ULC S102 surface burning characteristics. Flame Spread Rating 25 or less. Smoke Developed Classification 50 or less.
7. Acceptable Product: WoodWorks Linear Veneered Panels – items 6690F01W1 (NMP) as manufactured by Armstrong World Industries.

B. Accessories:

1. Backer Clip - Item 5687
2. Tee Bar Hook – Item 5986
3. Wood Screws – Item 7123PKG300
4. Safety Cable – Item 6091
5. Support Hanger – Item SH12
6. Beam End Retaining Clip – Item BERC2



2.03 SUSPENSION SYSTEMS

- A. Components: All main beams and cross tees shall be commercial quality hot dipped galvanized steel as per ASTM A653. Main beams and cross tees are double-web steel construction with 15/16-inch type exposed flange design. Exposed surfaces chemically cleansed, capping prefinished galvanized steel in baked polyester paint. Main beams and cross tees shall have rotary stitching.
 - 1. Structural Classification: ASTM C635 (Heavy Duty)
 - 2. Color: Tech Black.
 - 3. Acceptable Product: Prelude XL 15/16" 12' HD Main beam item 7301BL, Prelude XL 2' Cross Tee XL8320BL as manufactured by Armstrong World Industries, Inc.
 - 4. 12-Gauge Hanger Wire – Item 7891
- B. Attachment Devices: Size for five times design load indicated in ASTM C 635, Table 1, Direct Hung unless otherwise indicated.
- C. Wire for Hangers and Ties: ASTM A641, Class 1 zinc coating, soft temper, pre-stretched, with a yield stress load of at least times-three design load, but not less than 12 gauge.
- D. Accessories/Edge Moldings and Perimeter Trim:
 - a. Axiom Vector Straight Trim - AX6VESTRBL

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Do not proceed with installation until all wet work such as concrete, terrazzo, plastering and painting has been completed and thoroughly dried out.
- B. Proper designs for both supply air and return air, maintenance of the HVAC filters and building interior space are essential to minimize soiling. Before starting the HVAC system, make sure supply air is properly filtered and the building interior is free of construction dust.

3.02 PREPARATION

- A. Measure each ceiling area and establish layout of acoustical units to balance border widths at opposite edges of each ceiling. Avoid use of less than half width units at borders and comply with reflected ceiling plans. Coordinate panel layout with mechanical and electrical fixtures.



- B. WoodWorks ceiling materials should be permitted to reach room temperature and have a stabilized moisture content for a minimum of 72 hours before installation. (Remove plastic wrap to allow panels to climatize).

3.03 INSTALLATION

- A. Interior WoodWorks products, the veneered wood panels are designed for installation in temperature conditions between 50 degrees F and 86 degrees F, in spaces where the building is enclosed, and HVAC systems are functioning and will be in continuous operation. Relative humidity should not fall below 25 percent or exceed 55 percent.
- B. Install suspension system and panels in compliance with ASTM C636, ASTM E580, with the approval of the authorities having jurisdiction, and in accordance with the manufacturer's WoodWorks Linear Veneered Panels Installation Instructions.

3.04 ADJUSTING AND CLEANING

- A. Replace damaged and broken panels.
- B. Clean exposed surfaces of ceilings panels, including trim, edge moldings, and suspension members. Comply with manufacturer's instructions for cleaning and touch up of minor finish damage.

END OF SECTION



SECTION 09 65 13

RUBBER BASE

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

1. Topset coved rubber base for installation with surface flooring.

B. Related Requirements:

1. Division 01 - General Requirements.
2. Section 09 29 00 – Gypsum Board
3. Section 09 30 13 – Ceramic Tiling.

1.02 SUBMITTALS

- A. Product Data: Submit manufacturer's published technical data describing materials, construction and recommended installation instructions. Submit technical data and installation instructions for each adhesive material.
- B. Maintenance Instructions: Submit manufacturer's recommendations for maintenance, care and cleaning of base.
- C. Samples: Submit Samples of topset base in each available color. Following color selections, submit Samples, not less than 12 inches long of each selected color and type. Submit pint cans of each type adhesive.
- D. Maintenance Materials: Before Substantial Completion, deliver at least 50 lineal feet and five outside corner units of each color of rubber base installed. Deliver the materials in unopened factory containers or in sealed cartons with labels identifying the contents, matching installed materials. Include unopened cans of adhesives adequate to install the maintenance materials.
- E. LEED Submittals: Complete the LEED Material Buyout Form (MBoF) with all materials provided to the project. A complete submittal includes providing all material costs in the MBoF and all of the supporting documentation for the following credits:
 1. MRc2 - Environmental Product Declarations (EPD): Provide Industry-Wide or Product-Specific EPD.
 2. MRc3 - Sourcing of Raw Materials - Recycled Content: Provide product data for pre- and post- consumer recycled content.



3. MRc4 - Material Ingredients: Provide manufacturers Declare label, Health Product Declaration (HPD), Cradle to Cradle Certification, or Cradle to Cradle Health Product Certificate.
4. IEQc2 - Low-Emitting Materials – Interior Wet Applied Products: For paints, coatings, adhesives and sealants applied on site or used for laminating off-site, include product data indicating the VOC content (g/L) and testing certificates or third party certification demonstrating compliance with California Department of Public Health (CDPH) v1.2-2017 emissions testing.

1.03 QUALITY ASSURANCE

- A. Qualifications of Installer: Minimum five years experience in successfully installing the same or similar flooring materials.
- B. Comply with the following as a minimum requirement:
 1. ASTM E84: Standard Test Method for Surface Burning Characteristics of Building Materials.
 2. ASTM F1861: Standard Specification for Resilient Wall Base.
 3. Comply with current CHPS requirements, www.chps.net.
 4. Chemically based products such as sealers, primers, fillers, adhesives, etc. must be approved by Owner's Office of Environmental Health and Safety (OEHS).
 5. Each selected color and configuration shall be from same dye lot and color.

1.04 DELIVERY, STORAGE AND HANDLING

- A. Materials shall be delivered to the Project site in original unopened manufacturer's packaging clearly labeled with manufacturer's name. Store materials at room temperature, but not less than 70 degrees F, for a minimum of 48 hours before installation, unless otherwise indicated in manufacturer's printed instructions.

1.05 PROJECT CONDITIONS

- A. Ventilation and Temperature: Verify areas that are to receive rubber base are ventilated to remove fumes from installation materials, and areas are within temperature range recommended by the various material manufactures for site installation conditions.

1.06 WARRANTY

- A. Manufacturer shall provide a five year material warranty.



- B. Installer shall provide a two year fabrication and installation warranty.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Mannington/Burke Wall Base.
- B. Roppe, Pinnacle Rubber Base.
- C. Flexco Company, Wallflower Premium Rubber Wall Base.
- D. Equal.

2.02 MATERIALS

- A. Rubber base: Conform to ASTM F1861; Group 1, solid (homogeneous); Type 1, TS, (thermoset) vulcanized rubber, Style B (coved), 4-inch high unless otherwise indicated, integral colors as selected, non-shrinking, 1/8 inch thick, with matching molded outside corners.
- B. Base Adhesive: Water based, low odor type, as recommended by manufacturer of rubber base.

2.03 LEED REQUIREMENTS

- A. IW/PS EPD: Products specified under this section must have a Type III Product Specific EPD or the company must be listed in the industry group responsible for the Industry Wide Externally Verified EPD.
- B. PS EPD: Products specified under this section must have a Type III Product Specific EPD.
- C. HPDs: Products specified under this section must have one of the following unexpired material ingredient reports compliant with LEEDv4.1 requirements and declared to 1000 ppm or less: Declare label, Health Product Declaration (HPD), Cradle to Cradle Certification, Cradle to Cradle Health Product Certificate, or UL Product Lens Certification.
- D. Interior Wet Applied Products: All wet-applied on-site paints, coatings, adhesives, and sealants products provided under Part 2 of this specification section must be compliant with the VOC limits outlined under IEQc2: Low Emitting Materials in 01 81 13 Sustainable Design Requirements. In addition, all paints and coatings must be compliant with CDPH Standard Method v1.2-2017 emissions testing with proper unexpired CDPH testing certificates or acceptable third-party certification.



PART 3 - EXECUTION

3.01 COORDINATION

- A. Coordinate the Work of this section with other sections to provide a level, smooth and clean finish surfaces to receive rubber base.

3.02 EXAMINATION

- A. Field verify dimensions and other conditions affecting the Work of this section before commencing the Work of this section.
- B. Before Work is started, examine surfaces that are to receive rubber base. Deficiencies shall be corrected before starting the Work of this section.

3.03 PREPARATION

- A. Do not start preparation until adjacent concrete floor slabs are at least 90 days old and finish flooring is installed.
- B. Install rubber base when ambient temperature is 70 degrees F. or higher.

3.04 INSTALLATION

- A. Install topset base at:
 - 1. Hard floors, including resilient flooring, concrete and wood, carpet tile and other soft floors.
 - 2. Along cabinetry base and where flooring extends into open cabinets.
- B. Install all wall base with pre-molded outside corners. Clean and prep existing wall and apply adhesive to the wall or back of base. Ensure that not less than 18-inch-long filler or end pieces are not installed. Roll base to ensure that the top of the base installed is tight against the wall and toe is tight against the floor, all end joints to be tight with no gaps. Install matching factory pre-molded outside corners at all offsets. Should pre-molded outside corners become unavailable and confirmed, corners are to be wrapped tight by slightly gouging the back of the Base and apply adhesive at gauge. Wrap base around the corner, Push base down at the corner to form a consistent toe, ensuring that it is snug to the floor on both sides of the corner, All Inside corners shall be scribed fit tight with no gaps at the top or bottom of the base. Wrapped inside corners are not acceptable.
- C. Use of adhesive gun is prohibited. Apply adhesive directly to substrate using the appropriate notched trowel or spreader according to manufacturer's instructions. Maintain 1/8 inch gap from top of base to prevent adhesive oozing onto adjacent surfaces.
- D. Base and outside corners shall be rolled with a seam roller before adhesive sets.



3.05 CLEANING

- A. Maintain surfaces of base clean as installation progresses. Clean rubber base when sufficiently seated and remove foreign substances.
- B. Clean adjacent surfaces of adhesive or other defacement. Replace damaged and/or defective Work to the specified condition.

3.06 CLEAN UP

- A. Remove rubbish, debris and waste materials and legally dispose of off the Project site.

3.07 PROTECTION

- A. Protect the Work of this section until Substantial Completion.

END OF SECTION



SECTION 09 77 00

SPECIAL WALL SURFACES

PART 1 GENERAL

1.01 SECTION INCLUDES

1. Pre-manufactured High Pressure Decorative Laminate (HPL) and Phenolic Panel systems including mounting hardware and specified accessories.

1.02 RELATED SECTIONS

1. Section 06 10 00 - Rough Carpentry; furring, blocking, and other carpentry work that is not exposed to view.
2. Section 09 26 00 - Gypsum Board Assemblies; for metal support systems not included in this section.

1.03 REFERENCES

1. American Society for Testing and Materials (ASTM) E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
 - a) Class 1/A - Flame Spread 0-25, Smoke Developed 450 or less.
2. Architectural Woodwork Institute (AWI) Quality Standards.
3. National Electrical Manufacturer's Association (NEMA)

1.04 SUBMITTALS

1. Submit under provisions of Section 01 33 00.
2. Product Data: Manufacturer's Safety Data Sheets (MSDS) on each product to be used, including:
 - a) Preparation instructions and recommendations.
 - b) Storage and handling requirements and recommendations.
 - c) Installation methods.
3. Shop Drawings: Shop drawings in sufficient detail to show fabrication, installation, anchorage, and interface of the work of this Section with adjacent work.
4. Selection Samples: For each finish product specified, one complete set of color samples representing manufacturer's standard range of available colors and patterns.
5. LEED Submittals: Complete the LEED Material Buyout Form (MBoF) with all materials provided to the project. A complete submittal includes providing all material costs in the MBoF and all of the supporting documentation for the following credits:



- a) MRc2 - Environmental Product Declarations (EPD): Provide Industry-Wide or Product-Specific EPD.
- b) MRc3 - Sourcing of Raw Materials - Recycled Content: Provide product data for pre- and post- consumer recycled content.
- c) MRc4 - Material Ingredients: Provide manufacturers Declare label, Health Product Declaration (HPD), Cradle to Cradle Certification, or Cradle to Cradle Health Product Certificate.
- d) IEQc2 - Low-Emitting Materials – Interior Wet Applied Products: For paints, coatings, adhesives and sealants applied on site or used for laminating off-site, include product data indicating the VOC content (g/L) and testing certificates or third party certification demonstrating compliance with California Department of Public Health (CDPH) v1.2-2017 emissions testing.

1.05 QUALITY ASSURANCE

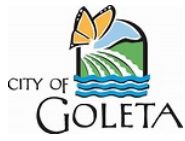
1. Manufacturer Qualifications:
 - a) Firm experienced in successful production of wall systems similar to that indicated for the Project, with sufficient production capacity to produce required units without causing delay in the work.
 - b) Provide certificate signed by panel manufacturer certifying that products comply with specified requirements.
2. Installer Qualifications: Demonstrate successful experience in installing architectural woodwork similar in type and quality to those required for this project.

1.06 DELIVERY, STORAGE, AND HANDLING

1. Do not deliver wall system until painting, wet work, grinding, and similar operations that could damage, soil, or deteriorate wall system have been completed in installation areas as specified by AWI 1700-G-3.
2. If panels are stored prior to installation, store them flat in completely enclosed areas, out of the weather. If panels must be stored in other than installation areas, store only in areas where environmental conditions comply with manufacturers recommendations. Do not expose panels to continuous direct sunlight, nor to extremes in temperature and humidity. Store products in manufacturer's packaging until ready for installation.
3. Store and dispose of solvent-based materials, and materials used with solvent-based materials, in accordance with requirements of local authorities having jurisdiction.

1.07 PROJECT CONDITIONS

1. Do not deliver or install wall system until building is enclosed, wet work is complete and HVAC system is operating and will maintain temperature and relative humidity at occupancy levels during the remainder of the construction period as specified by AWI 1700-G-3.
2. Do not install wall system until normal lighting conditions exist. Normal lighting



conditions are described as those in place when the project is finished. This includes, but not limited to, design lighting (wall washers, spot lights and flood lights, and similar fixtures) and natural lighting.

3. Wall, ceilings, floors, and openings must be level, plumb, straight, in-line and square as specified by AWI 1700-G-3.
4. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits. Panels shall be conditioned in the environment in which they will be installed for a minimum of 72 hours prior to installation. The recommended environment is 75 degrees F (24 degrees C) and 45 percent relative humidity.
5. Environmental Conditions: Comply with Woodwork Manufacturer's recommendations for optimum temperature and humidity conditions for woodwork during its storage and installation. Do not install woodwork until these conditions have been attained and stabilized so that woodwork is within plus or minus 1.0 percent of optimum moisture content from date of installation through remainder of construction period.

1.08 WARRANTY

1. Manufacturer warrants any product it has manufactured and sold against defects in materials or workmanship for a period of five years from the date of original purchase and acceptance for use. This warranty extends to products assembled / installed and used in the manner intended and does not cover damage or failure caused by: misuse, abuse or accidents, exposure to extreme temperature, improper installation, improper maintenance and exposure to water or excessive humidity or excessive moisture.

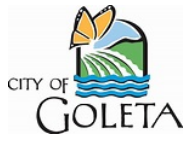
PART 2 PRODUCTS

2.01 MANUFACTURERS

1. Basis of Design: Panel Specialists, Inc.; 3115 Range Rd., Temple, TX 76504. ASD. Toll Free Tel: (800) 947-9422. Tel: (254) 774-9800. Fax: (254) 774-7222. Email: psiwalls@panelspec.com. Web: <http://www.panelspec.com>.
2. Or approved equal.

2.02 PANEL SYSTEMS

1. Provide prefinished decorative panels where shown on the drawings, as specified herein, and as needed for a complete and proper installation.
2. Comply with applicable requirements of "Architectural Woodwork Quality Standards" in the production and installation of the wall panel system as published by the Architectural Woodwork Institute (AWI) unless otherwise indicated.



3. Panel System: #310 as manufactured by Panel Specialists, Inc. A progressive panel system with an exposed divider molding creating a 1/16 inch (1.5mm) horizontal and vertical reveal between edge banded panels. Recommended for vertical and horizontal interior installations. Maximum panel length for horizontal installations is 96 inches (2438 mm).
 - a) Panel Thickness: 7/16 inches (11.1 mm).
 - b) Horizontal Reveal: System to provide a reveal of 1/16 inch (1.5mm) between panels.
 - c) Vertical Reveal: System to provide a recessed reveal of 1/16 inch (1.5mm) between panels.
 - d) Panel Edge Finish: Panel edges to be finish with .018 inch (.5mm) PVC edge banding or as indicated in drawings.
 - e) Panel Finish: High Pressure Decorative Laminate.
 - f) Main Laminated Panel Fire Rating:
 - 1) Fire Rating: ASTM E84, Class A.
 - g) Panel Dimensions: Refer to drawings.
 - h) Molding: All moldings to be .062" thick (at structural areas) 6063 alloy aluminum with T5 temper.
 - 1) Divider Moldings
 1. #302A Divider Molding
 - i) Finishes:
 - 1) Panel Face:
 1. Finish: Wilsonart Island (D498)
 - 2) Panel Face Pattern Direction:
 1. Horizontal
 - 3) Panel Edge Banding:

As indicated in drawings
 - 4) Aluminum Molding Finish:
 1. Clear Anodized

4. Panel System: #312 as manufactured by Panel Specialists, Inc. A progressive panel system with an exposed divider molding creating a 1/2inch (12mm) recessed channel reveal horizontally and vertically between edge banded panels. The reveal can be accented with a concave insert or p-lam or veneer strips. Recommended for vertical and horizontal interior installations. Maximum panel length for horizontal installations is 96 inches (2438 mm).
 - a) Panel Thickness: 7/16 inches (11.1 mm).
 - b) Horizontal Reveal: System to provide a reveal of 1/2 inch (12mm) between panels.
 - c) Vertical Reveal: System to provide a recessed reveal of 1/2 inch (12mm) between panels.
 - d) Panel Edge Finish: Panel edges to be finish with .018-inch (.5mm) PVC edge banding or as indicated in drawings.
 - e) Panel Finish: Phenolic .
 - f) Main Laminated Panel Fire Rating:
 - 1) Fire Rating: ASTM E84, Class A.



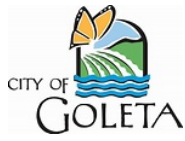
- g) Panel Dimensions: Refer to drawings.
- h) Molding: All moldings to be .062" thick (at structural areas) 6063 alloy aluminum with T5 temper.
 - 1) Divider Moldings
 - 1. #312 ½ in. Recess Channel Divider Molding
- i) Finishes:
 - 1) Panel Face:
 - 1. Finish: Wilsonart Biltmore Cherry (7924)
 - 2) Panel Face Pattern Direction:
 - 1. Horizontal
 - 3) Panel Edge Banding:
 - 1. As indicated in drawings
 - 4) Aluminum Molding Finish:
 - 1. Clear Anodized

2.03 MATERIALS

- 1. High Pressure Decorative Laminates (VGS, VGF.) and non-decorative backers (BKV) used to surface wall panels systems shall be manufactured to meet or exceed the National Electrical Manufacturing Association (NEMA LD3-2005) for thickness, performance properties and appearance.
- 2. Phenolic Panels
 - a) Panels to be durable 3/8" Compact Laminate panels formed from melamine resin saturated overlay and decorative papers bonded to a core of phenolic resin impregnated kraft papers to provide superior impact and moisture resistance.

2.04 LEED REQUIREMENTS

- A. IW/PS EPD: Products specified under this section must have a Type III Product Specific EPD or the company must be listed in the industry group responsible for the Industry Wide Externally Verified EPD.
- B. PS EPD: Products specified under this section must have a Type III Product Specific EPD.
- C. HPDs: Products specified under this section must have one of the following unexpired material ingredient reports compliant with LEEDv4.1 requirements and declared to 1000 ppm or less: Declare label, Health Product Declaration (HPD), Cradle to Cradle Certification, Cradle to Cradle Health Product Certificate, or UL Product Lens Certification.
- D. Interior Wet Applied Products: All wet-applied on-site paints, coatings, adhesives, and sealants products provided under Part 2 of this specification section must be compliant with the VOC limits outlined under IEQc2: Low Emitting Materials in 01 81 13 Sustainable Design Requirements. In addition, all paints and coatings must be compliant with CDPH



Standard Method v1.2-2017 emissions testing with proper unexpired CDPH testing certificates or acceptable third-party certification

PART 3 EXECUTION

3.1 EXAMINATION

1. Do not begin installation until substrates have been properly prepared according to AWI 1700-G-3.
2. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.2 FIELD DIMENSIONS

1. Where wall system is indicated to be fitted to other construction, check actual dimensions of other constructions by accurate field measurements before manufacturing wall system; show recorded measurements on final shop drawings. Coordinate manufacturing schedule with construction progress to avoid delay of work.
2. Where field measurements cannot be made without delaying the work, guarantee dimensions and proceed with manufacture of wall system without field measurements coordinate other construction to ensure that actual dimensions correspond to guaranteed dimensions.

3.3 PREPARATION

1. Panels must be acclimated to ambient temperature and humidity conditions in accordance with manufacturer's specifications prior to installation. Refer to PSI installation guide for proper, handling, storage and acclimation procedures.
2. Clean surfaces thoroughly prior to installation.
3. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.4 INSTALLATION

1. Install in accordance with manufacturer's instructions.
2. When interior paneling is on an exterior wall or in a wet area, provide a barrier sheet of plastic film between the outside wall and the panels in order to prevent condensation affecting the stability of the panels.
3. Field cutting of all wall systems should be accomplished using carbide tools. All face penetrations and cutouts should have a minimal 1/8 inch (3 mm) radius in corners according to NEMA Standards Publication LD 3-2005.



4. All wall systems should receive an "S" bead of panel mastic on the back of the panel during installation.
5. For vertical applications, wall systems shall be mechanically fastened to horizontal metal furring strapping spaced 24 inches (610 mm) O.C. Furring straps shall be no less than 18-ga 3-1/2 inches (89 mm) wide, continuously. Metal strapping to be installed to the drywall studs prior to the application of the gypsum board by the framing contractor. For panels installed with a horizontal orientation strapping is recommended but not necessary

3.5 PROTECTION

1. Protect installed products until completion of project.
2. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION



SECTION 09 77 13

REINFORCED FIBERGLASS PLASTIC (FRP)

PART 1: GENERAL

1.01 SUMMARY

A. Section Includes: Durable, decorative wall panels with smooth or textured finishes. Mounting hardware, adhesives, accessories and trims.

B. RELATED SECTIONS

1. Division 06: Section: Rough and Finish Carpentry.
2. Division 09: Section: Gypsum Board Assemblies.

1.02 REFERENCES

A. General: Standards listed by reference, including revisions by issuing authority, form a part of this specification section to the extent indicated. Standards listed are identified by issuing authority, authority abbreviation, designation number, title or other designation established by issuing authority. Standards subsequently referenced herein are referred to by issuing authority abbreviation and standard designation.

B. ASTM International:

1. ASTM E84 Standard Test Method for Surface Burning Characteristics Building Materials.
2. ASTM D256 Standard Test Methods for Determining the Izod Pendulum Impact Resistance of Plastics.
3. ASTM D638 Standard Test Method for Tensile Properties of Plastics.
4. ASTM D790 Standard Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials
5. ASTM D2583 Standard Test Method for Indentation Hardness of Rigid Plastics by Means of a Barcol Impressor.

1.03 SYSTEM DESCRIPTION



- A. Performance Requirements: Provide durable, decorative wall panels which have been manufactured and installed to maintain performance criteria stated by manufacturer without defects, damage or failure.

1.04 SUBMITTALS

- A. General: Submit listed submittals in accordance with Conditions of the Contract and Division 01 33 00 Submittal Procedures Section.
- B. Product Data: Submit manufacturer's product data, storage, handling and preparation requirements and installation instructions.
- C. Shop Drawings: Submit shop drawings showing layout, profiles and product components, including anchorage, accessories, finish colors, patterns and textures. Indicate location and dimension of joints and fastener attachment.
- D. Samples: Submit selection and verification samples for finishes, colors and textures. Submit 2 samples of each type of panel, trim and fastener
- E. General: Firm experienced in successful production of wall system similar to that indicated for the Project. Quality Assurance/Control Submittals: Submit the following:
 - 1. Test Reports: Certified test reports showing compliance with specified performance characteristics and physical properties.
 - 2. Certificates:
 - a. Submit manufacturer's certificate that products meet or exceed specified requirements.
 - b. Submit certificate of installer's qualifications.
 - 3. Manufacturer's Instructions: Manufacturer's installation instructions.
- F. Closeout Submittals: Submit the following:
 - 1. Operations and Maintenance Data: Operation and maintenance data for installed products in accordance with Division 01 Closeout Submittals (Maintenance Data and Operation Data) Section. Include methods for maintaining installed products and precautions against cleaning materials and methods detrimental to finishes and performance.
 - 2. Warranty documents specified herein.



1.05 QUALITY ASSURANCE

- A. Installer Qualifications: Installer shall have a minimum of 5 years experience with composite wall panel work similar in scope and size to this project.
- B. Mock-Ups: Provide 24" x 24" mock-up..
 - 1. Subject to acceptance by owner, mock-up may be retained as part of finish work.
 - 2. If mock-up is not retained, remove and properly dispose of mock-up.

1.06 DELIVERY, STORAGE AND HANDLING

- A. General: Comply with Division 01 Product Requirements Section.
- B. Lead Time: Comply with manufacturer's ordering instructions and lead time requirements to avoid construction delays.
- C. Delivery: Deliver materials in manufacturer's original, unopened, undamaged containers with identification labels intact.
- D. Storage and Protection: Store materials protected from exposure to harmful environmental conditions and at temperature and humidity conditions recommended by the manufacturer.
 - 1. Store panels indoors.
 - 2. Lay panels flat. Do not stand panels on edge.
 - 3. Protect panels from moisture.
 - 4. Do not store panels in contact with the floor or against an outside wall.
 - 5. Do not remove protective film from panel surface until after installation (if applicable).
 - 6. Maintain optimum storage conditions of 60-75 degrees F (16-24 degrees C) at 35 - 55% relative humidity. Avoid extremes in temperature and humidity.
- E. Handling: Remove foreign matter from face of panel by using a soft bristle brush, avoiding abrasive action.

1.07 PROJECT/SITE CONDITIONS

- A. Environmental Requirements:
 - 1. Installation shall not begin until building is enclosed, permanent heating and



cooling equipment is in operation and residual moisture from plaster, concrete or terrazzo work has dissipated.

2. Install panels between 60 degrees F - 75 degrees F (15 - 24 degrees C) and relative humidity below 55%, ideally at the same conditions as the room's normal operating temperatures after building is occupied.
3. Provide ventilation to disperse fumes during application of adhesive as recommended by adhesive manufacturer.
4. Do not install wall system until normal lighting conditions exist. Normal lighting conditions are described as those in place when the project is finished.

B. Field Measurements: Verify actual measurements/openings by field measurements before fabrication; show recorded measurements on shop drawings. Coordinate field measurements and fabrication schedule with construction progress to avoid construction delays.

1. Wall, ceilings, floors and openings must be level, plumb, straight, in-line and square

1.08 WARRANTY

- A. Project Warranty: Refer to Conditions of the Contract for project warranty provisions.
- B. Manufacturer's Warranty: Submit, for Owner's acceptance, manufacturer's standard warranty document executed by authorized company official. Manufacturer's warranty is in addition to, and not a limitation of, other rights Owner may have under Contract Documents.
- C. Warranty Period: 10 years commencing on Date of Substantial Completion.
 1. Warranty extends to products assembled / installed and used in the manner intended and does not cover damage or failure caused by: misuse, abuse or accidents, exposure to extreme temperature, improper installation, improper maintenance and exposure to water or excessive humidity or excessive moisture.

1.09 MAINTENANCE

- A. Extra Materials: Provide 10 percent of additional material for use by owner in building maintenance and repair.



PART 2: PRODUCTS

2.01 COMPOSITE WALL PANELS

- A. Manufacturer:
 - 1. Basis of Design: Nudo, Contact: 1500 Taylor Avenue, Springfield, IL 62703; Telephone: (800) 826-4132, (217) 528-5636; Fax: (217) 528-8722; E-mail: info@nudo.com ; website: www.nudo.com
- B. Proprietary Products/Systems: Composite wall & ceiling panels, including the following: Fiberlite: Fiberglass Reinforced Plastic (FRP) panel.
 - 1. Texture: Smooth, High Pressure Laminate (HPL)
 - 2. Thickness: 0.090"
 - 3. Fire Rating Class: A
 - 4. Color: As selected by Architect from standards manufacturer's colors.
 - 5. Size: As indicated in drawings.
- C. Properties:
 - 1. Flexural Strength (ASTM D790)
 - 2. Flexural Modulus (ASTM D790)
 - 3. Tensile Strength (ASTM D638)
 - 4. Barcol Hardness (ASTM D2583)
 - 5. Izod Impact (ASTM D256)

2.02 ACCESSORIES

- A. Moldings: Aluminum coordinating moldings, color as selected by Architect from manufacturer's color chart.

2.03 LEED REQUIREMENTS

- A. IW/PS EPD: Products specified under this section must have a Type III Product Specific EPD or the company must be listed in the industry group responsible for the Industry Wide Externally Verified EPD.
- B. PS EPD: Products specified under this section must have a Type III Product Specific EPD.
- C. HPDs: Products specified under this section must have one of the following unexpired material ingredient reports compliant with LEEDv4.1 requirements and declared to



1000 ppm or less: Declare label, Health Product Declaration (HPD), Cradle to Cradle Certification, Cradle to Cradle Health Product Certificate, or UL Product Lens Certification.

- D. Interior Wet Applied Products: All wet-applied on-site paints, coatings, adhesives, and sealants products provided under Part 2 of this specification section must be compliant with the VOC limits outlined under IEQc2: Low Emitting Materials in 01 81 13 Sustainable Design Requirements. In addition, all paints and coatings must be compliant with CDPH Standard Method v1.2-2017 emissions testing with proper unexpired CDPH testing certificates or acceptable third-party certification.

PART 3: EXECUTION

3.01 MANUFACTURER'S INSTRUCTIONS

- A. Adhesive: Provide panel adhesive as recommended by panel manufacturer.
- B. Trim and Seam Treatment:
 - 1. Manufacturer: Acceptable to panel manufacturer.
 - 2. Material and Color: Aluminum moldings, color as selected by Architect.
- C. Fasteners: Provide appropriate fasteners and accessories as required to properly complete installation.

3.03 PREPARATION

- A. Comply with the instructions and recommendations of the durable, decorative wall panel manufacturer.
- B. Site Verification of Conditions: Verify substrate conditions, which have been previously installed under other sections, are acceptable for product installation in accordance with manufacturer's instructions. Verify that site conditions are acceptable for installation of durable, decorative wall panels. Examine back-up surfaces to determine that corners are plumb and straight, surfaces are smooth, uniform, clean and free from foreign matter, nails are countersunk and joints and cracks are filled flush and smooth with the adjoining surface. Do not proceed with installation of durable, decorative wall panels until unacceptable conditions are corrected

3.04 INSTALLATION

- A. General: Prior to installing panels, remove packaging and allow panels to acclimate to room temperature and humidity for at least 48 hours.
 - 1. Wall substrate must be dry and free from dirt, dust, grease and other



contaminants. Walls must be flat and even. Remove high spots and fill low spots with material acceptable to panel manufacturer.

2. Inspect panels for any defects immediately. Do not install panels of unacceptable quality. Field cutting of all wall systems should be accomplished using a circular saw with fine tooth carbide blade.
3. Position panel so that the saw blade enters the finished HPL side first to avoid chipping or damage. Protect decorative laminate face of panel by covering work area, do not remove protective will until after installation.
4. Follow adhesive manufacturer's recommendations for appropriate height of adhesive bead left by trowel and do not allow adhesive to skin over. When interior paneling is on an exterior wall or wet area, provide a barrier sheet and/or follow the adhesive manufacturer's installation recommendations for a secure bond.

B. Installation Using Aluminum Moldings:

1. Start in the corner. Mark plumb line 48 1/8 inches from corner.
2. Apply adhesive directly to entire back of composite wall panel using correct trowel with 100% adhesive coverage using crosshatch pattern. Apply adhesive to within 1/2 inch of all edges of panel.
3. Slide panel into molding and withdraw 1/16 inch for aluminum moldings to provide appropriate gap. Align with plumb line.
4. Begin in top corner nearest molding with laminate roller, rolling down and out toward the edge without molding.
5. Continue rolling down and out working across panel away from previously installed panel or initial molding. Remove all trapped air.
6. Install one-piece division bar and caps or next molding by sliding onto panel.
7. Repeat process, working in one direction around room.
8. Immediately remove all adhesive residue. To remove, clean with nonabrasive cotton cloth and warm water. If necessary, use a mild nonabrasive detergent. For cleanup with solvent based adhesives, use mineral spirits or acetone to remove residue.

C. Installation Using Caulk:

Plan panel layout so seams are not directly over seams of substrate.



1. Apply adhesive directly to back of composite wall panel with 100% adhesive coverage using crosshatch pattern. Extend adhesive to all edges of panel.
2. Install panel. Place six-penny finishing nails at 1/8 inch (3.2mm) spacing against the panel about 2 feet (610mm) apart to hold panels in place while adhesive sets and provide proper spacing for color caulk. Continue installing panels using this method, leaving nails in place during installation.
3. Remove nails after adhesive sets.
4. Place a narrow piece of masking tape along panel edge from top to bottom, exactly at joint edge. Firmly apply tape to both panels.
5. Fill 1/8 inch (3.2mm) gap between the panels with caulk, making sure gap is completely filled.
6. Tilt caulking tube back from vertical so that tip of tube advances first in direction of travel.
7. Wet finger and smooth bead if necessary.
8. Remove masking tape before bead cures. Clean off excess caulk with damp cloth.
9. Install corner moldings as described in molding instructions.

3.05 CLEANING

- A. Clean panel surfaces in compliance with manufacturer's recommendations.
 1. Use a clean, damp, nonabrasive cotton cloth and a mild liquid detergent or household cleaner.
 2. Rinse with clean water using a clean, nonabrasive cotton cloth.
 3. Dry panels with a soft, clean nonabrasive cotton cloth.
 4. Do not use cleaners containing acid, alkali or sodium hypochlorite.

3.06 PROTECTION

- A. Protect installed work from damage due to subsequent construction activity on the site.

END OF SECTION



SECTION 09 90 00

PAINTING AND COATING

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

1. Interior and exterior painting.

B. Following items shall not be painted:

1. Brass valves, chromium or nickel-plated piping and fittings.
2. Boiler control panels and control systems.
3. Fabric connections to fans.
4. Flexible conduit connections to equipment, miscellaneous name plates, stamping, and instruction labels and manufacturer's data.
5. Mechanical and electrical utility lines, piping and heating and ventilation ductwork in tunnels, under-floor excavated areas or crawl spaces, attic spaces and enclosed utility spaces.
6. Flag, floodlight, parking light poles and loudspeaker poles, metal stairs, handrails and chain-link fence with a galvanized finish, unless otherwise noted.
7. Structural and miscellaneous steel, open web steel joists and metal floor decking, which will not be exposed in final construction, shall have no finish other than one coat of shop primer.
8. Hardboard covering on tops and backs of counters and benches.
9. Brass, bronze, aluminum, lead, stainless steel and chrome or nickel-plated surfaces.
10. Non-metallic walking surfaces unless specifically shown or specified to be painted.

1.02 REGULATORY REQUIREMENTS

- ###### A. Paint materials shall comply with the Food and Drug Administration's (F.D.A.) Lead Law and the current rules and regulations of local, state and federal agencies governing the use of paint materials.

1.03 SUBMITTALS



- A. List of Materials: Before submittal of samples, submit a complete list of proposed paint materials, identifying each material by distributor's name, manufacturer's name, product name and number, including primers, thinners, and coloring agents, together with manufacturers' catalog data fully describing each material as to contents, recommended installation, and preparation methods. Identify surfaces to receive various paint materials.
- B. Material Samples: Submit manufacturer's standard colors samples for each type of paint specified. Once colors have been selected, submit Samples of each color selected for each type of paint accordingly:
 - 1. Samples of Paint and Enamel must be submitted on standard 8 ½" x 11" Leneta Opacity-Display Charts. Each display chart shall have the color in full coverage. The sample shall be prepared from the material to be installed on the Work. Identify the school on which the paint is to be installed, the batch number, the color number, the type of material, and the name of the manufacturer.
 - 2. Elastomeric shall be submitted in duplicate samples of the texture coating. Samples will be not less than 2 ½ by 3 ½ in size and installed upon backing. Finished Work will match the reviewed Sample in texture.
 - 3. Materials and color samples shall be reviewed before starting any painting.
- C. For transparent and stained finishes, prepare samples on same species and quality of wood to be installed in the Work, with written description of system used.
- D. LEED Submittals: Complete the LEED Material Buyout Form (MBoF) with all materials provided to the project. A complete submittal includes providing all material costs in the MBoF and all of the supporting documentation for the following credits:
 - 1. MRc2 - Environmental Product Declarations (EPD): Provide Industry-Wide or Product-Specific EPD.
 - 2. MRc3 - Sourcing of Raw Materials - Recycled Content: Provide product data for pre- and post- consumer recycled content.
 - 3. MRc4 - Material Ingredients: Provide manufacturers Declare label, Health Product Declaration (HPD), Cradle to Cradle Certification, or Cradle to Cradle Health Product Certificate.
 - 4. IEQc2 - Low-Emitting Materials – Interior Wet Applied Products: For paints, coatings, adhesives and sealants applied on site or used for laminating off-site, include product data indicating the VOC content (g/L) and testing certificates or third party certification demonstrating compliance with California Department of Public Health (CDPH) v1.2-2017 emissions testing.

1.04 QUALITY ASSURANCE

- A. Certification of Materials: With every delivery of paint materials, the manufacturer shall provide written certification the materials comply with the requirements of this section.



- B. Coats: The number of coats specified is the minimum number. If full coverage is not obtained with the specified number of coats, install additional coats as required to provide the required finish.
- C. Install coats and undercoats for finishes in strict accordance with the recommendations of the paint manufacturer as reviewed by the Architect.
- D. Paint materials shall comply with the following as a minimum requirement:
 - 1. Materials shall be delivered to Project site in original unbroken containers bearing manufacturer's name, brand number and batch number.
 - 2. Open and mix ingredients on premises in presence of the Project Inspector.

1.05 DELIVERY, STORAGE AND HANDLING

- A. Storage and Mixing of Materials: Store materials and mix only in spaces suitable for such purposes. Maintain spaces clean and provide necessary precautions to prevent fire. Store paint containers so the manufacturer's labels are clearly displayed.

1.06 SITE CONDITIONS

- A. Temperature: Do not install exterior paint in damp, rainy weather or until surface has thoroughly dried from effects of such weather. Do not install paint, interior, or exterior, when temperature is below 50 degrees F, or above 90 degrees F, or dust conditions are unfavorable for installation.

1.07 WARRANTY

- A. Manufacturer shall provide a three year material warranty.
- B. Installer shall provide a three year application warranty.

1.08 MAINTENANCE

- A. Provide at least one gallon of each type, color and sheen of paint coating installed. Label containers with color designation indicated on Drawings.

PART 2 - PRODUCTS

2.01 PAINT MATERIALS

- A. Furnish the products of only one paint manufacturer unless otherwise specified or required. Primers, intermediate and finish coats of each painting system must all be the products of the same manufacturer, including thinners and coloring agents, except for materials furnished with shop prime coat by other trades.
- B. Factory mix paint materials to correct color, gloss, and consistency for installation to the maximum extent feasible.
- C. Paint materials to be minimum "Architectural Grade".



D. Gloss degree standards shall be as follows:

HIGH GLOSS	70 and above	EGGSHELL	30 to 47
SEMI-GLOSS	48 to 69	SATIN	15 to 29

2.02 MANUFACTURERS

A. Acceptable manufacturers, unless otherwise noted:

1. Dunn-Edwards Corporation Paints
2. Frazee Paints and Wall coverings
3. Vista Paints
4. Sherwin Williams
5. ICI Paints
6. Equal.

2.03 LEED REQUIREMENTS

- A. IW/PS EDP: Products specified under this section must have a Type III Product Specific EPD or the company must be listed in the industry group responsible for the Industry Wide Externally Verified EPD.
- B. PS EPD: Products specified under this section must have a Type III Product Specific EPD.
- C. HPDs: Products specified under this section must have one of the following unexpired material ingredient reports compliant with LEEDv4.1 requirements and declared to 1000 ppm or less: Declare label, Health Product Declaration (HPD), Cradle to Cradle Certification, Cradle to Cradle Health Product Certificate, or UL Product Lens Certification.
- D. Interior Wet Applied Products: All wet-applied on-site paints, coatings, adhesives, and sealants products provided under Part 2 of this specification section must be compliant with the VOC limits outlined under IEQc2: Low Emitting Materials in 01 81 13 Sustainable Design Requirements. In addition, all paints and coatings must be compliant with CDPH Standard Method v1.2-2017 emissions testing with proper unexpired CDPH testing certificates or acceptable third-party certification.

PART 3 - EXECUTION

3.01 PREPARATION

- A. Examine surfaces to receive paint finish. Surfaces which are not properly prepared and cleaned or which are not in condition to receive the finish specified shall be corrected before prime coat is installed.



- B. New woodwork shall be thoroughly cleaned, hand sandpapered, and dusted off. Nail holes, cracks or defects in Work shall be filled. On stained woodwork, fill shall be colored to match stain. Filling shall be performed after the first coat of paint, shellac or varnish has been installed.
- C. Plaster surfaces except veneer plaster shall be allowed to dry at least 3 weeks before painting. Veneer plaster shall be allowed to dry sufficiently to receive paint as determined by moisture meter tests.
- D. Metal surfaces to be painted shall be thoroughly cleaned of rust, corrosion, oil, foreign materials, blisters, and loose paint.
- E. Do not install painting materials to wet, damp, dusty, dirty, finger marked, rough, unfinished or defective surfaces.
- F. Concrete surfaces shall be dry, cleaned of dirt and foreign materials and in proper condition to receive paint. Neutralize spots demonstrating effects of alkali.
- G. Mask off areas where necessary.

3.02 APPLICATION

- A. Backpainting: Immediately upon delivery to the Project site, finish lumber and millwork shall be backpainted on surfaces that will be concealed after installation. Items to be painted shall be backpainted with priming coat specified under "Priming".
- B. Priming: New wood and metal surfaces specified to receive paint finish shall be primed. Surfaces of miscellaneous metal and steel not embedded in concrete, and surfaces of unprimed plain sheet metal Work shall be primed immediately upon delivery to the Project site. Galvanized metal Work and interior and exterior woodwork shall be primed immediately after installation. Priming of surfaces and priming coat shall be as follows:
 - 1. Knots, Pitch and Sap Pockets: Shellac before priming.
 - 2. Exterior Woodwork and Wood Doors: Prime with one coat of exterior waterborne emulsion wood primer.
 - 3. Interior Woodwork: Where indicated to be painted, prime with one coat of waterborne wood primer.
 - 4. Stain: Woodwork indicated to receive a stain and varnish finish shall be stained to an even color with water borne stain. On open-grained hardwood, mix stain with paste filler and completely fill pores in wood.
 - 5. Galvanized Metal Work: Clean oil, grease and other foreign materials from surfaces. Install vinyl wash pretreatment coating. Follow manufacturer's instructions for drying time, and then prime with one coat of metal primer.
 - 6. Unprimed Iron, Steel, and Other Uncoated Metals: Where specified to be painted, prime with one coat of metal primer.



7. Shop Primed Metal Items: Touch up bare and abraded areas with metal primer before installation of second and third coats.
 8. Coats shall be installed evenly and with full coverage. Finished surfaces shall be free of sags, runs and other imperfections.
- C. Allow at least 24 hours between coats of paint.
 - D. Rollers shall not be used on wood surfaces.
 - E. Each coat of painted woodwork and metal, except last coat, shall be sandpapered smooth when dry. Texture-coated gypsum board shall be sanded lightly to remove surface imperfections after first coat of paint has been installed.
 - F. Each coat of paint or enamel shall be a slightly different tint as required. Each coat of paint, enamel, stain, shellac, and varnish will be inspected by the IOR before next coat is applied. Notify the Project Inspector that such Work is ready for inspection.
 1. Tinting Guideline: The first coat, primer/undercoat(s) to be untinted or tinted up to 50 percent lighter or darker (at the discretion of the installer) than the finish coat. The second coat (or third coat if a seal coat and undercoat have been specified) is to be factory tinted in the range of 10 percent to 15 percent lighter or darker (at the discretion of the installer) than the finish coat. The final coat is to be factory tinted to the required color selected. These tinting guidelines shall be provided on all surfaces receiving paint.
 - G. Do not "paint-out" UL labels, fusible links and identification stamps.
 - H. Paint Roller, brush and spray.
 1. Only Paint rollers shall be used on interior plaster, drywall, masonry/plaster and plywood surfaces, nap shall not exceed one half inch in length.
 2. First coat on wood overhang and ceilings shall have material applied by roller and then brushed out in a professional manner to leave surface free of imperfections. Finish coat may be sprayed.
 3. Other surfaces shall have all coatings applied with brushes of proper size.
 4. Spray work is permitted only on radiators, acoustic plaster, masonry and plaster.
 - I. Where ceilings are specified to be painted, beams, cornices, coves, ornamental features, plaster grilles, etc. shall be included.
 - J. Ceilings shall be white, including classrooms, storage rooms, offices, arcades, etc. Boiler room and fan room ceiling color shall match adjacent walls.

3.03 CLEANING

- A. Remove rubbish, waste, and surplus material and clean woodwork, hardware, floors, and other adjacent Work.



- B. Remove paint, varnish and brush marks from glazing material and, upon completion of painting Work, wash and polish glazing material both sides. Glazing material, which is damaged, shall be removed and replaced with new material.
- C. Clean hardware and other unpainted metal surfaces with recommended cleaner. Do not furnish abrasives or edged tools.

3.04 SCHEDULE

- A. Interior:
 - 1. Woodwork, Painted: 3 coats.
 - a. First Coat: As specified in this section under Priming.
 - b. Second and Third Coats: Interior enamel, semi-gloss or gloss as indicated.
 - 2. Woodwork, Stained and Varnished: 4 coats.
 - a. First Coat: As specified in this section under Priming.
 - b. Second, Third and Fourth Coats: Varnish, semi-gloss.
 - 3. Wood Corridor doors: 4 coats.
 - a. First Coat: As specified in this section under Priming.
 - b. Second, Third, and Fourth Coats: Varnish, gloss.
 - 4. Other Wood Doors: 4 coats.
 - a. Varnished or painted as indicated.
 - b. If varnished, same finish system as painted woodwork, with semi-gloss or gloss finish to match adjacent wall.
 - 5. Miscellaneous Woodwork: 4 coats. Wood items including, but not limited to: stair treads and risers, handrails, rolling ladders, wood base and shoe, chair rails, counter tops and locker room benches.
 - a. First Coat: As specified in this section under Priming.
 - b. Second, Third and Fourth: Exterior varnish, gloss.
 - 6. Casework: Interior surfaces of casework (except plastic laminate-faced casework) including top, edges and underside of shelving, poles, surfaces of drawers (except fronts), interior surfaces of mailbox pigeonholes, and particle board.
 - a. First Coat: Waterborne stain.



- b. Second and Third Coats: Satin varnish.
 7. Plaster: 4 coats.
 - a. First Coats: Pigmented wall sealer.
 - b. Second coat: Enamel under coater.
 - c. Third and Fourth Coats – Interior enamel, semi-gloss or gloss as indicated.
 8. Gypsum Board: 4 coats.
 - a. First Coat: Drywall sealer.
 - b. Second Coat: Enamel under coater.
 - c. Third and Fourth Coats: Interior enamel, semi-gloss or gloss as indicated.
 9. Concrete: 3 coats.
 - a. First: Concrete sealer.
 - b. Second and Third: Interior enamel, semi-gloss or gloss as indicated.
 10. Concrete Block: 3 coats.
 - a. First: Concrete block filler.
 - b. Second and Third: Interior enamel, semi-gloss or gloss as indicated.
 11. Metal: Shall be cleaned, pre-treated and painted with 3 coats. Items to be painted include, but are not limited to: exposed structural and miscellaneous steel, metal doors and frames, ladders, table and bench legs.
 - a. First Coat: Metal primer.
 - b. Second and Third Coats: Interior gloss enamel, except metal doors and frames which shall be semi-gloss or gloss to match adjacent wall.
- B. Exterior:
1. Woodwork: 3 coats.
 - a. First Coat: As specified in this section under Priming.
 - b. Second and Third Coats: Exterior house and trim enamel.
 2. Wood Doors: 3 coats.
 - a. First Coat: As specified in this section under Priming.



- b. Second and Third Coats: Exterior gloss enamel.
 3. Plaster and Stucco: 3 coats. Flat 100 percent acrylic.
 - a. Prime Coat: Alkali resistant primer/sealer.
 - b. Exterior 100 percent acrylic.
 4. Concrete: 3 coats. Flat 100 percent acrylic.
 - a. First Coat: Concrete sealer.
 - b. Second and Third Coats: Exterior 100 percent acrylic.
 5. Concrete Block: 3 coats. Flat 100 percent acrylic.
 - a. First Coat: Concrete block filler.
 - b. Second and Third Coats: Exterior 100 percent acrylic.
 6. Metal: 3 coats. Shall be cleaned and pre-treated. Items to be painted include, but are not limited to: steel columns and miscellaneous steel items, gravel stops, metal doors and frames, hoods and flashings.
 - a. First Coat: As specified in this section under Priming.
 - b. Second and Third Coats: Exterior gloss enamel.
- C. Mechanical and Electrical Work:
 1. Except where interior mechanical and electrical Work to be painted is specified to receive another paint finish, Work occurring in finished rooms and spaces shall be cleaned, pre-treated, and painted with 3 coats. Items to be painted include, but are not limited to: steel and copper piping, pipes, vents, fittings, ducts, plenums, miscellaneous supports and hangers, electrical conduit, fittings, pull boxes, outlet boxes, unfinished surfaces of plumbing fixtures, miscellaneous metal cabinets, panels, and access doors and panels.
 - a. First Coat: As specified in this section under Priming.
 - b. Second and Third Coats: Interior enamel, semi-gloss or gloss to match adjacent wall or ceiling finish.
 2. Insulation and Taping on Pipes and Ducts: 3 coats.
 - a. Finished Rooms:
 - 1) First Coat: Interior waterborne primer.
 - 2) Second and Third Coats: Interior semi-gloss or gloss enamel to match adjoining wall or ceiling finish.



- b. Building Exterior:
 - 1) First Coat: Exterior waterborne primer.
 - 2) Second and Third Coats: Exterior gloss enamel.
 - 3. Inside surfaces of ducts, vents, dampers and louvers as far back as visible from room in which they open shall be painted with 2 coats of flat black paint.
- D. Miscellaneous:
- 1. Outside Storage Units (wood or metal): 3 coats.
 - a. First Coat: As specified in this section under Priming.
 - b. Second and Third Coats: Exterior gloss enamel.
 - 2. Exterior and interior surfaces of storage bins, and potting tables shall have 3 coats of acrylic stain.
 - 3. Wood compost bins shall be finished with 3 coats of acrylic stain.

3.05 PROTECTION

- A. Protect the Work of this section until Substantial Completion.

3.06 CLEANUP

- A. Remove rubbish, debris, and waste materials and legally dispose of off the Project site.

END OF SECTION



SECTION 09 96 23

GRAFFITI-RESISTANT COATINGS

PART 1 - GENERAL

1.01 SUMMARY

- A. Work includes anti-graffiti coating.
- B. Related Requirements:
 - 1. Division 01 - General Requirements.
 - 2. Section 09 90 00: Painting and Coating.

1.02 SUBMITTALS

- A. Provide submittals in accordance with Division 01.
- B. Samples: Submit Samples of coating system.
- C. Product Data: Submit anti-graffiti coating manufacturer's technical data and installation instructions, recommended coverage rates for types of surfaces to be treated, and evidence that coatings conform to requirements specified. Submit evidence of code approvals.
- D. Furnish Samples on the same materials to which coating will be applied on. Indicate satin or flat finish. Coat one-half of each Sample, with the other half non-coated.
- E. Installer: Submit written evidence the installer for the Work of this section has completed at least five projects of similar complexity within the past five years.
- F. Certificate and Summary Statement: Before Substantial Completion, submit a certificate stating that coatings applied conform to reviewed submittals and specified requirements. Provide a summary statement setting forth the following:
 - 1. Number of square feet of each surface treated with coating, classified as to the kind of material treated, open pore or closed pore type, and whether vertical or horizontal.
 - 2. The number of gallons of each type, class, or grade of coating required to treat involved surfaces, based on the number of square feet of each type and orientation of the material the coating was installed on.
 - 3. Total gallons of each coating type, class, or grade installed.
- G. Maintenance Instructions: Furnish manufacturer's recommended graffiti removal instructions, and recommendations for recoating. Furnish names and addresses of cleaning firms and of suppliers of maintenance materials.
- H. Maintenance Material: Furnish five gallons of each product specified.



- I. LEED Submittals: Complete the LEED Material Buyout Form (MBoF) with all materials provided to the project. A complete submittal includes providing all material costs in the MBoF and all of the supporting documentation for the following credits:
1. MRc2 - Environmental Product Declarations (EPD): Provide Industry-Wide or Product-Specific EPD.
 2. MRc3 - Sourcing of Raw Materials - Recycled Content: Provide product data for pre- and post- consumer recycled content.
 3. MRc4 - Material Ingredients: Provide manufacturers Declare label, Health Product Declaration (HPD), Cradle to Cradle Certification, or Cradle to Cradle Health Product Certificate.
 4. IEQc2 - Low-Emitting Materials – Interior Wet Applied Products: For paints, coatings, adhesives and sealants applied on site or used for laminating off-site, include product data indicating the VOC content (g/L) and testing certificates or third party certification demonstrating compliance with California Department of Public Health (CDPH) v1.2-2017 emissions testing.

1.03 QUALITY ASSURANCE

- A. Manufacturer's Observation: Start coating application under the observation of the coating manufacturer's technical representative. Notify Project Inspector and coating manufacturer at least 72 hours before starting installation.
- B. Preliminary Tests: Perform tests on each kind of surface to be treated to establish the actual application rates required to provide the surfaces resistant to defacing and meet warranty requirements. Tests shall demonstrate the coating does not yellow, darken, mottle, or discolor any treated surface and those surfaces to be treated are dry. Established application rates shall not be less than those recommended in the coating manufacturer's technical data for the kind and surface orientation of the material.
- C. Compliance with Regulations: Materials shall comply with the current rules and regulations of the local air quality management district, with the rules regarding volatile organic compounds, and with FDA rules and regulations for dangerous materials in coatings.
- D. Materials shall meet requirements of SCAQMD regarding emission of solvents and other pollutants.
- E. Qualifications:
1. Manufacturer: Anti-graffiti coating shall be product of a manufacturer who has been regularly engaged in manufacturing anti-graffiti coatings for at least 5 years. Manufacturer shall supply references of at least five satisfactory installations in which anti-graffiti coating has been in service for at least five years.

1.04 DELIVERY, STORAGE AND HANDLING

- A. Deliver coating materials to the Project site in containers bearing name and batch number of manufacturer, with seals intact.

1.05 PROJECT CONDITIONS



- A. Protection: Install temporary coverings and protection, and do not allow coating to contact plastic, planting soil, plants, asphaltic paving, roofing membranes, or other materials that are likely to be damaged by coating.
- B. Weather Conditions: Do not install coating during windy, wet, or excessively hot or dry weather conditions.

1.06 WARRANTY

- 1. Manufacturer shall provide a five year material warranty.
- 2. Installer shall provide a one year application warranty.

PART 2 - PRODUCTS

2.01 ACCEPTABLE PRODUCTS

- A. Permashield, by Monopole Inc.:
 - 1. Permashield Premium 5600 over Aquaseal ME12, Permanent Graffiti Control, Monopole Inc., ND Graffiti Shield System, Rainguard VandlGuard System, or equal. Matte finish.
- B. Coval Anti-Graffiti coating by Coval Molecular Coatings.

2.02 PROPERTIES

- A. Coatings shall not darken or discolor the treated surfaces and shall be non-toxic, compatible with standard polymer type sealing materials, conforming to AQMD 1113, and certified by manufacturer as suitable over paint finish.
- B. Colors of opaque materials shall match adjoining colors, or shall be selected from manufacturer's custom colors.

2.03 LEED REQUIREMENTS

- A. IW/PS EDP: Products specified under this section must have a Type III Product Specific EPD or the company must be listed in the industry group responsible for the Industry Wide Externally Verified EPD.
- B. PS EPD: Products specified under this section must have a Type III Product Specific EPD.
- C. HPDs: Products specified under this section must have one of the following unexpired material ingredient reports compliant with LEEDv4.1 requirements and declared to 1000 ppm or less: Declare label, Health Product Declaration (HPD), Cradle to Cradle Certification, Cradle to Cradle Health Product Certificate, or UL Product Lens Certification.
- D. Interior Wet Applied Products: All wet-applied on-site paints, coatings, adhesives, and



sealants products provided under Part 2 of this specification section must be compliant with the VOC limits outlined under IEQc2: Low Emitting Materials in 01 81 13 Sustainable Design Requirements. In addition, all paints and coatings must be compliant with CDPH Standard Method v1.2-2017 emissions testing with proper unexpired CDPH testing certificates or acceptable third-party certification.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Do not start installation of coating if conditions are present that prevent or interfere with the correct preparation of surfaces or installation of coating system.

3.02 PREPARATION

- A. Remove dust, dirt, oil, grease, other deleterious substances and stain, and efflorescence and laitance from surfaces. Repair cracks and holes over 1/16 inch size. Spot prime cracks and holes 1/16 inch size and smaller and prime horizontal surfaces other than soffits with a heavy duty coating supplied by same coating manufacturer. Mask and protect adjoining surfaces and glass, unless coating is harmless and easily removed.

3.03 APPLICATION

- A. Install the anti-graffiti coating to surfaces indicated on drawings.
- B. Test graffiti resistant coating in an inconspicuous location to ensure adhesion and performance.
- C. Apply the anti-graffiti coating to surfaces indicated on drawings per manufacturer's recommended application methods and thicknesses.

3.04 CLEANING

- A. Remove rubbish, debris, and waste materials and legally dispose of off the Project site.

3.05 PROTECTION

- A. Protect the Work of this section until Substantial Completion.

END OF SECTION



SECTION 10 14 00 SIGNAGE

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

1. Interior and exterior accessibility, identification, directional and informational signs.
2. Parking signs.
3. Building sign.

B. Related Requirements:

1. Section 08 11 13: Hollow Metal Doors and Frames.
2. Division 09: Finishes.
3. Section 32 13 13 – Portland Cement Concrete Paving

1.02 REFERENCES

A. ASTM International:

1. ASTM A500 - Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes.
2. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.
3. ASTM D4802 - Standard Specification for Poly (Methyl Methacrylate) Acrylic Plastic Sheet.

1.03 SUBMITTALS

- A. Product Data: Submit material descriptions, finishes and color charts for each type of sign.
- B. Shop Drawings: Submit Shop Drawings indicating sign style, lettering, overall dimensions and quantities. Submit floor plans showing locations for each sign.
- C. Material Samples: Submit three samples illustrating full size sample sign, of type, style and color specified.
- D. Manufacturer's installation instructions.
- E. LEED Submittals: Complete the LEED Material Buyout Form (MBoF) with all materials provided to the project. A complete submittal includes providing all material costs in the MBoF and all of the supporting documentation for the following credits:
 1. MRc2 - Environmental Product Declarations (EPD): Provide Industry-Wide or Product-Specific EPD.
 2. MRc3 - Sourcing of Raw Materials - Recycled Content: Provide product data for pre- and post- consumer recycled content.



3. MRc4 - Material Ingredients: Provide manufacturers Declare label, Health Product Declaration (HPD), Cradle to Cradle Certification, or Cradle to Cradle Health Product Certificate.
4. IEQc2 - Low-Emitting Materials – Interior Wet Applied Products: For paints, coatings, adhesives and sealants applied on site or used for laminating off-site, include product data indicating the VOC content (g/L) and testing certificates or third party certification demonstrating compliance with California Department of Public Health (CDPH) v1.2-2017 emissions testing.

1.04 QUALITY ASSURANCE

- A. Pre-Installation Conference: Notify OAR when signs are ready for installation. Arrange for conference at site. Do not proceed with installation until ARCHITECT'S approval of specific locations and methods of attachment has been obtained.
- B. Provide signs from one manufacturer.

1.05 DELIVERY, STORAGE AND HANDLING

- A. Deliver products to site and protect from damage. Store until immediately prior to installation.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Products of following manufacturers are acceptable and are the basis for intended design and quality.
 1. ASI Signage Innovations
 2. H. Toji and Company.
 3. Karman Ltd., Architectural Signs.
 4. Vomar Products Inc.
 5. ASI-Modulex, Inc.
 6. Mohawk Sign Systems, Inc.
 7. Accent Signage Systems.
 8. The Gruenke Company.
 9. Ada Sign Products.
 10. AccuBraille.
 11. Equal.

2.02 MATERIALS AND FABRICATION

- A. Interior Sign Materials:
 1. Substrate Panel: 1/8 inch minimum thick, integrally colored or clear acrylic plastic, or laminated acrylic. Conforming to ASTM D4802; non-glare (matte), UV stable, suitable for interior and exterior use.



- a. Corners shall be square.
 - b. Edges shall be square and eased.
 - c. Colors as selected by ARCHITECT from manufacturer's custom color range.
2. Fasteners:
- a. Stainless steel tamper-proof screws and plastic anchors.
 - b. Signs mounted on fire-rated doors shall be secured with adhesive.
 - c. Adhesives and sealants shall comply with the limits for VOC content.
- B. Exterior Sign Materials:
1. Sign: ASTM B209 aluminum sheet, 0.080 inch thick with rounded corners of at least 1/8 inch radius and eased edges. White figure on a blue background; non-glare, high contrast signs. The blue shall be equal to color number 15090 in Federal Standard 595B.
 2. Post: 2 by 2 inch galvanized steel tubing, weighing minimum of 4.31 pounds per foot and conforming to ASTM A500, Grade B, 3/16 inch thick wall thickness.
 3. Concrete Post Footings: Refer to Section 32 13 13, Site Concrete Work.
 4. Fasteners: Stainless steel carriage bolts with tamper resistant nuts.
- C. Exterior Building Sign.
1. Illuminated Channel Letters
 - a. Material: Aluminum body with translucent acrylic face.
 - b. Letter Size: 14" high, 2" minimum depth.
 - c. Letter Style: As indicated in drawings.
 - d. Face Finish: As indicated in drawings.
 - e. Body Finish: Baked enamel, color as selected by from manufacturer's color chart.
 - f. Illumination: Combination of face and halo lit.
 - g. Mounting: wall mount.
- D. Characters and Symbols: Shall be fabricated by one of the processes described below:
1. Computer cut raised characters and graphics shall be cut from 1/16 inch integrally colored acrylic. Raised characters and graphics shall be inlaid 1/32 inch minimum into first surface of sign background, secured with adhesive so it cannot be removed without the use of tools. Raised characters and graphics shall have beveled, eased or rounded edges. Non-tactile text and graphics shall be applied to the second surface, and background color shall be applied to the second surface and protected with film or an additional backplate. Pictograms and other symbols including the International Symbol of Accessibility, which are included on signs with raised characters and Braille, are not required to be raised.



2. Raised characters and graphics including braille shall be integral to sign face and shall be formed into sign face by high pressure thermoforming using a negative mold. No applied, glued, welded tactile elements are acceptable. Raised characters and graphics shall have beveled, eased or rounded edges. No sharp, square edges are acceptable. Non-tactile text and graphics shall be applied to the second surface, and background color shall be applied to the second surface and protected with vinyl film. Pictograms and other symbols including the International Symbol of Accessibility, which are included on signs with raised characters and Braille, or other signs are not required to be raised.

2.03 COMMUNICATION ELEMENTS AND FEATURES

- A. Raised Characters Raised characters shall comply with CBC 11B-703.2.
 1. Character Type: Characters on signs shall be raised 1/32 inch minimum above their background and shall be sans serif uppercase characters duplicated in Braille. Characters and Braille shall be in a horizontal format.
 2. Character Height: Character height measured vertically from the baseline of the character shall be 5/8 inch minimum and 2 inch maximum based on the height of the uppercase letter “I”.
 3. Character Proportions: Characters shall be selected from fonts where the width of the uppercase letter “O” is 60 percent minimum and 110 percent maximum of the height of the letter “I”.
 4. Stroke Thickness: Stroke thickness of the uppercase letter “I” shall be 15 percent maximum of the height of the character.
 5. Character and Line Spacing shall be in conformance to CBC 11B-703.2.7 and 11B-703.2.8.
 6. Character Placement: Shall be placed in accordance to Paragraph 2.03, C below.
- B. Visual Characters: Visual characters shall comply with CBC Section 11B-703.5. Characters shall be conventional in form, and shall be uppercase or lowercase or a combination of both, as indicated on the drawings. Characters shall not be italic, oblique, highly decorative, or of other unusual forms.
 1. Finish and Contrast: Characters and their backgrounds shall have a non-glare finish. Characters shall contrast with their background with either light characters on a dark background or a dark characters on a light background.
 2. Character Proportions: Characters shall be selected from fonts where the width of the uppercase letter “O” is 60 percent minimum and 110 percent maximum of the height of the uppercase of the letter “I”.
 3. Character Height: Minimum character height shall comply with CBC Table 11B-703.5.5.
 4. Height from Finish Floor or Ground: Visual characters shall be a 40 inches minimum above the finish floor or ground
 5. Stroke Thickness: Uppercase letter “I” shall be 10 percent minimum and 20 percent maximum of the height of the character.



6. Character and Line Spacing: Shall be in accordance to CBC 11B-703.5.8 and 11B-703.5.9.
- C. Braille: Contracted Grade 2 Braille, conforming to CBC 11B-703.3. Braille characters shall be inlaid optically correct acrylic Raster beads into computer drilled holes in the panel surface.
1. Dimensions and Capitalization: Braille dots shall have a domed or rounded shape and shall comply with CBC Table 11B-703.3.1. The indication of an uppercase letter or letters shall only be used before the first word of sentences, proper nouns and names, individual letters of the alphabet, initials, and acronyms.
 2. Position: Braille shall be positioned below the corresponding text in a horizontal format, flush left or centered. If text is multi-lined, Braille shall be placed below the entire line of text. Braille shall be separated 3/8 inch minimum and 1/2 maximum from any other tactile characters and 3/8 inch minimum from raised borders and decorative elements.
- D. Pictograms: In conformance to CBC 11B-703.6. Pictograms shall have a field height of 6 inches minimum. Characters and Braille shall not be located in the pictogram field.
1. Finish and Contrast: Pictograms and their field shall have a non-glare finish. Pictograms shall contrast with their field with either a light pictogram on a dark field or a dark pictogram on a light field.
 2. Text Descriptors: Pictograms shall have text descriptors located directly below the pictogram field, and shall comply with CBC 11B-703.2, 11B-703.3 and 11B-703.4.
- E. International Symbol of Accessibility (ISA): Shall comply with CBC 11B-703.7 and CBC Figure 11B-703.7.2.1. The ISA shall consist of a white figure on a blue background. The blue color shall be approximate to FS. 15090 in Federal Standard 595C.
- F. Mounting Locations and Height: Signs with tactile characters shall be as indicated on the drawings and in conformance to CBC 11B-703.4.
1. Mounting Locations:
 - a. Identification signs for rooms and spaces shall be located on the wall adjacent to the latch side of the door, as one enters the room or space.
 - b. Signs that identify exits shall be located at the exit door when approached in the direction of egress travel.
 - c. Signs containing tactile characters shall be located so that a clear floor space 18 inches minimum by 18 inches minimum, centered on the tactile characters, is provided beyond the arc of any door swing between the closed position and 45 degree open position.
 - d. Where a tactile sign is provided at a door, the sign shall be located alongside the door at the latch side.
 - e. Where a tactile sign is provided at double doors with one active leaf, the sign shall be located at the inactive leaf.



- f. Where a tactile sign is provided at double doors with two active leaves, the sign shall be located to the right of the right hand door.
 - g. Where there is no wall space at the latch side of a single door or at the right side of double doors, signs shall be located on the nearest adjacent wall.
2. Mounting height above finish floor or ground: Tactile characters on signs shall be located 48 inches minimum above the finish floor or ground surface, measured from the baseline of the lowest Braille cells and 60 inches maximum above the finish floor or ground surface, measured from the baseline of the highest line of raised characters.

2.04 ROOM IDENTIFICATION SIGNS

A. Room Identification Sign Types:

1. Room Identification Sign with Changeable Insert: 7 inches high by 9 inches wide, minimum, with 4 inches high by 9 inches wide window for name and title removable insert. Locate room name immediately below window, and centered above room number. Room name shall be raised characters 3/4 inches high minimum, and room number 1 inch minimum; and shall be accompanied with Braille indicators.
2. Room Identification Sign with Room Name and Room Number: 7 inches high by 9 inches wide, minimum. Room name shall be raised characters 3/4 inches high minimum, and room number 1 inch minimum; and shall be accompanied with Braille indicators.
3. Room Number Sign: 7 inches wide by 4 inches high; room number, 1 inch high minimum, raised character, accompanied by Braille indicator immediately below.

B. Room Identification Sign Requirements:

1. Finish and Contrast: Refer to paragraph 2.03.B.
2. Raised Characters and Proportions: Refer to paragraph 2.03.A.
3. Braille: Refer to paragraph 2.03.C.
4. Mounting Location and Height: Refer to paragraph 2.03.F.

2.05 RESTROOM SIGNAGE

A. Multiple-Occupancy restrooms shall be provided with geometric symbols and wall mounted pictograms with text descriptors.

B. Geometric Symbols:

1. Doorways leading to toilet rooms shall be identified by a geometric symbol complying with CBC Section 11B-703.7.2.6.
2. Male Restroom Door Symbol: 1/4 inch thick equilateral triangle with edges 12 inches long, with vertex pointing upward, the triangle symbol shall contrast with the door, either light on a dark background or dark on a light background. A male silhouette shall appear within the equilateral triangle in contrasting color to it.



3. Female Restroom Door Sign: 1/4 inch thick circle 12-inch diameter, the circle symbol shall contrast with the door, either light on a dark background or dark on a light background. A female silhouette shall appear within the circle in contrasting color to it.
 4. “All Gender” Restroom Door Sign (Single occupancy restrooms): 1/4 inch thick circle, 12-inch diameter with a 1/4 inch thick equilateral triangle with the vertex pointing upward superimposed on the circle and within the 12-inch diameter. Triangle and circle shall be of contrasting colors; the circle symbol shall contrast with the door. A female and male silhouettes shall appear within the equilateral triangle in contrasting color to it, and the word “restroom” shall appear on the bottom part of the circle in contrasting color to it.
 5. Edges and Vertices on Geometric Symbols: Shall be eased or rounded at 1/16 inch minimum, or chamfered at 1/8 inch maximum. Vertices shall be radiused between 1/8 minimum and ¼ inch maximum.
 6. Location and Mounting Height: Symbols shall be mounted at 58 inches minimum and 60 inches maximum above the finish floor or ground surface measured from the centerline of the symbol. Where a door is provided the symbol shall be mounted within one inch of the vertical centerline of the door.
- C. Room Identification for Multiple-Occupancy Restrooms: Provide a 16 inch long by 6 inch tall room identification sign, including a pictogram of the International Symbol of Accessibility on a side. Restroom names shall be “Women” and “Men”. Characters, Braille, pictograms and mounting locations and height shall be in conformance to Article 2.03.
- D. Room Identification for Single-Occupancy Restrooms: Provide a 16 inch long by 6 inch tall room identification sign, including a pictogram of the International Symbol of Accessibility on a side. Text descriptor shall be “All Gender Restroom”. Characters, Braille, pictograms and mounting locations and height shall be in conformance to Article 2.03.

2.06 RAISED CHARACTER AND BRAILLE EXIT SIGNS

- A. Tactile Exit Sign Types:
1. “EXIT”.
 2. “EXIT ROUTE”.
 3. “TO EXIT”.
 4. “EXIT ONLY” on exit doors which lock from outside and does not allow a return.
- B. Sign Requirements:
1. Finish and Contrast: Refer to paragraph 2.03.B.
 2. Raised Characters and Proportions: Refer to paragraph 2.03.A.
 3. Braille: Refer to paragraph 2.03.C.
 4. Mounting Location and Height: Refer to paragraph 2.03.F.



2.07 ACCESSIBILITY ENTRANCE SIGNS AND PATH OF TRAVEL DIRECTIONAL SIGNS

- A. Entrance Sign: Provide at each building entrance an International Symbol of Accessibility sign. Signs shall be visible to persons along approaching pedestrian ways.
- B. Directional Signs: Provide where indicated on the drawings with arrow indicators and International Symbol of Accessibility.
- C. Signs shall be mounted on wall with lower edge between 48 inches and 60 inches above ground surface or finish floor. Pole mounted, overhead and projecting signs shall have the lower edge at least 80 inches from the ground surface or finish floor.
- D. Sign shall comply with the following requirements.
 - 1. Directional Signs: Refer to paragraph 2.03.B.
 - 2. Symbol of Accessibility: Refer to paragraph 2.03.E.
- E. No Smoking Sign: Provide at each building entrance. Reverse cut white vinyl sign with 4 1/2-inch high no smoking symbol, mounted on glass entry doors. Under No Smoking symbol, place words "No Smoking", 1/2 inch high minimum, San Serif upper and lower case characters.

2.08 PARKING SIGNS

- A. Tow-Away Sign: 18 inches by 24 inches with rounded corners. Black graphics on white background, with lettering not less than 1 inch high. Sign to read: "UNAUTHORIZED VEHICLES PARKED IN DESIGNATED ACCESSIBLE SPACES NOT DISPLAYING DISTINGUISHING PLACARDS OR SPECIAL LICENSE PLATES ISSUED FOR PERSONS WITH DISABILITIES WILL BE TOWED AWAY AT THE OWNER'S EXPENSE. TOWED VEHICLES MAY BE RECLAIMED AT [Insert location] OR BY TELEPHONING (213) 625-6631".
- B. Parking Space Identification Sign: 12-inch by 18-inch with rounded corners. White reflectorized graphic on dark blue background, and shall display an 8-inch high International Symbol of Accessibility per paragraph 2.03.E.
 - 1. Additional language or an additional sign below the International Symbol of Accessibility shall state I "Minimum Fine \$250".
 - 2. Signs identifying van accessible parking spaces shall contain additional language or an additional sign with the designation "Van Accessible".
- C. Signs shall be mounted on posts at head of each accessible parking with lower edge 80 inches minimum above ground surface, or mounted on walls at a minimum height of 60 inches from ground surface.

2.09 OCCUPANT LOAD SIGNS

- A. Provide maximum occupancy load signs. Post in a conspicuous place near the main exit or exit access doorway from the room or space of rooms and areas indicated in the drawings.
- B. Minimum size: 4 inches high by 8 inches wide, 7/8 inch high letters, 1 inch high numerals.



- C. Sign to read: “MAXIMUM OCCUPANCY LOAD XXX”. Indicate occupant load shown on drawings.

2.10 FIRE SPRINKLER RISER ROOM SIGN

- A. Locate one sign at each fire sprinkler riser room door as indicated in drawings.
- B. Text: Sign to read “Fire Sprinkler Riser Inside”, white characters, 1 inch high on red background.
- C. Sign Requirements:
 - 1. Raised Characters and Proportions: Refer to paragraph 2.03.B.
 - 2. Braille: Refer to paragraph 2.03.C.
 - 3. Mounting Location and Height: Mounted on the door, refer to paragraph 2.03.F.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Verify that surfaces are ready to receive work.
- B. Beginning of installation means installer accepts condition of existing surfaces.

3.02 METHODS OF INSTALLATION

- A. Interior Identification Signs and Interior Directional Signs:
 - 1. Fasten to wall with four tamper-proof round-head screws, one at each corner of sign. Furnish plastic anchors.
 - 2. When concealed installation is specified, install backplate to wall as above. Fasten sign to backplate with very high-bond double-faced tape.
 - 3. For installation on glass, fasten sign to glass with very high bond double faced tape. On opposite side of glass, anchor matching backplate to glass with very high-bond double-faced tape.
- B. Geometric Signs: Geometric toilet room signs shall be fastened to doors with three tamper-proof oval-head counter-sunk screws.
- C. Exterior Post Mounted Directional Signs: Size of required footing shall be as indicated on the drawings. Fasten sign with tamperproof stainless steel bolts.
- D. Exterior Wall Mounted Identification Signs and Directional Signs:
 - 1. Aluminum signs: Fasten to wall with 4 tamper-proof round-head screws, one at each corner of sign. Furnish plastic anchors.
 - a. Cement Plaster, Brick, or Masonry: Provide plastic anchors. For signs greater than 640 square inches use Leadwood Screw Anchors, concrete fasteners 1WSA 10112, or equal.
 - b. Chain Link Fence: Fasten with 9 gage hog rings, King Hughes Fasteners 5150DG50, or equal, with 11/16 inch opening at each corner of sign.



- c. Wrought Iron Fence: Install at each corner with 3/16 inch stainless steel rivets.
 2. Acrylic signs: Install backplate to wall as indicated above. Fasten sign to backplate with high-bond double-faced tape and silicone.
- E. Exterior Building Sign:
 1. Each letter shall be furnished with a minimum of three cast mounting lugs on backside, drilled and tapped to receive installation bolts.
 2. Letters shall be installed according to manufacturer's method PMC-1. Letters shall be installed $\frac{3}{4}$ inch away from wall surface, by an aluminum sleeve spacer.

3.03 CLEANUP

- A. Remove rubbish, debris, and waste materials and legally dispose of off Project site.

3.04 PROTECTION

- A. Protect Work of this section until Substantial Completion.

END OF SECTION



SECTION 10 21 13

PHENOLIC TOILET COMPARTMENTS

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

1. Solid phenolic toilet compartments, urinal screens, and vision screens.

B. Related Requirements:

- 1 Division 01 - General Requirements.
- 2 Section 05 41 00 - Structural Metal Stud Framing.
- 3 Section 06 10 00 - Rough Carpentry.
- 4 Section 10 28 13 - Toilet Accessories.

1.02 DESIGN REQUIREMENTS

- A. Design and fabrication shall conform to requirements of ADAAG and CBC Chapter 11B.
- B. Toilet Compartments: Floor supported overhead braced type units consisting of solid phenolic pilasters, panels and doors; plated steel leveling devices with stainless steel covers; and stainless steel fittings, hardware and fastenings.
- C. Urinal Screens: Floor supported and wall hung type consisting of solid phenolic screen panels and plated steel leveling devices with stainless steel covers, stainless steel fittings and fastening.
- D. Vision Panels: Floor- and wall-mounted solid phenolic type.

1.03 SUBMITTALS

- A. Shop Drawings: Submit Shop Drawings indicating complete layout, elevations of partitions, thickness of solid phenolic panels, fastenings, proposed method of anchoring, size and spacing of anchors, details of construction, hardware, fittings, mountings, method of assembly, other related items, and installation details.
- B. Product Data: Submit manufacturer's technical data for materials, fabrication, finishing, fastenings, hardware, and installation details.
- C. Material Samples:



1. Submit full range of Samples of phenolic chips for initial color selection. Chips shall be at least 2-inch by 3-inch.
 2. Submit Samples of hardware and fasteners.
- D. Certificates: Furnish manufacturer's certification that materials meet or exceed Specification requirements.

1.04 QUALITY ASSURANCE

- A. Comply with the following as a minimum requirement:
1. ASTM A167: Standard Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet and Strip.
 2. ASTM E84: Standard Test Method for Surface Burning Characteristics of Building Materials.
 3. Underwriters Laboratories Inc. (UL):
 - a. UL Fire Resistance Directory; applicable UL Design Numbers for application of fireproofing and conditions as indicated.
 4. Chemical Resistance: Panels to meet or exceed Scientific Equipment Furniture Association's (S.E.F.A.) list of 49 standard chemicals.
 5. Consistency:
 - a. Panels to have uniform thickness (+0.03 inch).
 - b. Panels to have uniform flatness (maximum difference of 0.03 inch) for a 10-foot span.

1.05 DELIVERY, STORAGE AND HANDLING

- A. Deliver materials to Project site with manufacturer's labels intact and legible, in sealed containers. Materials shall be kept dry.
- B. Protect compartments and screens.

1.06 COORDINATION

- A. Field Measurements: Secure field measurements prior to fabrication, for proper and adequate fabrication and installation of the Work of this section.
- B. Furnish inserts and anchorage built into other construction for installation of toilet compartments, urinal screens and vision panels.

1.07 WARRANTY



- A. Toilet Compartment Manufacturer shall provide a 25 year material warranty for solid phenolic panels and hardware.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Manufacturer:
 - 1. Qualifications of Toilet Compartment Manufacturer: Partition Manufacturer shall have been regularly engaged in the construction of Phenolic Toilet Compartments of the type specified for a minimum of five years.
- B. Solid Phenolic Panels:
 - 1. Basis of Design: Formica Solid Phenolic panels with -692 Folkstone Celesta, 689 Stellar, Formica Corporation.
 - 2. Wilsonart.
 - 3. Nevamar Surface Systems.
 - 4. Equal.
- C. Hardware:
 - 1. Basis of Design: Galaxy Hardware, Series 8033.
 - 2. Jacknob Corporation.
 - 3. Equal.

2.02 MATERIALS

- A. Toilet compartments panels, doors and pilasters; urinal screens and visual screens.
 - 1. Core: Phenolic impregnated Kraft papers. Panel shall be at least 93 pounds per cubic foot to ensure full saturation of Kraft core.
 - 2. Face Sheet: Over decorative papers impregnated with melamine resin and integrally compression molded with the core.
 - 3. Fire Resistance: The panels shall have the following surface burning characteristics and smoke generation values in accordance with UL 723 classification and labeling in accordance with ASTM E84 Class A tests and shall be self-extinguishing.
 - a. Flame spread: Maximum 30 for $\frac{3}{4}$ inch thick panels; 30 for $\frac{1}{2}$ inch thick panels.



- b. Smoke developed: Maximum 70 for 3/4 inch thick panels; 85 for 1/2 inch thick panels.
- 4. Panels shall be UL registered and labeled.
- 5. Panel shall be resistant to cleaning solvents and uric acid.
- 6. Product/Material Specification:
 - a. Modulus of Elasticity: 1.5 million psi minimum.
 - b. Shear Strength: 2,000 psi minimum.
 - c. Compressive strength: 24,000 psi minimum.
 - d. Water Absorption: 3 percent maximum.
 - e. Use Temperature: 350 degrees F maximum.
 - f. Surface and Edges: Non-porous.
 - g. Material Resistance: Will not support fungus or bacteria.
 - h. Uniform Load Deflection: 1/4 inch maximum per Table A:

<u>Table A: Uniform Load (lbs) which causes 1/4 inch deflection at Center</u>				
(Shelves not fixed at either end, static load on E modulus of 2.0 by 106)*				
Uniform Load in pounds:				
<u>Thickness</u>	<u>12 by 24-inch</u>	<u>12 by 36-inch</u>	<u>12 by 48-inch</u>	<u>24 by 36-inch</u>
1/2 inch	370	110	45	220
1/4 inch	1,400	400	170	800
*Loads can be affected by temperature, humidity, time, and other environmental factors. Users should test shelves in appropriate environment. It is assumed that deflection greater than 1/4 inch is undesirable aesthetically, even though rupture has not occurred.				

- B. Stainless Steel: ASTM A167, Type 304.
- C. Concealed Fasteners and Leveling Devices:
 - 1. Concealed Fasteners: Stainless steel.
 - 2. Leveling Devices: Zinc or cadmium coated steel, Stainless steel.

2.03 FABRICATION



- A. Doors shall be $\frac{3}{4}$ inch thick, panels $\frac{1}{2}$ inch thick, pilasters $\frac{3}{4}$ inch thick and screens $\frac{1}{2}$ inch thick. Edges shall be machined to a radius of $\frac{3}{16}$ inch; exposed surfaces shall be free of fabrication marks.
- B. Pilasters: Flush, formed of $\frac{3}{4}$ inch thick solid phenolic panels. Edges shall be machined to a radius of $\frac{3}{16}$ inch.
 - 1. Door Dimensions: Unless otherwise indicated, furnish 24-inch wide in-swinging doors for standard toilet compartments, 36-inch wide clear opening out-swinging doors when located at the end, and 36-inch wide clear opening out-swinging doors when located at the side for stalls equipped for use by the physically disabled
 - 2. Anchorage: Provide stainless steel anchorage, complete and threaded rods, washers, and leveling adjustment nuts at pilasters, to permit connection to floor slab. Furnish devices, which are designed to support pilasters from structure without transmitting load to floor fill.
 - 3. Overhead Bracing: Provide anti-grip, decorative, heavy duty, extruded aluminum head rail with clear anodized finish.
- C. Panels and Urinal Screens: Flush, formed of $\frac{1}{2}$ inch thick solid phenolic panels with a one inch corner radius. Height and width as indicated in drawings.

2.04 HARDWARE

- A. Door hardware shall be cast Type 304 stainless steel, as follows:
 - 1. Hinges: 11 gage Cast Stainless Steel Hinge. Hinge shall be cast of type 304 stainless steel and shall have a Satin finish. Hinge shall be gravity type for self-closing action and shall be fully adjustable up to 360 degrees. Pivot pin shall be made of type 304 stainless steel. Only stainless steel components shall be used in the construction of the Hinge. Plastic inserts are unacceptable. Hinges shall provide emergency access by lifting the door. Hinges shall be pre-drilled for mounting to door and pilaster with Stainless Steel through-bolts. Stamped stainless steel is not acceptable.
 - a. Galaxy Hardware: CS-560 (LeftHand IN/RightHand OUT) or CS-561 (RightHand IN/LeftHand OUT).
 - b. Jacknob Corporation: 7273 (RightHand IN/LeftHand OUT) or 7283 (LeftHand IN/RightHand OUT).
 - c. Equal.
 - 2. Continuous Hinge: Continuous 14 gauge stainless steel hinge (48.5") shall be made of Type 302/304 Stainless Steel and shall have a Satin Finish. Hinge shall be 3" wide and shall have four (4) Stainless Steel wire springs for self-closing action. Pivot pin shall be .250" in diameter, and shall be made of Type 304 Stainless Steel. Hinges shall provide emergency access by lifting the door. Hinges shall be pre-drilled for mounting to door and pilaster with Theft Proof



Stainless Steel Torx Head with Pin Through-Bolts. Brass inserts are unacceptable. Each Hinge Set is to be packaged in a separate carton, and is to be labeled by stock number, manufacturer, and left or right hand. Furnish one per door.

- a. Galaxy Hardware: SS-953 (LeftHand IN/RightHand OUT) or SS-954 (RightHand IN/LeftHand OUT).
 - b. Jacknob Corporation: 7339 (RightHand IN/LeftHand OUT) or 7349 (LeftHand IN/RightHand OUT).
 - c. Equal.
2. Strike and Keeper with Emergency Access: Refer to Detail #1 of this section. Strike and keeper shall be heavy duty ASTM A167, Type 304 cast stainless steel with a polished satin finish. All outside corners and edges shall be rounded to ensure there are no sharp edges. The strike and keeper shall provide emergency egress by lifting of the door. The strike and keeper shall be 2.50" high, with the mounting holes at 1.50" O.C. The wall thickness shall be a minimum of .125". The keeper shall have a minimum 7/8 inch tab to prevent impaling injuries. The strike and keeper shall be mounted to the pilaster with theft proof stainless steel Torx Head with pin through-bolts. Strike and keeper shall have an integral rubber bumper door stop rated and able to withstand a sudden impact of 350 lbs. Stamped stainless steel strike and keepers are unacceptable. Extra door stops that encumber the door opening and create a hazard are unacceptable. The stock number shall be molded into the back of strike and keeper for ease in identification. Furnish one per door.
- a. Galaxy Hardware: CS-458 (inswing strike & keeper), or CS-456 (outswing strike & keeper).
 - b. Jacknob Corporation 6283 (inswing strike & keeper), or 4913 (outswing strike & keeper).
 - c. Equal.
3. Slide Latch: Heavy duty cast stainless steel with satin finish. Slide latch shall be surface mounted. The slide bar shall be .150 inch thick, 1.020 inch wide and 3.720 inch long. Latch shall have an internal stainless steel buffering spring to prevent damage when door is inadvertently slammed against the latch. Mounting holes are to be spaced at 3.50 inch on center. Latch knob shall be riveted to the slide bar and welded to insure that the knob will not come off. Stock number shall be molded into the back of the slide latch for ease identification. Furnish one per door. Stamped stainless steel is not acceptable.
- a. Galaxy Hardware: CS-233.
 - b. Jacknob Corporation: 5053



- c. Equal.
4. Coat Hook: Heavy duty cast stainless steel with satin finish. Coat hook and bumper shall be 2.340 inch high, 1.230 inch wide and shall protrude out from the door 3.05 inch. The hook portion shall have a finished diameter of .250 inch thick. The stock number shall be molded into the back of the Coat Hook and Bumper for ease in identification. Furnish one per door. Stamped stainless steel is not acceptable. Mount at 48 inches maximum above finished floor in accessible toilet compartments.
 - a. Galaxy Hardware: CS-274.
 - b. Jacknob Corporation.
 - c. Bobrick: B-212.
 - d. Equal.
5. Door Stop: Heavy duty cast stainless steel with satin finish. Plated Zarnac Door stops are unacceptable. Door Stop shall have a 2.125 inch base diameter and shall protrude 1.80 inch from the Wall. The bumper at the end of the Door Stop shall be .250 inch thick. The diameter of the shaft shall be .6875 inch. The stock number shall be molded into the back of the Door Stop for ease in identification. Stamped stainless steel is not acceptable.
 - a. Galaxy Hardware: CS-276.
 - b. Jacknob Corporation: 4123.
 - c. Equal.
6. Pull Handle:
 - a. Heavy duty cast stainless steel with satin finish. Plated Zamac Door pulls are unacceptable. Pull Handle shall protrude from the face of the door .940 inch and shall be 4.735 inch long. The Pull Handle shall have mounting holes drilled and tapped for 10/24 threads at 3.50 inch on center. The Pull Handle shall be .655 inch wide and shall be mounted back to back with the slide latch. The stock number shall be molded into the back of the pull handle for ease in identification. Stamped stainless steel is not acceptable. Provide u-pull shape handle on each side of accessible toilet compartment doors.
 - 1) Galaxy Hardware: CS-277.
 - 2) Jacknob Corporation: 6253.
 - 3) Equal.
 - b. Accessible Door Pull: 5-1/8 inch by 3 inch high stainless steel pull:



- 1) Galaxy Hardware: PH-200.
 - 2) Jacknob Corporation: 6253.
 - 3) All Partitions A0625.
 - 4) Equal.
- B. Pilaster Shoes: ASTM A167, Type 302/304 Stainless Steel, minimum 3-inch high, 18 gauge, finish with #3 Directional polish, attached with stainless steel through bolts.
- C. Brackets: One piece double ear bracket or single ear bracket (at end partition) extending within 3 inches of top and bottom panel edges. Extruded 6063-T5 Aluminum with a satin anodized finish or 304 stainless steel. The minimum weight shall be 1.685 pounds per lineal foot. Inside opening of Bracket shall be .50 inch for panels, .75 inch for pilasters. Holes for mounting to wall and panel/pilaster shall be pre-drilled. Holes are to be spaced at 9 inches on center along the full length of the bracket for a total of twelve holes (double ear) for mounting to the wall and six holes (single ear) for mounting to the panel/pilaster. Each bracket is to have a minimum wall thickness of .125 inch.
- D. Overhead Bracing (Headrail): Continuous heavy duty extruded 6063-T5 Aluminum Headrail with anti-grip profile. Head rail shall have integral reinforcing channel and curtain track. Head rail shall have Satin Anodized finish. Provide headrail corner brackets, wall brackets, and headrail end caps as required. The headrail and headrail brackets shall have a minimum wall height of 2 inch. The minimum wall thickness of the headrail and head rail brackets shall be .125 inch.
1. Galaxy: AL-115 (16' antigrip headrail), EC-120 (3/4" END CAP), HP-132 (Headrail to wall bracket pack), HP-970 (Corner headrail bracket pack).
 2. Jacknob Corporation: 80188 – Extruded Aluminum Headrail, 2109 Headrail Wall Brackets, 6672 Headrail End Caps.
 3. Equal.
- E. Chrome-plated, non-ferrous cast alloy material shall not be furnished for hinges, brackets, locks, latches and other fittings and accessories.

PART 3 - EXECUTION

3.01 EXAMINATION AND PREPARATION

- A. Before covering wall framing with finish materials, examine framing to ensure that backing plates and structural framing have been installed in such position as to receive all attachment screws.
- B. Verify spacing of plumbing fixtures to ensure compatibility with installation of compartments.



- C. Do not start the Work of this section until all deficiencies have been corrected.

3.02 INSTALLATION

- A. Install partitions and screens as shown in the Shop Drawings and in accordance with manufacturer's instructions and as specified. Install straight, level and plumb.
- B. No evidence of drilling, cutting or patching shall be visible in finished Work.
- C. Fasten panel brackets securely to walls and ceilings with recommended anchoring devices.
- D. Fasten panels and pilasters to brackets with through bolts and nuts.
- E. Fasten urinal screen panels to walls with a continuous bracket.
- F. Provide ½ inch spaces between wall surface and panels or pilasters.
- G. Provide for adjustment of floor variations with non-breakable plastic shoes on pilasters. Conceal floor fastenings in pilaster shoes.
- H. Furnish each toilet compartment door with top and bottom hinges, and door latch.
- I. Install door strike keeper on each pilaster in alignment with door latch.
- J. Furnish each toilet compartment door with one coat hook and bumper.

3.03 TOLERANCES OF INSTALLED WORK

- A. Maximum Variation from Plumb or Level: 1/8 inch.
- B. Maximum Misplacement from Intended Position: 1/8 inch.

3.03 ADJUSTING AND CLEANING

- A. Hardware Adjustment: After installation, adjust hardware for proper operation. Install hinges on in-swinging doors to hold open approximately 30 degrees from the closed position when unlatched. Install hinges on out-swinging doors to return to the fully closed position. Door shall be plumb with pilasters when door is closed.
- B. Adjust and align door hardware to uniform clearance at vertical edges of doors. Clearance space shall not exceed ¼ inch.
- C. Cleaning: Clean compartments, hardware, and doors before Substantial Completion and leave free from imperfections. Remove protective coverings.

3.04 CLEANUP

- A. Remove rubbish, debris, and waste materials and legally dispose of off the Project site.



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3.05

PROTECTION

- A. Protect the Work of this section until Substantial Completion.

END OF SECTION



SECTION 10 28 13

TOILET AND JANITOR ACCESSORIES

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

1. Toilet accessories.

B. Related Requirements:

1. Division 01 - General Requirements.
2. Section 05 41 00 - Structural Metal Stud Framing.
3. Division 9 - Finishes
4. Section 10 21 13 - Plastic Toilet Compartments.

1.02 REGULATORY REQUIREMENTS

- A. Comply with CBC Chapter 11B requirements and ADAAG recommendations for accessibility.

1.03 SUBMITTALS

- A. Shop Drawings: Submit a schedule of accessories and Shop Drawings indicating installation methods and fasteners.

- B. Changing Tables: Submit conformance to specified standards.

- C. LEED Submittals: Complete the LEED Material Buyout Form (MBoF) with all materials provided to the project. A complete submittal includes providing all material costs in the MBoF and all of the supporting documentation for the following credits:

1. MRc2 - Environmental Product Declarations (EPD): Provide Industry-Wide or Product-Specific EPD.
2. MRc3 - Sourcing of Raw Materials - Recycled Content: Provide product data for pre- and post- consumer recycled content.
3. MRc4 - Material Ingredients: Provide manufacturers Declare label, Health Product Declaration (HPD), Cradle to Cradle Certification, or Cradle to Cradle Health Product Certificate.



4. IEQc2 - Low-Emitting Materials – Interior Wet Applied Products: For paints, coatings, adhesives and sealants applied on site or used for laminating off-site, include product data indicating the VOC content (g/L) and testing certificates or third party certification demonstrating compliance with California Department of Public Health (CDPH) v1.2-2017 emissions testing.

1.04 QUALITY ASSURANCE

- A. Coordinate related Work as required to ensure proper and adequate provision in framing of backing and wall finish for installation of accessories.
- B. Coordinate requirements of Section 10 21 13 - Plastic Toilet Compartments to ensure that correct openings are provided in partitions for toilet accessories where required.

1.05 DELIVERY, STORAGE AND HANDLING

- A. Protect accessories from damage.

PART 2 - PRODUCTS

2.01 GENERAL

- A. Manufacturer Basis of Design: Bobrick Washroom Equipment, Inc. 6901 Tujunga Ave. North Hollywood, CA. 91605-6213, Tel: (818) 764-1000, or approved equal.
- B. Accessories shall be provided with necessary anchoring devices and fasteners appropriate for surfaces on which items are to be fastened.

2.02 TOILET AND JANITOR ACCESSORIES

- A. Refer to architectural drawings for Toilet and Janitor accessories schedule.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Check openings in substrates to receive accessories. Verify openings are correctly located and sized to receive accessories, and that locations will comply with disability access requirements. Confirm that blocking, backing or support is properly located and adequate for the accessory installation.
- B. Verify spacing of plumbing fixtures and toilet partitions. Confirm spacing and locations are compatible with proposed accessory locations and will allow compliance with disability access requirements.



3.02 INSTALLATION

- A. Install toilet accessories in accordance with manufacturer's written recommendations and accessibility requirements. Fasten components firmly in place.
- B. Drill holes to correct size and application that is concealed by item with ¼ inch tolerance.
- C. Install recessed accessories into wall openings with sheet metal screws into metal frames.
- D. Install surface-mounted accessories to backing plates with machine screws, plumb, and aligned.
- E. Grab Bars:
 - 1. Fasten to toilet partition with 3-inch diameter stainless steel back plates with studs, couplings, and stainless steel machine screws.
 - 2. At wood stud walls, fasten wood blocking with threaded stainless steel wood screws of sufficient length to penetrate blocking 1 ¼-inch minimum.
 - 3. At metal stud walls, provide 1/8 inch cold-rolled steel plate, drilled and tapped for machine screws, or 16 gage cold-rolled steel plate complete with threaded sleeves for stainless steel machine screws. Weld plates to studs.
 - 4. At concrete or masonry walls, install bars with sheet metal screws and expansion anchors.
 - 5. At plaster or gypsum board walls, provide spacers of same thickness as wall material to prevent crushing of wall material.
- F. Mirrors: Install mirror on manufacturer supplied concealed wall hanger and fasten with two theft-resistant locking screws.
- G. Stainless Steel Medicine Cabinet: Fasten cabinet to wall.
- H. Before Substantial Completion, deliver keys and maintenance instructions and product data to OAR.

3.03 ADJUSTING AND CLEANUP

- A. Adjust accessories for proper operation.
- B. Remove rubbish, debris, and waste material and legally dispose of off the Project site.

3.04 PROTECTION



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- A. Protect the Work of this section until Substantial Completion.

END OF SECTION



SECTION 10 44 13

FIRE EXTINGUISHERS AND CABINETS

PART 1 - GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Fire Extinguishers and Cabinets.
- B. Related Requirements:
 - 1. Division 01 - General Requirements.
 - 2. Section 09 29 00 - Gypsum Board.

1.02 SUBMITTALS

- A. Shop Drawings: Indicate materials, sizes, anchorage, and installation details.
- B. Product Data: Submit manufacturer's product literature, indicating product characteristics.
- C. Material Samples: Submit manufacturer's standard cabinet color Samples for selection by Architect.
- D. LEED Submittals: Complete the LEED Material Buyout Form (MBoF) with all materials provided to the project. A complete submittal includes providing all material costs in the MBoF and all of the supporting documentation for the following credits:
 - 1. MRc2 - Environmental Product Declarations (EPD): Provide Industry-Wide or Product-Specific EPD.
 - 2. MRc3 - Sourcing of Raw Materials - Recycled Content: Provide product data for pre- and post- consumer recycled content.
 - 3. MRc4 - Material Ingredients: Provide manufacturers Declare label, Health Product Declaration (HPD), Cradle to Cradle Certification, or Cradle to Cradle Health Product Certificate.
 - 4. IEQc2 - Low-Emitting Materials – Interior Wet Applied Products: For paints, coatings, adhesives and sealants applied on site or used for laminating off-site, include product data indicating the VOC content (g/L) and testing certificates or third party certification demonstrating compliance with California Department of Public Health (CDPH) v1.2-2017 emissions testing.

1.03 QUALITY ASSURANCE



- A. Installer shall be manufacturer trained and certified to install the Work of this section.

1.04 DELIVERY, STORAGE AND HANDLING

- A. Deliver products in manufacturer's wrapping to protect items.
- B. Store items in a dry, enclosed area.

PART 2 - PRODUCTS

2.01 FIRE EXTINGUISHERS AND CABINETS

- A. Location: Fire extinguisher cabinets and fire extinguishers shall be installed where indicated on Drawings or as required by authorities having jurisdiction.
- B. Manufacturer: Fire extinguishers and cabinets shall be manufactured by one of the following:
 - 1. Potter-Roemer.
 - 2. J. L. Industries.
 - 3. Larsen's Manufacturing.
 - 4. Modern Metal Products.
 - 5. Waltrous.
 - 6. Amerex (fire extinguishers).
 - 7. Equal.
- C. Fire Extinguisher Type: Provide a legally appropriate rechargeable fire extinguisher for every fire extinguisher cabinet and as otherwise indicated.
 - 1. Type ABC multi-purpose dry chemical with UL rating 2A:10B:C, 5 pound size, also with red glossy polyester coated steel cylinder, pressure gage, hose and horn. Maximum Height: 15 ¼-inch. Maximum Cylinder Diameter: 4 ½-inch.
- D. Fire Extinguisher Requirements:
 - 1. Design Specification:
 - a. Finish: Corrosion and impact resistant red epoxy.



- b. Valve Stem Assembly: Metal, reusable, connects to cylinder by threaded pipefitting, aluminum or steel siphon tube, and shatter resistant plastic face gage.
 - c. Gage (if applicable) to Indicate: “Recharge,” “fully charged (195 PSI),” and “over charge.”
 - d. Pull Pin: Metal, reusable and securely fastened to unit with metal, aluminum chain or very heavy plastic line approximately 4 ½-inch long.
 - e. Mechanical Operation: Pistol grip, heavy duty metal handle (plastic not permitted), and shall be operated by a grip and squeeze lever.
 2. Manufacturer Identification/Information: Manufacturer’s name, date manufactured, model number, U.L. approval seal and number, contents operating instructions, Fire Marshall approval, etcetera shall be identified on the Fire Extinguisher.
 3. Warranty:
 - a. Manufacturer shall provide a five year material warranty.
 - b. Installer shall provide a five year installation warranty.
 4. Material Safety Data Sheet: Provide an MSDS sheet with every shipment.
- E. Fire Extinguisher Cabinet: Potter-Roemer cabinets are listed as the standard of quality, products by other listed manufacturers are acceptable.
 1. Fully recessed cabinet: Provide fully recessed, square trim edge cabinet with ½ inch projection:
 - a. Potter-Roemer Fire Extinguisher Cabinet 7020:
 - 1) Door Style: either DVL (Duo Vertical Panel with lock) or E (Center Break Glass with lock), glass to be clear tempered safety glass.
 - 2) Cabinet Door and Frame: Cold rolled steel electrostatically applied, thermally fused polyester coating with recoatable white finish.
 - 3) Identification Lettering: Cabinet door to be furnished with die cut lettering indicating “FIRE EXTINGUISHERS” in contrasting color to cabinet finish, and either vertical or horizontal lettering depending upon door style.



2. Semi-recessed cabinet: Provide semi-recessed, square trim edge cabinet with 1 1/4 inch to 2-inch projection:
 - a. Potter-Roemer Fire Extinguisher Cabinet 7022:
 - 1) Door Style: either DVL (Duo Vertical Panel with lock) or E (Center Break Glass with lock), glass to be clear tempered safety glass.
 - 2) Cabinet Door and Frame: Cold rolled steel with electrostatically applied, thermally fused polyester coating with recoatable white finish.
 - 3) Identification Lettering: Cabinet door to be furnished with die cut lettering indicating "FIRE EXTINGUISHERS" in contrasting color to cabinet finish, and either vertical or horizontal lettering depending upon door style.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Installation shall be in accordance with manufacturer's recommendations.
- B. Cabinets shall be installed plumb and level, where indicated on Drawings, at heights required by authorities having jurisdiction.

3.02 PROTECTION

- A. Protect the Work of this section until Substantial Completion.

3.03 CLEANUP

- A. Remove rubbish, debris, and waste materials and legally dispose of off Project site.

END OF SECTION



SECTION 10 51 13 METAL LOCKERS

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

1. Metal lockers and accessories.

B. Related Requirements:

1. Division 01 - General Requirements.
2. Section 03 30 00 - Cast-In-Place Concrete.

1.02 REFERENCES

- A. ASTM International (ASTM): ASTM A792, Standard Specification for Steel Sheet.

1.03 SUBMITTALS

- A. Shop Drawings: Submit Shop Drawings indicating locker sizes, locations, construction details and locker numbering layout. Indicate size and location of accessories, mounting heights of hardware and details of anchorage.
- B. Material Samples: Submit color chips of manufacturer's standard colors for selection by ARCHITECT.
- C. The manufacturer shall supply a Certificate of Conformance stating that finished surfaces are lead free and that they satisfy finish requirements of these specifications.
- D. LEED Submittals: Complete the LEED Material Buyout Form (MBoF) with all materials provided to the project. A complete submittal includes providing all material costs in the MBoF and all of the supporting documentation for the following credits:
1. MRc2 - Environmental Product Declarations (EPD): Provide Industry-Wide or Product-Specific EPD.
 2. MRc3 - Sourcing of Raw Materials - Recycled Content: Provide product data for pre- and post- consumer recycled content.
 3. MRc4 - Material Ingredients: Provide manufacturers Declare label, Health Product Declaration (HPD), Cradle to Cradle Certification, or Cradle to Cradle Health Product Certificate.



4. IEQc2 - Low-Emitting Materials – Interior Wet Applied Products: For paints, coatings, adhesives and sealants applied on site or used for laminating off-site, include product data indicating the VOC content (g/L) and testing certificates or third party certification demonstrating compliance with California Department of Public Health (CDPH) v1.2-2017 emissions testing.

1.04 QUALITY ASSURANCE

A. Qualifications:

1. Manufacturer: Regularly engaged in manufacturing metal lockers for at least 5 years.
2. Installer: Trained and certified by the equipment manufacturer.

1.05 DELIVERY, STORAGE AND HANDLING

- A. Deliver materials to the Project site with manufacturer's labels intact and legible.
- B. Protect metal lockers before, during and after installation. In case of damage, immediately provide necessary repairs and replacements.

PART 2 -- PRODUCTS

2.01 MANUFACTURERS

- A. Lyon Metal Products Inc.
- B. Nelson Adams Naco.
- C. Penco Products.
- D. List Industries Inc., Superior, Heavy-Duty Corridor.
- E. Equal.

2.02 FABRICATION

- A. Frames: Constructed from 16 gage steel formed to a channel to include a continuous door stop on each side of frame, with at least 16 gage steel formed channel cross lapped members located at top and bottom and welded at corners. Bodies shall be at least 16 gage cold-rolled steel for tops, intermediate bottoms and sides. Backs shall be minimum of 18 gage cold rolled steel with bottoms and intermediate bottoms totally enclosed and bolted or riveted. The bottoms and intermediate bottoms shall fit tight along the sides and backs. A gap minimally greater than 1/16" is allowable at the tabs locating the part



inside the door frame and at the back corners where legs can be fitted. The bottom of lowest opening in the locker shall be constructed from 16 gage cold rolled steel, reinforced each one with a 16 gage cold rolled steel hat section to prevent distortion when anchored. Lockers bodies assembled of all welded construction are not acceptable.

B. Doors:

1. Lockers shall be furnished with right-hand hinged doors, unless otherwise indicated. Doors shall be at least 14 gage cold-rolled steel. Custodial lockers shall have mini louver perforations – 16 minimum at top of door and 16 minimum at bottom of door. No louver perforations for lockers at corridors, halls, exterior, etc.
2. Door stiffeners – Minimum 18 gage steel, 2 inches wide, formed in a hat channel shape and located top to bottom along the hinge side of each door. Weld a minimum of 6 inches on center and tack welded to the top and bottom door flange. Door stiffeners shall not have openings.
3. Doors shall be provided with non-corrosive number plates, 22 gage aluminum minimum, having figures approximately 3/8 inch high etched into metal, finished in black enamel and fastened with binder-head bolts, or rivets. Split rivets are not permitted. Holes in number plates and doors shall be the same size and shall not exceed 0.125 inch.
 - a. Provide numbering for lockers.
 - b. Locker numbering shall start with number 1, and increase consecutively throughout the room, running first from top to bottom on multi-tiered lockers and then from left to right consecutively.
 - c. Accessible lockers shall also be numbered following this sequence.

C. Door Handles: Recessed handles shall be constructed 22 gage, drawn plated steel, stainless steel, or die cast zinc alloy, nickel plated, with a minimum tensile strength of 40,000 PSI, and shall be furnished with a 3/8 inch eye for a 3/16 inch standard padlock and padlock strike. Doors 72 inches or more in height shall be furnished with three locking points. The two locking points shall be no more than 8 inches from top and bottom. The third locking point shall be at the center. Doors shall be automatic latching when pushed shut. All other locker doors shall be single point latching.

D. Hinges: 16 gage continuous piano hinge for the full height of the door. Weld the hinge to the door and rivet to the door frame using 3/16 inch diameter rivets.

E. Shelves, Hooks and Coat Rods: Lockers shall be furnished with at least two single-prong hooks with ballpoints, located on opposite sides. Hooks shall be smooth and



rustproof and shall be fastened with two dome head 10-14 bolt with Kep nuts (nut with built on external tooth lock washer) each or 2 each 3/16" diameter pop rivets. Lockers that are 72 inches, and are 18 inches or deeper, shall be furnished with coat rod and 2 coat hooks. Single-tier 72-inch high lockers shall be furnished with one shelf, 9 inches from top of locker.

F. Accessible lockers

1. Comply with Americans with Disabilities Act (ADA) requirements.
2. Handle: One handed operation and shall not require tight grasping, pinching, or twisting of the wrist. The force required to activate operable parts shall be 5 pounds maximum. Operable handle shall be located no lower than 15" and no higher than 48" above finish floor.
3. Locker bottom: The locker bottom shall be no lower than 15" above finish floor. If the bottom of the opening designated as ADA accessible is located below this minimum, an additional shelf shall be installed no less than 15" above finish floor.
4. Single Tier Lockers: 72-inch Lockers: Provide shelf and coat hooks 48 inches above finish floor. If locker is 18 inches or deeper, a coat rod shall be provided with 2 coat hooks.
5. Assigned Lockers: minimum one locker and not less than 5 percent of total lockers shall be accessible.
6. Provide manufacturer's 4 by 4-inch ISA symbol decal.
7. Accessible lockers shall include an accessible lock with a metal dial, 1695MK ADA Master Lock Company, Zephyr 1992A or equal. 72 inch locker doors shall include 1636MKADA Master Lock, Zephyr 1930A or equal. Mounting height for locks shall be 48 inches maximum above floor.

G. Kep nuts and/or 3/16" diameter pop rivets shall be used for assemblies, including those to attach wardrobe hooks. Bolts shall not protrude more than 1/8 inch past dome head 10-14 bolt with Kep nut.

H. Exposed ends, backs and tops ends, backs tops and hoods, shall be 16 gage cold-rolled steel.

I. Parts shall be finished before assembly; fasteners shall be cadmium-plated.

J. Locks:

1. All keyed/combo combination locks shall have black metal dials with white lettering.



2. Lockers shall be furnished with built-in Master 1690MD, Zepher 1992, or equal, master keyed combination locks. Each shall be furnished with separate control keys; 12 each for 24 keys. Control key numbers shall be obtained from the OAR.
 3. Custodial lockers shall be furnished with built-in Master 1790KA key lock or equal locks. Locks shall be keyed differently and master-keyed. Furnish two keys for each lock. Master key number shall be obtained from the OAR. Provide two master keys.
 4. 72 inch locker doors shall include 1630MD Master Lock, Zephyr 1930, or equal. Cafeteria lockers shall be furnished with 3/8-inch hole in handle for personal locks (no-built-in locks). Blank off combo hole.
- K. Accessories: Lockers shall be furnished with 16 gage sloping tops unless recessed. Lockers shall be furnished with metal legs and skirts unless they are installed on a raised concrete curb and/or platform. Provide 16 gage cold-rolled steel trim, cap strips, filler strips, corner fillers, and other items required for a complete assembly.

2.03 FINISH

- A. Lockers shall be GREENGUARD Gold Certified by UL Environment through the GREENGUARD Certification Program.
- B. Steel shall be galvalume coated per ASTM A792. Surfaces shall be finished with either powder coating, or a heavy coat of baked-on enamel. Dry film thickness shall be a minimum of 2 mil for all surfaces. The manufacturer shall supply a Certificate of Conformance stating that the lockers satisfy finish requirements of these specifications.
- C. Finished surfaces shall be lead free. The manufacturer shall supply a Certificate of Conformance stating that finished surfaces are lead free and that they satisfy finish requirements of these specifications.
- D. Manufacturer shall provide a minimum of five standard colors. Standard color to be selected by ARCHITECT. The selected color applied at exterior exposed areas including side panels, tops, frame, hinges and doors with a light shade common color applied on all internal areas.

2.04 LOCKER BENCHES

- A. Bench Tops: Provide manufacturer's standard solid phenolic resin, one-piece units, 3/4 inch thick, with rounded corners and edges.
 1. Standard bench: 9 ½-inch wide.
 2. Accessible bench: 24-inch wide and 48-inch in length.



3. Height: 17 to 19 inches above finish floor.
 4. Bench lengths shall be as indicated on the drawings.
- B. Pedestals: Provide manufacturer's standard pedestal supports, with predrilled fastener holes, complete with fasteners and anchors, and as follows:
1. Type: Tubular steel, minimum 1 ¼ inch diameter by 0.12 inch thick wall, with steel flanges welded at top and base. Steel flanges shall be minimum 7-3/8 inches diameter by 0.125 inch thickness for shaped flanges; flat flanges shall have a minimum thickness of 0.375 inch. Finish shall be baked enamel.
 2. Color: As selected by ARCHITECT from manufacturer's full range.
 3. Bench Fastener: Thru Bolt with ¼ inch by 20 Stainless Steel Carriage Bolts, Nuts, and Lock Washers.
 4. Floor Fastener: No. 14 by 2 inch stainless steel expansion bolts sunk into concrete floor.
- C. Bench Assembly: Furnish a minimum of two pedestals for each bench, with pedestal spacing not more than 36 inches on centers.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Locker banks shall be fabricated with independent backs.
- B. Installation of lockers shall be in accordance with manufacturer's written recommendations and reviewed Shop Drawings. Installation shall meet requirements of Department of Health Services codes. Installed lockers shall comply with ADAAG and CBC Chapter 11B requirements.
- C. Provide and install trim, sloped, hoods, tops, cap strips, ends and back panels, filler strips, corner fillers and any other items required to complete installation in accordance with manufacturer's written recommendations and this specification. Exposed ends, tops, and backs shall be 16 gage cold-rolled steel and powder coated to match new lockers.
- D. Lockers shall be completely assembled and ready for installation prior to delivery to the Project site. The lockers shall be set plumb and securely fastened in place. Bottom of lockers shall be reinforced to prevent distortion from anchoring devices.
- E. Anchor lockers to back wall, not to exceed 4 feet. Anchor back to back lockers to floor, not to exceed 4 feet.



- F. The back shall be secured with a minimum thickness of 5/16 inch zinc plated steel or stainless steel anchor as indicated on drawings.

3.02 CLEANUP

- A. Remove rubbish, debris, and waste materials and legally dispose of off the Project site.

3.03 PROTECTION

- A. Protect the Work of this section until Substantial Completion.

END OF SECTION



SECTION 10 81 13

BIRD CONTROL DEVICES

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

1. Spike bird deterrent system including adhesives and anchorage.

1.02 SUBMITTALS

- A. Product Data: Submit manufacturer's Product Data for materials and accessories and installation instructions.
- B. Shop Drawings: Submit Shop Drawings indicating locations of spikes.
- C. Samples: Provide material and color samples for each type of spike.
- D. Qualifications: Submit installer's qualifications per Article below.

1.03 QUALITY ASSURANCE

A. Installer Qualifications:

1. Installer shall have at least five years experience in installing materials of types specified and shall have successfully completed at least three projects of similar scope and complexity.
2. Installer shall submit a letter of certification from the material manufacturer, indicating installer is certified to install the products of this section.

- B. Single Source Responsibility: Furnish products from one manufacturer for entire project.

1.04 DELIVERY, STORAGE AND HANDLING

- A. Store materials and accessories in their original packages, dry, clean and undamaged. Do not stack or place other packaging on these boxes.
- B. Keep products in original packaging until installation.

1.05 WARRANTY

- A. Five year warranty against U.V. breakdown.
- B. Two year installation warranty.



PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Bird B Gone, Inc.
- B. Bird-X, Inc.
- C. ABC Advanced Bird Control.
- D. Nixalite of America, Inc.
- E. Equal.

2.02 PRODUCT DESCRIPTION

- A. Bird Spikes: U.V. stabilized, injection molded, polycarbonate. Heat and weather resistant. Non-conductive and not interfering with electronic security systems or transmissions.
 - 1. Widths: 3", 5" and 7" spike width.
 - 2. Length: Between 3 and 5 inches, and set at 90, 60 and not less than 30 degrees.
 - 3. Base Strip: 2 feet long with not less than 10 screw attachment points.
 - 4. Points per Inch: No less than 20 points per foot.
 - 5. Color: As selected by Architect from manufacturer's standard color options.

2.03 MOUNTING DEVICES

- A. Bird Spikes:
 - 1. Screws: #8 wood screws for fastening into wood.
 - 2. Adhesive: Outdoor construction adhesive, non-silicone based, as recommended by manufacturer for application on steel, brick, stone or concrete. Screws and bolts shall be used in conjunction for location where additional support is required.
 - 3. Ty-Wraps: U.V. protected for use on pipes or poles in conjunction with adhesives.

PART 3 - EXECUTION

3.01 EXAMINATION



- A. Visually inspect the surfaces to receive bird control devices and report any damaged or incomplete work to OAR.

1.02 SURFACE PREPARATION

- A. Clean surfaces thoroughly. Remove bird droppings, nesting materials and any other debris. Use cleaning products that will neutralize bird droppings and follow manufacturer's cleaning recommendations.
- B. Allow all surfaces to air dry completely, and then reapply to sanitize and deodorize the surface before proceeding with installation.

3.03 INSTALLATION

- A. Install bird deterrent devices following manufacturer's installation instructions.
- B. Bird Spikes:
 - 1. Install covering the entire depth of the surface, not just the perimeter.
 - 2. Follow contours and angles closely; cut or break away to fit properly. Space materials in accordance with manufacturer's recommendations.

3.04 PROTECTION

- A. Protect the Work of this section until Substantial Completion.

3.05 CLEAN UP

- A. Remove rubbish, debris and waste materials and legally dispose of off the Project site.

END OF SECTION



SECTION 11 11 00

ELECTRIC VEHICLES CHARGING STATIONS

PART 1 - GENERAL

1.01 SUMMARY

- A. This specification covers single-phase and three-phase Electric Vehicles Charging Stations (EVCS), including equipment, accessories, and wiring necessary to provide a complete and functional system.
- B. Work, material or equipment shall comply with the codes, industry standards, and ordinances and regulations of the local government having jurisdiction, including the regulations of serving utilities and any participating agencies having jurisdiction.
- C. Related Requirements – General provisions of the contract, including General Conditions, Supplementary Conditions, and the following related sections apply:
 - 1. Division 01 - General Requirements.
 - 2. Section 26 05 00: Common Work Results for Electrical.
 - 3. Section 26 05 13: Basic Electrical Materials and Methods.
 - 4. Section 26 05 26: Grounding and Bonding.
 - 5. Section 26 05 19: Low-Voltage Wires (600 Volts AC)
 - 6. Section 26 05 33: Raceways and Boxes, Fittings and Supports.
 - 7. Section 26 08 00: Electrical Systems Commissioning.
 - 8. Section 26 26 00: Power Distribution Units.
 - 9. Division 27: Communications.
- D. Codes and Applicable standards: Products and installation shall meet or exceed the latest edition of the following standards.
 - 1. ADA – Americans with Disabilities Act (ADA).
 - 2. ANSI/NEMA 250 Enclosure for Electrical Equipment (1000 Volts Maximum).
 - 3. ANSI/UL 62 – Safety Flexible Cord Cables.



4. ANSI/UL 2202 – Safety Electric Vehicle Charging System Equipment (AC to DC).
5. ANSI/UL 25942 – Electric Vehicle Supply Equipment (AC to AC).
6. ANSI/UL 2231-1 – Personnel Protection Systems for Electric Vehicle Supply Circuits – General ANSI/Requirements (referred to in UL 2202/UL 2594).
7. ANSI/UL 2231-2 –Protective Devices for Use in Charging Systems (referred to in UL 2202/UL 2594).
8. ANSI/UK 2251 – Safety Plugs, Receptacles and Couplers for Electric Vehicles.
9. ANSI/UL 2271 – Batteries for Use in Light Electric Vehicle (LEV) Applications.
10. California Air Resources Board (CARB) – Regulation for Electric Vehicle Supply Equipment.
11. California Building Code (CBC).
12. California Electrical Code (CEC).
13. California Green Building Code. (CalGreen).
14. Department of Energy, Energy Act.
15. IEEE C2 – National Electrical Safety Code.
16. IEEE-1100 – Recommended Practice for Powering and Grounding Sensitive Electronic Equipment.
17. IEEE 1547 – Interconnection and Interoperability of Distributed Energy Resources with Associated Electric Power Systems Interfaces
18. International Electrical Code adopted by the State of California.
19. ISO 15118 – Energy, Transportation Technology, Health and Safety
20. SAE J-1772 – EV Conductive Charge Coupler.
21. UL 2580 – Batteries for Use in Electric Vehicles.
22. UL 2750 – Outline Of Investigation For Wireless Power Transfer Equipment For Electric Vehicles.
23. UL 9741 – Standard for Bidirectional Electric Vehicle (EV) Charging System Equipment



E. No requirement of these drawings and specifications shall be construed to void any of the provisions of the above standards. The CONTRACTOR Shall bring to the attention of the OWNER any conflicts or changes required to the contract documents in order to obtain compliance with applicable codes and standards.

F. ACRONYMS

ANSI	American National Standards Institute
AOR	Architect of Record
CEC	California Electrical Code
EOR	Engineer of Record
IEEE	Institute of Electrical and Electronics Engineers
NEC	National Electrical Code
NEMA	National Electrical manufacturers Association
SAE	Society of Automotive Engineers
UL	Underwriters Laboratory

1.02 SUBMITTALS

- A. Provide submittals in accordance with Division 01.
- B. Shop Drawings: Include make, catalog number, dimensions, weight, KVA, KW, KWh Charging Rate, Amperage, finish, type, insulation class, design and operating temperature ranges, sound levels, efficiency, installation instructions and testing procedures, maintenance manual, communication interface and communication protocols.
- C. Provide manufacturers data for all major components, including batteries, inverters, charge controllers, monitoring systems, fire suppression, and fire alarm, and inspection reports that confirms EVCS compliance with standards listed in article 1.01.D
- D. Provide a full connection schematic and wiring diagrams.
- E. Provide copies or required test reports and manufacturer's certification of compliance with applicable standards and codes and certification of installers.
- F. Submit one copy for each set of shop drawings.



- G. Provide a list of replacement parts.

1.03 SUBSTITUTIONS

- A. EVCS that deviate from these requirements shall not be accepted without written approval from OWNER'S Design Standards and Maintenance and Operations Technical Units. When deviating or proposing substitutions the following information shall be submitted:
 - 1. Substitution request form with substantiating reasons for the deviation and benefits to the OWNER.
 - 2. Proposed substitutions requests shall provide proof of compliance with EVCS characteristics indicated in this specifications section.
- B. Submittals must comply with contract general provisions.

1.04 QUALITY ASSURANCE

- A. Provide charging stations from a manufacturer with a minimum of seven-years of experience in designing and manufacturing EV charging stations.
- B. The EVCS shall be certified to comply with the applicable codes, industry standards, and federal and stated applicable regulations.
- C. Installation shall be performed by California Electric Vehicle Infrastructure Training Program (EVITP) certified installers. Provide certificate as part of the submittal process.
- D. EVCS shall be listed and approved for the intended application by Underwriter's Laboratories (UL), or other Nationally Recognized Testing Laboratory (NRTL), and in compliance with applicable industry standards and codes, including those mentioned under REFERENCES.
- E. Provide manufacturer's testing of EVCS supply equipment.
- F. Proposed products shall have been in the market for a minimum of five years,
- G. Provide labor, engineering, design, testing, supervision, material and equipment required.
- H. Charging stations and related equipment shall be delivered to the site in the manufacturer's original packaging, labeled with the manufacturer's name, model number, and electrical specifications.



- I. Visual and Mechanical Inspection: CONTRACTOR shall verify the equipment nameplate data with specifications and approved shop drawings.
 - 1. Inspect physical and mechanical condition. Damaged equipment shall not be acceptable.
 - 2. Perform specific inspections and mechanical tests as recommended by manufacturer.
- J. Provide electrical tests results that indicate the following:
 - 1. Perform resistance measurements through all bolted connections with low-resistance ohmmeter.
 - 2. Verified voltage levels.
 - 3. Check ground ding level and continuity.
 - 4. Check and verify pilot signal detection and verification.
 - 5. Check and verify current limit.
 - 6. Check system response for compliance with expected performance.
 - 7. Check and verify operation of alarms.
 - 8. Check and verify Electronic Data Interface, demand response, .
- K. CONTRACTOR shall have an established communication mechanism for providing support (regarding technical questions, billing, operations, etc.) to OWNER.
- L. EVCS are required to comply with the California Air Resources Board (CARB) Regulation for Electric Vehicle Supply Equipment.

1.05 COMMISSIONING

- A. CONTRACTOR shall provide as part a copy of fully completed and verified EVCS manufacturer's start-up and functionality test reports, and commissioning and functionality acceptance criteria.
- B. CONTRACTOR shall provide all tools and personnel, and perform start-up, prefunctional and functional performance testing in the presence of the OWNER.

1.06 TRAINING

- A. Provide a 4 hours hands-on training session to OWNER's Maintenance and Operations personnel. Training shall include:
 - 1. EVCS description, features, and operation.



2. Demonstration on routine testing and maintenance operations, and instruction on all items included in the maintenance and operations manual.
3. Safety criteria and protection.
4. Programming features and firm ware reprogramming.
5. Recommendations and lessons learned from previous projects.

1.07 WARRANTY

- A. Provide a one-year labor warranty.
- B. EVCS shall be warranted to be free from defects in materials and fabrication for a period of five-years from the date of substantial completion.
- C. Warranty period begins at project acceptance for beneficial occupancy.
- D. Warranty exclusions for third party components is not acceptable.

PART 2 – PRODUCTS

2.01 ALTERNATING CURRENT EVCS

- A. EVCS shall be listed for Level 2 (208/240 volts AC, 40 amps minimum) charging.
- B. EVCS shall be pedestal or wall mounted, single or double units with charging cords type SAE J1772 or other approved universal type connector.
- C. Each item of equipment shall have a nameplate bearing the following:
 1. Manufacturer's name and address.
 2. EVCS model number and serial number securely affixed in a conspicuous place. Nameplate of the distributing agent will not be acceptable. Include additional information as applicable to fully identify the equipment.
 3. Nameplates shall be made of noncorrosive metal.
- D. EVCS shall use cellular network connection for communication with owners, operators, and users.
- E. EVSE shall include automatic web-based tracking / metering and control connection via a cell phone service provider compatible with Electric Vehicle Management system.



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1. The web-based application shall generate per vehicle kW and Kwh usage and charging times based on user input intervals.
2. EVCS Electronic Data Interface shall capture and be capable of push and pull file transfer of the parameters listed below:
 - a) Web-based control capability shall enable remote charger station administration and access control by the OWNER.
 - b) Open Charge Point protocol (OCPP) 1.6 minimum.
 - c) Data must be User ID and Password protected.
 - d) KW data report shall be Microsoft Excel compatible.
 - e) It shall have the option to limit usage to designated users with bar code/key card type system (locked or open access).
 - f) Manufacturer control of EVCS is not allowed without prior OWNER's approval.
- F. The system shall support (Network Time Protocol) NTP/UTC time synchronization.
- G. Provide an OpenADR 2.0b VEN interface that includes the following features:
 1. Support for the events profile services.
 2. Support for required set of common signals.
 3. Support for all transport requirements as specified including HTTP (pull), URI usage, header and behavior requirements, and error codes.
 4. Conformance to security requirements, including RSA or ECC, and TLS 1.2 support.
- H. OpenADR 2.0b VEN interface shall be certified. The VEN shall be a software VEN that allows owners/operators and/or users to interact with the signals prior to enacting any controls.
- I. The system shall not act on expired signals or messages or create duplicate events.
- J. Communication solutions shall offer a "power down" throttling capability to limit charge current to a percent of normal current during a Demand Response (DR) event (e.g., 25%, 50% or 75%). This shall be achievable via J1772 PWM Duty Cycle commands.



1. EVCSs shall be able to respond to requests to initiate charging (e.g., close contact) or increase charging in response to a DR event.
 2. The system shall be able to inform the OWNER, operators and/or users of utility company issued DR events.
 3. The system shall allow the OWNER, operators and/or users to interact with utility company events e.g., opt out or choose to curtail or throttle EV charging (as opposed to complete curtailment) in real time.
- K. EVCSs and communications solutions shall have metering capacity through an internal or onboard metrology device and shall be able to measure or calculate the following:
1. Accumulated consumption (aggregated kWh), consumption per session (kWh), demand (peak and average, per session).
 2. Consumption (kWh) at 15-minute intervals.
- L. Message priority shall be set, programed, and not modifiable by unauthorized users.
- M. The system shall provide the following explicit error and communication failures messages:
1. Unrecognized message.
 2. Out of range/low signal strength.
 3. Low battery level.
 4. Feature not supported.
 5. Meter faults.
 6. EVCS faults and receipt of control signals.
- N. Provide communication solutions that are independent of existing site communications (e.g., cellular communications rather than using customer internet).
- O. Provide field-programmable or remote software upgrade function (i.e., firmware upgrade).
- P. EVCS shall be programmed for Cold Load Pickup (Randomized auto restart following power outages).



- Q. After loss of power, the EVCSs shall return to its previous configuration state. The station shall retain communication and registration configurations. This does not include continuing user sessions when authorization is required to start a session.
- R. EVCSs shall provide a reset option, which returns the device to its pre-charge state.
- S. EVCSs shall have health checking functionality, reporting, logging and bi-directional alerting capability.
- T. EVCS shall be UL listed for outdoor use and be California ADA compliant.
- U. EVCS shall be standalone type with necessary circuitry to enable communications and safe charging.
- V. EVSEs SHALL use cellular network connection for communication with owners, operators, and users.
- W. Approved Products: AeroVironment – EVSE-RS 19356-32A-025; EVBOX –Iqon; ChargePoint – CT4023 and CT4021; EVSE – 3703; OPConnect Mark II, Or OWNER approved equal.

2.02 CONNECTOR HOLSTER DOCK

- A. Provide connector holster dock to store charger plugs when not in use.
- B. Holster construction consist of high strength injection molded plastic with temperature ratings of minus 10 deg C to 60 deg C.
- C. Provide holster to match EV plug.
 - 1. Provide ADA compliant cord management mechanism and retractor with all necessary hardware.

2.03 ACCESSORIES

- A. Back-lit touch button interface keypad with audio feedback. LCD must display: READY TO CHARGE, CHARGING, CHARGE COMPLETE, PAUSE-WAITING TO CHARGE AND FAULT.
- B. Daylight readable 640x480 active matrix LCD with auto brightness control.
- C. Units shall be capable of activation of EVCS upon identification utilizing magnetic swipe, RFID, QR code, or plug-and-charge via ISO 15118.
- D. Units shall be equipped with real-time energy measurement controls, 15 minutes energy measurement interval recording, and time of day pricing capability.



- E. Provide minimum four keycards/barcodes/RFID keys for each charger to activate the charger and its data network.

2.04 SECURITY

- A. data stored or transmitted by EVCSs, gateways, and BMSs shall be designated an appropriate level of controls to protect its confidentiality, integrity or availability. CONTRACTOR shall ensure the same level of controls wherever the data is subsequently stored and whenever it is transmitted.
- B. Personal identifiable information shall be encrypted using secure industry standard techniques to protect confidentiality.
- C. The EVCS shall provide the same level of protection and controls as is commensurate with its security profile, as governed by emerging standards from the following organizations:
 - 1. National Institute of Standards and Technology (NIST).
 - 2. Society of Automotive Engineers (SAE).
 - 3. California Department of Food and Services, Division of Measurements Standards (DMS)

2.05 PAVEMENT MARKINGS, SIGNAGE, AND PROTECTION

- A. Provide pavement markings and signage to indicate the restrictions for electrical vehicle charging parking per CBC requirements.
- B. Provide wheel stops and bollards for protection of electric vehicle supply equipment.
- C. A label indicating fuel dispensed in accordance with Part 309, Title 16 Code of Federal Regulations must be installed. The label must indicate fuel dispensed, rate and amperage, and dispense manner (conductive or inductive).

2.06 PAYMENT AND PROCESSING

- A. The system shall comply with the California Department of Food and Agriculture, Division of Measurement Standards (DMS) requirements for the use of electricity as vehicles' fuel.
- B. Fees associated with EVCS use shall be displayed at the point of sale.
- C. The system shall be customizable for customer fees and charging response to comply with DR events.



- D. The system shall accept, process, and manage payments and billing settlements using customer credit/debit cards. or other system acceptable to the OWNER.
 - 1. As a minimum provide the following options: Credit card reading (EMV chip and contactless), over the phone processing, or other system acceptable to the OWNER.
 - 2. Customers shall have the option for 3rd party payment mechanisms.
 - 3. The system shall provide for billing the user by time charging, time connected, session, kWh used per session, time of use pricing, parking space rental, or a combination of several while remaining in compliance with the DMS regulations.
 - 4. The system shall provide for customization of invoicing on transactional, monthly, or a combination basis.
- E. The systems shall have user identification capabilities via card reader, keypad, or smart phone application for access and payment purposes.
- F. The system shall be preprogrammed with a free charge option to allow users to operate EVCS with and without authorization. The option shall be activated with an OWNER security provided code or electronic key, via OCPP, or plug-and-charge ISO 15118.

2.07 REPORTING

- A. Comply with the reporting requirements of the California Electric Vehicle Supply Equipment (EVSE or EV Charging Station) Standards Regulation.

PART 3 - EXECUTION

3.01 DELIVERY AND STORAGE

- A. Deliver, storage, protect and handle products in accordance with the manufacturer's recommendations.
- B. EVCS shall be stored in a dry, clean, and protected area to keep units from damage and theft until installation.
- C. Where field applied painting of enclosures is required to correct damage to the manufacturer's factory applied coatings, provide manufacturer's recommended coatings and apply in accordance with manufacturer's instructions.

3.02 INSTALLATION



- A. EVCS shall be mounted on concrete pads, unless noted otherwise in the construction documents.
- B. EVCS units frame shall be installed level on concrete pads. Mounting bolts for floor mounted EVCS shall be extended into pads only and shall not be in direct contact with building structural members.
- C. Comply with CBC seismic requirements.
- D. EVCS shall be effectively grounded.

3.03 TESTING

- A. Provide instruments and accessories required to perform checks. Voltmeters, Amp meters, etc., shall be accurate within .075 percent or one percent and shall have scales permitting voltage readings to be performed on upper half of scale.
- B. Test meters and ammeter calibration: Calibration shall be in compliance of
- C. Visual and Mechanical Inspection:
 - 1. CONTRACTOR shall verify the equipment nameplate data with specifications and approved shop drawings.
 - 2. Inspect physical and mechanical condition. Check for damage. Damaged equipment shall not be acceptable.
 - 3. Inspect anchorage, alignment, and grounding.
 - 4. Perform specific inspections and mechanical tests as recommended by manufacturer.
- D. Provide Electrical Tests results that indicate the following:
 - 1. Perform resistance measurements through all bolted connections with low-resistance ohmmeter.
 - 2. Verified voltage levels.
 - 3. Check verify ground fault circuit interrupt.
 - 4. Check and verify pilot signal detection and verification.
 - 5. Check and verify current limit.
 - 6. Check and verify operation of alarms.



7. Check and verify Electronic Data Interface.
8. Validate charging times.

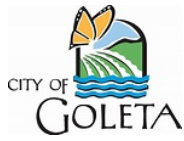
3.04 PROTECTION

- A. Protect the Work of this section until Substantial Completion.

3.05 CLEANUP

- A. Remove rubbish, debris and waste materials and legally dispose of off Project site.
- B. Repair scratched or marred surfaces affected during the execution of work. Repair surfaces shall match original finish.

END OF SECTION



SECTION 12 36 61 QUARTZ COUNTERTOPS

GENERAL

1.01 SECTION INCLUDES

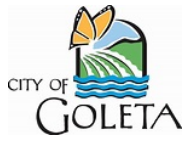
- A. Quartz agglomerate surfacing countertops.
- B. Quartz agglomerate backsplashes.
- C. Quartz agglomerate endsplashes.
- D. Adhesives and sealants.

1.02 RELATED REQUIREMENTS

- A. Section 01 30 00 - Submittals.
- B. Section 05 50 00 - Metal Fabrications.
- C. Section 06 10 00 - Rough Carpentry.
- D. Section 07 90 00 - Joint Sealants.

1.03 REFERENCES

- A. Reference Standards:
 - 1. ASTM C 97: Standard Test Methods for Absorption and Bulk Specific Gravity of Dimension Stone.
 - 2. ASTM C 170: Standard Test Method for Compressive Strength of Dimension Stone.
 - 3. ASTM C 501: Standard Test Method for Relative Resistance to Wear of Unglazed Ceramic tile by the Taber Abraser.
 - 4. ASTM C 834: Standard Specification for Latex Sealants.
 - 5. ASTM C 920: Standard Specification for Elastomeric Joint Sealants.
 - 6. ASTM D 790: Standard Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials.
 - 7. ASTM E 84: Standard Test Method for Surface Burning Characteristics of Building Materials
 - 8. LEED: Leadership in Energy and Environmental Design.



9. NEMA LD-3: High Pressure Decorative Laminates.
10. NSF/ANSI Standard 51: Food Equipment Materials.
11. ISO: International Organization for Standardization.
12. ISO 9001: Quality Management Systems.
13. SCAQMD Rule 1168: Adhesive and Sealant Applications.
14. UL 2818: GREENGUARD Certification Program for Chemical Emissions for Building Materials, Finishes and Furnishings.

1.04 SUBMITTALS

- A. Submit under provisions of Section 01 3000 - Submittals.
- B. Product Data:
 1. Submit product data for each specified product. Include manufacturer's technical data sheets and published instruction instructions.
 2. Submit Safety Data Sheets (SDS) for adhesives and sealants.
- C. Shop Drawings:
 1. Submit fully dimensioned shop drawings showing countertop layouts, backsplashes, end splashes, vanities, joinery, edge conditions, terminations, substrate construction, cutouts and holes. Show plumbing installation provisions. Include elevations, section details, and large scale details.
- D. Samples:
 1. Submit selection and verification samples for each color and pattern required.
- E. Quality Assurance Submittals:
 1. Test Reports: Submit certified test reports showing compliance with specified performance characteristics and physical properties, if required.
 2. LEED Submittals: Submit applicable LEED documentation for potential credits specified in this Section.
 3. Warranty: Specimen copy of specified warranty.
- F. Closeout Submittals:
 1. Maintenance Data: Submit manufacturer's published Care & Maintenance manual with closeout submittals.

1.05 REGULATORY REQUIREMENTS



- A. Accessibility Requirements: Comply with the U.S. Architectural & Transportation Barriers Compliance Board ADA-ABA Accessibility Guidelines for Buildings and Facilities.
- B. Adhesives, Sealants, and Sealant Primers:
 - 1. SCAQMD (South Coast Air Quality Management District) Rule 1168.

1.06 QUALITY ASSURANCE

- A. Qualifications:
 - 1. Manufacturing Facility Qualifications: Quartz surfacing materials produced in an ISO 9001 certified facility.
 - 2. Fabricator Qualifications: Minimum of five years documented experience in fabricating quartz surfacing countertops similar in scope and complexity to this Project, using water-cooled cutting tools. Currently certified by the manufacturer as an acceptable fabricator.
 - 3. Installer Qualifications: Minimum of five years documented installation experience for projects similar in scope and complexity to this Project, and currently certified by the manufacturer as an acceptable installer.
- B. LEED 2009 rating system potential credits for adhesives:
 - 1. LEED-CI IEQ Credit 4.1 Low-Emitting Materials - Adhesives and Sealants.
- C. Mock-Ups:
 - 1. Install at Project using acceptable products and manufacturer approved installation methods. Obtain Architect's acceptance of color, pattern, finish, fabrication, and installation standards.
 - 2. Mock-Up Size: 24" by 36".
 - 3. Mock-Up Location: As directed by Architect.
 - 4. Maintain mock-up during construction for fabrication and installation comparison. If required, remove and legally dispose of mock-up when no longer required.
 - 5. Incorporation: If permitted by Architect, mock-up may be incorporated into as part of the completed Work.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Delivery and Handling: Comply with manufacturer's recommendations for shipping and handling quartz surfacing materials to preclude breakage or



damage. Brace quartz surfacing units as necessary during shipment, transporting in near-vertical position with finished face towards finished face. Do not allow finished surfaces to rub during shipping and handling.

- B. Storage and Protection: Store materials protected from exposure to harmful weather conditions, at temperature and humidity conditions recommended by manufacturer. Store quartz surfacing sheet materials on racks in near-vertical position to preclude damage. Store with finished face turned towards finished face. Prevent warpage and breakage.

1.08 PROJECT CONDITIONS

- A. Field Measurements: Verify actual measurements and openings by field measurements before fabrication; show recorded measurements on shop drawings. Coordinate field measurements and fabrication schedule with construction progress to avoid construction delays.
- B. Adhesive: Acclimate adhesives to occupancy room temperatures with maximum temperature not to exceed 75 deg F.

1.09 WARRANTY

- A. Manufacturer's Limited Warranty: Provide manufacturer's standard 10 Year Commercial and Residential Limited Warranty against defects in quartz surfacing sheet materials.

PRODUCTS

2.01 MANUFACTURER

- A. Basis of Design: Wilsonart. 2501 Wilsonart Drive, Temple, TX 76503- 6110. Tel. 254.207.7000, Toll-Free 800.433.3222, Fax 254.207.2384. Websites are: www.wilsonart.com (primary website), <http://sustain.wilsonart.com> (sustainable design website)
- B. Or Approved equal.

2.02 QUARTZ SURFACING SHEET MATERIAL

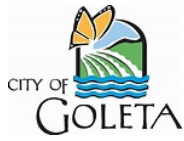
- A. Acceptable Product: "Wilsonart Quartz."
- B. Composition: Up to 93 percent quartz aggregate combined with polyester resin binders and proprietary pigments that are fabricated into slabs using vacuum vibrocompaction technology.
- C. Material Thickness: Product Type 063 - 1.18 inch (3 cm)], nominal.



- D. Material Weight: 15 lbs./ft² for 3 cm thick surfacing.
- E. Countertop Dimensions: As indicated on Drawings.
- F. Conformance Standards:
 - 1. NSF/ANSI Standard 51. 2. UL 2818:
 - a. GREENGUARD - Emission levels in UL 2818, Section 7.1 are applicable for furniture products.
 - b. GREENGUARD Gold - Emission levels in UL 2818, Section 7.2 are applicable for building materials, finishes, and furnishings.
- G. Physical Characteristics:
 - 1. Flexural Strength: Greater than 4,500 psi; ASTM D 790.
 - 2. Flexural Strain: Less than 0.375 percent; ASTM D 790.
 - 3. Flexural Modulus: Greater than 3.75 MPsi; ASTM D 790.
 - 4. Stain Resistance (24 Hour): No effect to moderate effect; NEMA LD-3.
 - 5. Abrasion Resistance: Greater than 100 in.-lbs.; ASTM C 501.
 - 6. Density: Greater than 2.1 g/cm³; ASTM C 97.
 - 7. Compressive Strength (One Axis - Dry): Greater than 20,000 psi; ASTM C 170.
 - 8. Moisture Absorption: Maximum 0.022 percent; ASTM C 97.
- H. Quartz Finish: Polished finish with Glossometer reading greater than 45.
- I. Color and Pattern: Selected from manufacturer's standard offerings.
- J. Edge Detail: Selected from manufacturer's standard offerings.

2.03 ACCESSORY MATERIALS

- A. Joint Adhesive: Methacrylate-based adhesive for chemically bonding quartz surfacing seams. Color complementary to quartz surfacing sheet material. UL 2818 GREENGUARD Gold certified and complies with SCAQMD Rule 1168.
 - 1. Basis of Design: "Wilsonart Hard Surface Adhesive."
 - 2. Other Acceptable Products: Pigmented knife grade adhesives suitable



for use with quartz surfacing are also acceptable.

- B. Elastomeric Sealant: Mildew-resistant silicone sealant for filling gaps between countertops and terminating substrates in wet environment applications. Complies with ASTM C 920, Type S (single component), Grade NS (nonsag).
 - 1. Product: Acceptable to countertop manufacturer.
 - 2. Color: Selected from sealant manufacturer's standard offerings.
- C. Siliconized Acrylic Sealant: Siliconized acrylic latex sealant. For general applications to fill gaps between countertops and at terminating substrates. Complies with ASTM C 834, Type OP, Grade NF, and SCAQMD Rule 1168.
 - 1. Product: Color Matched Caulk".
 - 2. Color: Selected from sealant manufacturer's standard offerings.
- D. Construction Adhesive: Countertop manufacturer's recommended silicone-based construction adhesive for backsplashes, endsplashes, and other applications according to manufacturer's published fabrication instructions.

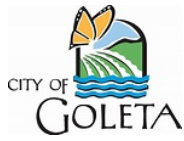
2.04 FABRICATION

- A. Fabricate components in shop, to greatest extent practicable, in sizes and shapes indicated according to approved shop drawings and Quartz Fabrication Manual.
- B. Form joint seams between quartz surfacing components with specified seam adhesive. Completed joints inconspicuous in appearance and without voids. Provide joint reinforced if required by manufacturer for particular installation conditions.
- C. Provide holes and cutouts for plumbing fixtures and accessories indicated on approved shop drawings. Rout cutouts and finish edges smooth.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine substrates and conditions that could adversely affect the work of this Section.
- B. Substrates must be sound, flat, smooth, and free from dust or other surface contaminants.



- C. Commencement of work will constitute acceptance of substrates and conditions to receive the work.

3.02 COUNTERTOP INSTALLATION

- A. Install quartz surfacing components plumb, level, and true according to approved shop drawings and manufacturer's published installation instructions. Use woodworking and specialized fabrication tools acceptable to manufacturer.
 - 1. Fasten quartz surfacing components to base cabinets or other supporting substrates with suitable adhesives acceptable to manufacturer.
- B. Form joint seams with specified seam adhesive. Seams to be inconspicuous in completed work. Seams in locations shown on approved shop drawings and acceptable to manufacturer. Promptly remove excess adhesive.
 - 1. Clamp or brace quartz surfaces in position until adhesive sets.
- C. Fill gaps between countertop and terminating substrates with specified silicone sealant.
- D. Install backsplashes and endsplashes where indicated on Drawings. Adhere to countertops with specified construction adhesive.

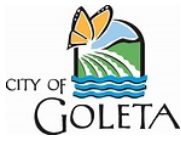
3.03 REPAIRS

- A. If permissible to Architect, minor surface marring for quartz surfacing components may be repaired according to manufacturer's published installation instructions.
- B. Remove and replace quartz surfacing components that are damaged and cannot be satisfactorily repaired.

3.04 CLEANING AND PROTECTION

- A. Clean quartz surfacing components according to manufacturer's published maintenance instructions. Completely remove excess adhesives and sealants from finished surfaces.
- B. Protect completed work from damage during remainder of construction period.

END OF SECTION



SECTION 12 67 23

FURNISHINGS

PART 1 - GENERAL

1.01 DESCRIPTION OF WORK

- A. Furnish all materials, labor, transportation, services, and equipment necessary to furnish and install site furnishings as shown on the Drawings and as specified herein.
- B. Work included in this Section:
 - 1. Trash Receptacles and Recycling Trash Receptacles
 - 2. Folding Chairs and Tables
 - 3. Stackable Chairs
 - 4. Carts
 - 5. Seating Units
 - 6. Charging Gadget Desk
- C. Work related in other Sections:
 - 1. Portland Cement Concrete Paving - Section 32 1313.

1.02 QUALITY CONTROL

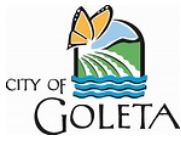
- A. Manufacturer's Directions:
 - 1. Manufacturer's directions and drawings shall be followed in all cases where the manufacturers of articles used in the Section furnish directions covering points not shown in the Drawings and Specifications.
- B. Project Assurance:
 - 1. Do not fabricate components that require fitting to structural elements or into finished spaces until dimensions have been verified in the field.

1.03 COORDINATION

- A. The Contractor shall notify all other trades, such as plumbers, electricians and concrete installers in ample time to install his work, including sleeves, bolts and drains.

1.04 SUBMITTALS

The specific submittal requirements of this section shall be guided by Division 1.



- A. Product Data:
 - 1. Submit manufacturer's catalog cuts, or a typed listing of all products specified in this Section.
- B. Shop Drawings:
 - 1. Submit for review and approval all manufacturers catalogue information or shop drawings indicating size, materials, finishes, specifications, installation methods and quantities of items being supplied.

1.05 PRODUCT HANDLING

- A. Delivery:
 - 1. Deliver all specified products on-site in their original unopened packages for review by the Owner's Authorized Representative. If damaged has occurred to the products, the Contractor shall be responsible to replace the damaged product with new at his own expense.
- B. Storage:
 - 1. Store materials in a dry and protected location. Protect from damage, deformation, staining, and moisture damage.
- C. Protection:
 - 1. Protect products from damage due to Contractor negligence, vandalism and inclement weather.

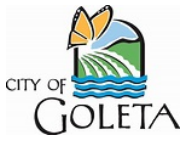
PART 2 - PRODUCTS

2.01 MANUFACTURER

- A. Trash Receptacles: Manufacturer indicated in plans.
- E. Stackable Chairs and Tables: Manufacturer indicated in plans.
- F. Folding Chairs and Tables: Manufacturer indicated in plans.
- G. Chair and Table Carts: Manufacturer indicated in plans.
- H. All other Interior Furnishings: Manufacturer indicated in plans.

PART 3 - EXECUTION

3.1 INSTALLATION



- A. Location shall be approved by OAR prior to installation.
- B. Installation shall be per manufacture's recommendations unless otherwise stated in drawings.
- C. Work shall be set plumb, level, and true to line and shall present a neat and finished appearance. Include setting each item in its correct place, fastening it, connecting it, or incorporating it into other portions of the work, as each item may require.
- D. The work of this Section shall include the furnishing of anchors and adhesives required for installing and attaching the equipment specified herein. All furnishings shall be installed per manufacturer's recommendations unless noted otherwise in the Drawings.
- E. Adequately protect all work from damage by subsequent construction operations. Damaged work shall be replaced.

3.2 CLEAN UP

- A. Upon completion of the work under this Section, remove all rubbish, waste and debris resulting from his operations offsite. Remove all equipment and leave the entire work area in a neat, clean, and Architect-accepted condition.

END OF SECTION



SECTION 12 93 13

BICYCLE RACKS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. High capacity bicycle racks

1.02 RELATED SECTIONS

- A. Section 03 30 00 - Poured in Place Concrete
- B. Section 09 90 00 – Painting

1.03 REFERENCES

- A. American Society for Testing and Materials ASTM A513 - Standard Specification for Electric-Resistance-Welded Carbon and Alloy Steel Mechanical Tubing.
- B. American Society for Testing and Materials ASTM A500B - Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes.

1.04 SUBMITTALS

- A. Submit under provisions of Section 01 33 00.
- B. Product Data : Manufacturer's data sheets on each product to be used, including:
 - 1. Preparation instructions and recommendations.
 - 2. Storage and handling requirements and recommendations.
- C. Shop Drawings: Manufacturing details for each bicycle rack.
- D. Selection Samples: For each finish product specified, two complete sets of color chips representing manufacturer's full range of available colors and patterns.
- E. Verification Samples: For each finish product specified, two samples, minimum size 6 inches (150 mm) square representing actual product, color, and patterns.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications:
 - 1. A firm experienced in manufacturing bicycle racks similar to those required for



this project and with a record of successful in-service performance.

- B. Installer Qualifications:
 - 1. An experienced installer who has completed installation of bicycle racks similar in material, design, and extent to that indicated for this project and whose work has resulted in construction with a record of successful in-service performance.
- C. Source Limitations: Obtain each color, finish, shape and type of bicycle rack from a single source with resources to provide components of consistent quality in appearance and physical properties.
- D. Mock-Up: Provide a mock-up for evaluation of surface preparation techniques and application workmanship.
 - 1. Install in areas designated by Architect.
 - 2. Do not proceed with remaining work until workmanship and installation are approved by Architect.
 - 3. Refinish mock-up area as required to produce acceptable work.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Store products in manufacturer's unopened packaging until ready for installation.
- B. Store and dispose of solvent-based materials, and materials used with solvent-based materials, in accordance with requirements of local authorities having jurisdiction.

1.07 PROJECT CONDITIONS

- A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Basis of Design: Saris Cycling Group; 5253 Verona Rd., Madison, WI 53711. ASD. Toll Free TEL: (800) 783-7257. Te1: (608) 274-6550. Fax: (608) 274-1702. Email: info@sarisinfrastructure.com Web: <http://www.sarisinfrastructure.com>
- B. Or approved equal.

2.02 HIGH CAPACITY BICYCLE RACKS

- A. Stretch Series: #8118



1. Construction: 11 gauge (0.06 inch) (1.52 mm) steel for corner pieces and cross braces.
2. Capacity: 8 bike capacity, 13.5 inch (343 mm) spacing.
3. Locking Bar: 3/8 inch (9.5 mm) solid steel locking bar.
4. Finish: Polyester powder coat.
5. Color: Black.
6. Quantity: As shown in drawings.

2.03 EXTERIOR BIKE RACKS

- A. Manufacturer indicated in plans (Landscape Forms) or equal approved by the OAR.

2.04 EXTERIOR BIKE LOCKERS

- A. Salvage existing, restore, paint, and install per plan. Provide SS Anchorage.

2.05 FINISH

- A. Manufacturer's standard factory-applied polyester paint finishes using a powder coating heat-cured system.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Do not begin installation until substrates have been properly prepared.
- B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.02 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Anchor racks as directed by Architect using manufacturer's recommended anchors.

3.03 PROTECTION

- A. Protect installed products until completion of project.
- B. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION



SECTION 13 47 13

CORROSION MONITORING / CATHODIC PROTECTION

PART 1 – GENERAL

1.01 WORK OF THIS SECTION

- A. The work of this Section includes installation of bonding across insulating devices, test stations, deep anode wells and rectifiers, as indicated in the plans and details, including electrical connections, installation of test stations, bond cables, exothermic welds, anodes, test leads, rectifiers, conduit, AC service to rectifiers, and all accessories required for a complete operable system, including testing the system after installation.
- B. The work also includes coordination of assembly, installation and testing.

1.02 CODES AND STANDARDS

- A. The work of this Section shall comply with the current editions of the following codes as adopted by Goleta Water District:
 - 1. National Electric Code
- B. The Contractor shall install each system component in a workmanlike manner and in strict conformance with the latest edition of the following standards:
 - 1. NEMA National Electrical Manufacturers Association
 - 2. ASTM American Society for Testing and Materials
 - 3. IEEE Institute of Electrical and Electronic Engineers
 - 4. ANSI American National Standard Institute
 - 5. ICEA Insulated Cable Engineers Association
 - 6. OSHA Occupational Safety and Health Administration
 - 7. NACE National Association of Corrosion Engineers
 - 8. UL Underwriters Laboratories
- C. Where the drawings or these Specifications require a higher degree of workmanship or better quality of material than implied by the above codes and standards, these drawings and Specifications shall prevail

1.03 SHOP DRAWINGS AND SAMPLES

- A. The following shall be submitted to the District, prior to installation:



1. Catalog cuts, bulletins, brochures or data sheets for all equipment including test stations, wire/cable/test leads, exothermic welding equipment, anode assemblies, rectifiers, test station hardware and test boards, wire identifiers and any other equipment to be installed.
2. Certification that the equipment and materials proposed meets the Specifications and the intent of the Specifications.

1.04 OWNER'S MANUAL

- A. The following shall be included in the Owner's Manual:
 1. Operations and maintenance instructions.
 2. List of spare parts recommended for 2 years' successful operation.

1.05 INTERFERENCE AND EXACT LOCATIONS

- A. The locations of corrosion monitoring/cathodic protection equipment, devices, outlets and appurtenances as indicated are approximate only. The Contractor, subject to approval of the Engineer, shall determine exact locations.
- B. The Contractor shall verify in the field, all data and final locations of work done under other Sections of the Specifications required for placing of the corrosion monitoring/cathodic protection, including installation of A.C. service or other electrical work.
- C. In case of interference with other work or erroneous locations with respect to equipment or structures, the Contractor shall furnish all labor and materials necessary to complete the work in an acceptable manner.

PART 2 – PRODUCTS

2.01 GENERAL

- A. All materials to be installed must be new and of a quality generally accepted by the industry and must comply with the codes and standards as specified in Section 1.2. Nothing in the drawings or Specifications is to be construed as permitting work not conforming to these codes and standards. Where larger size or better grade materials than required by the above-mentioned regulations and codes are specified, these drawings and Specifications shall have precedence. All equipment and materials supplied shall be similar to that which has been in satisfactory service for at least 5 years.



2.02 CONDUIT AND FITTINGS

- A. The minimum conduit size shall be 3/4-inch unless otherwise indicated. Rigid steel conduit shall be galvanized conforming to UL 6. Rigid nonmetal conduit shall be PVC schedule 40 conduit approved for underground use.
- B. Fittings for use with rigid steel conduit shall be galvanized cast ferrous metal, with gasketed covers, Crouse Hinds Condulets, Appleton Unilets, or equal. Rigid metallic conduit fittings shall be galvanized conforming to UL 514B.
- C. Fittings for use with either rigid nonmetallic conduit or duct shall be PVC and shall have solvent weld type conduit connections. If such are not available, then the Specification for rigid steel fittings shall apply except in corrosive locations where PVC coating shall be provided.
- D. Union couplings for conduits shall be the Ericson or Appleton type EC or 0-Z Gedney 3-piece Type 4, or equal.

2.03 TEST STATION HOUSINGS - POST MOUNTED TEST STATIONS

- A. The test station housings shall be made from 3-inch diameter, schedule 80 PVC pipe, 6 feet in length. The test head shall be a “Fink” test head, mounted at the top of the PVC post, as shown in the details.

2.04 TRAFFIC VALVE BOXES - FLUSH MOUNTED TEST STATIONS

- A. The traffic valve box for test stations shall be G05 Traffic Box as manufactured by Christy Concrete Products, Inc., No. 1-RT Traffic Valve Box as manufactured by Brooks Products or approved equal. Traffic box covers for anode beds and test stations shall be cast iron with welded bead legend "CP TEST" or “ANODE.”

2.05 TERMINAL BOARDS - FLUSH MOUNTED TEST STATIONS

- A. Terminal boards for flush mounted test stations shall be “Fink” test heads, as shown in the details. Test boards shall be labeled as required to identify the piping to which the leads are connected. All hardware installed on the test boards shall be brass or bronze.

2.06 WIRE

- A. Conductors shall consist of solid or stranded copper of the gauge indicated. Wire sizes shall be based on American Wire Gage (AWG). Copper wire shall be in conformance with ASTM Designations B3 and B8.



- B. All wires terminating in a junction box or test station shall have a wire identifier attached within 4 inches of end of wire at terminal board, prior to backfill, as specified under "Wire Identification".

2.07 ANODE WIRES

- A. The wire attached to the anodes shall be (AWG) stranded, single conductor, copper and insulated for 600 volts. Wire size shall be minimum No. 6 AWG Kynar for deep anode wells and shall conform to the requirements of ASTM D1248 Type 1, Class C, Grade 5. Connection of wire to the anode shall have a pulling strength, which shall exceed the tensile strength of the wire. Any damage to the wire insulation or anode shall require complete replacement of the wire and anode.
- B. The anode supplier shall mark the reel holding the anode wire for shipment to the job site with the same anode numbering system used on the test records and the total length of attached anode wire.
- C. Anode wires shall be of one continuous length from the anode connection to rectifier or anode splice box. Anode wires with the attached anode shall be shipped to the job site with the wire wound on a reel. The minimum core diameter of the reel shall be 5-1/2 inches. The anode wire insulation shall be free of surface damage such as nicks, abrasions, scratches, etc., in all respects throughout the entire length of the wire. Precaution shall be taken during fabrication, transportation and installation of the anodes to see that the wire is not kinked or sharply bent. Bends sharper than 2-1/2 inches in radius are not permissible.
- D. All wires used for corrosion monitoring/cathodic protection systems shall be visually inspected for any damage to the insulation prior to and after installation by the Contractor. Any damage to the insulation will require replacement of the cable. Splicing of cables will not be permitted.

2.08 WIRE IDENTIFICATION

- A. All test lead and drain cables shall be coded with circular brass stamped or engraved identifier or wrap around marker. The letters and numbers shall be printed, minimum 3/16-inch in size, and shall identify the piping to which the lead is connected.
- B. Wire identifiers for anodes shall be the wrap around type with a high resistance to oils, solvents and mild acids. Marker shall fully encircle wire with imprinted alpha-numeric characters for pipe identification.
- C. The following colors and minimum wire gauges have been used:
 - 1. Test Leads:



- Impressed Current System #10 THHN White
- 2. Drain Cable:
Impressed Current System #6 HMWPE Black
- 3. Anode Leads:
Impressed Current System #6 Kynar Black
- 4. Bond Cables:
At AC Insulators #4 HMWPE Black

2.09 EXOTHERMIC WELDS

- A. Exothermic welds shall be provided for connecting cables to structures in strict accordance with the manufacturers' recommendations. Connections shall be made at locations indicated. Exothermic welds shall be Cadweld, as manufactured by Erico Products, Inc. or Thermoweld, or approved equal. Duxseal packing as manufactured by JM Clipper or approved equal shall be used where necessary to prevent leakage of molten weld metal.
- B. The shape and charge of the exothermic weld shall be chosen based on the following parameters:
 - 1. Pipe material
 - 2. Pipe size
 - 3. Wire material
 - 4. Number of strands to be welded
 - 5. Orientation of weld (vertical or horizontal)
- C. All exothermic weld locations shall be coated with a coating, which is compatible with the pipeline coating. The area of the weld shall be coated with a suitable epoxy, as shown in the details, to provide protection to the area of the cadweld and any metal surface exposed during the welding.

2.10 MIXED METAL OXIDE CONTINUOUS ANODE FOR DEEP ANODE WELL

- A. Active anode area shall be mixed metal oxide coated titanium, installed in a preassembled unit, including anode lead cables, attached to either end of the active area of the anode, using a waterproof connection. The active area of the anode shall be equipped with a perforated vent pipe. The assembly shall be equipped with a lowering rope and supplied with sufficient coke breeze to fill the annular space between the



anode assembly and the drilled hole for the active area of the anode. The active area shall be 100-feet.

2.11 CALCINED COKE BREEZE

- A. Backfill material for impressed current system anodes shall be calcined coke breeze with a resistivity of 25 ohm-cm or less when tested with an applied pressure of 2 pounds per square inch. The material shall conform to the following gradation requirements:

<u>Sieve Size</u>	<u>Percent Passing</u>
3/8	100 minimum
1/8	5 maximum

- B. The impressed current system anode backfill shall have the following chemical properties:

Fixed carbon	98.0% minimum
Ash	0.5% maximum
Sulfur	5.0% maximum
Volatile Matter	1.0% maximum
Moisture	1.0% maximum

2.12 PEDESTAL MOUNTED AIR COOLED RECTIFIERS

- A. Rectifiers shall have a minimum 120 Volt Single-phase AC input and have a minimum rated DC output of 20 volts-20 amperes. Rectifiers shall be pedestal mounted. Rectifiers shall be manufactured by Matcor, Inc., or an approved equal.
- B. Rectifier shall be supplied with a set of slide out racks for the transformer and stacks.
- C. Rectifiers shall meet with the following specifications: NEMA Pub. No. MR-20-1958, reaffirmed by NEMA 1971 and 1975. Rectifiers shall be capable of operating continuously at the rated output current at any voltage from zero to 100 percent without damaging any rectifier components. Full rated DC output voltage shall be adjustable by not less than 20 equal steps from approximately 5 percent of rated voltage to full rated output. This adjustment may be accomplished with studs and link-bars or tap switches. If tap switches are used, they shall not carry over 50 percent of the nominal current rating assigned by the manufacturer. Rectifiers shall be designed to operate continuously at rated maximum voltage and current in ambient temperature of 45 degrees C without damage to the rectifier components. Cooling shall be accomplished by natural convection. Fan cooling is not acceptable for unattended equipment.



- D. All rectifiers shall have overload protection. Protection from overload on the input shall be accomplished by molded case, fully magnetic circuit breakers on the incoming power lines. These circuit breakers shall hold at 100 percent of load and may trip between 101 percent and 125 percent of rated load. They shall trip at 125 percent of rated load. The trip point shall be unaffected by changes in ambient temperature. Trip handles of individual pole breakers shall be mechanically linked to open all lines when an overload occurs. Units shall be equipped with silicon stacks, overload protection shall be provided by a quick opening fuse in the transformer secondary.
- E. Voltage surge protection for units equipped with silicon stacks shall be supplied by AC and DC lightning arresters and metal oxides varistors across all secondary lines to the stack and across the DC output of the rectifier. The metal oxide varistors must fire before the voltage surge reaches the peak inverse voltage rating of the diodes used in the stack. Transformers shall be isolation type with a grounded electrostatic shield between the primary and secondary windings. Dielectric strength of all insulating materials shall not be less than 2,000 volts RMS as tested for one minute and applied between windings and the transformer core. Magnetic wire insulation and layer insulation shall be rated no less than 155 degrees C. Magnetic wire insulation shall not show signs of softening or crazing after 24 hours immersion in any of the following chemicals: Naptha, Toluene, Ethyl Alcohol, Trichloro-Ethylene, Styrene Polyester, Butyl Acetate, Mild Acids, or Acetone. Impregnating varnish used shall meet the standards for 155 degrees C when tested according to AIEE test procedures. The transformer shall be preheated before dipping and baked after dipping. The transformer temperature rise, as measured by thermocouples within the transformer, shall not exceed 85 degrees C. The transformer efficiency shall not be less than 85 percent. The transformer voltage regulation shall not exceed 3 percent from full rated load to 1/4 of rated load when measured in accordance with the procedure described in MR-20-1958. Chokes and reactors shall meet the requirements listed for transformers.
- F. Silicon stacks shall be equipped with silicon diodes rated a minimum of 800 peak inverse volts. Heat sinks shall be sized to keep diode junction and case temperatures from exceeding 100 degrees C under 45 degrees C ambient temperature conditions.
- G. Separate voltmeter and ammeter shall be provided for monitoring rectifier output. Minimum meter width shall be 3-1/2 inches round or rectangular with minimum scale length of 2-7/8 inches. Meter movement shall be jewel and pivot D'Arsonval type. Taut band meters are not acceptable because of a tendency to break when jolted during shipment. Meter accuracy shall be a minimum of plus or minus 2 percent of full scale at 80 degrees F and shall be temperature compensated to vary no more than 1 percent per 10 degrees F temperature variation. Scale faces shall be metal or plastic. Ammeter shunt shall be block type mounted on the front panel for easy access. Current and millivolt ratings shall be clearly stamped on the shunt. Shunt accuracy shall be at least plus or minus 1 percent.
- H. Electrical tests shall be performed by the manufacturer and recorded as listed below:



- AC Volts Input
 - DC Amperes Input
 - Apparent Watts Input
 - True Watts Input
 - Power Factor
 - DC Volts Output
 - DC Amperes Output
 - DC Watts Output
 - Conversion Efficiency
 - Dielectric Strength
 - Transformer Primary to Ground
 - Transformer Secondary to Ground
 - Transformer Primary to Secondary
 - Stack AC to Ground
 - Stack DC to Ground
 - Ripple Voltage at Full Output
- I. Rectifier shall be heavy steel or anodized aluminum swing open case, with white baked-enamel finish, and 10-inch standard leg support, or shall be suitable for post mounting.

PART 3 – EXECUTION

3.01 GENERAL

- A. Upon completion of installation of all components as shown on the drawings and in accordance with these specifications, testing shall be performed to demonstrate that the installation has been completed and is in working order in conformance with the Contract Documents. In no case shall the testing be less than that outlined herein unless requested in writing by the Contractor and approved by the Engineer. The interim testing described herein shall be in addition to and not substitution for any required testing of individual items at the manufacturers' plant. District shall provide testing of the system. The test data shall be submitted to the Engineer for acceptance to demonstrate that the system is in proper working order.

3.02 EXCAVATION AND BACKFILL

- A. Buried wires shall have a minimum cover of 24 inches. The bottom of the trenches shall be covered with 1 inch of mortar sand prior to placing wires, insulation, anodes, coatings or other underground appurtenances.
- B. Wire identification tags shall be placed on the wires prior to placing wire in conduit or backfilling.



3.03 TEST STATIONS

- A. Test stations shall be placed at the locations indicated. The Contractor shall field verify final location of the test stations. Wire identifiers shall be placed on all wire prior to backfill and installation of test stations.

3.04 WIRES

- A. Wires buried in the ground shall be laid straight, without kinks. Each wire run shall be continuous in length and free of joints or splices, unless otherwise approved. Care shall be taken during installation to avoid punctures, cuts or other damage to the wire insulation. Damage to insulation shall require replacement of the entire length of wire at the Contractor's expense.
- B. At least 18 inches of slack (coiled) shall be left for each conductor, at each test station housing. Slack in the wire shall be sufficient to allow removal of wire extension for testing. Wire shall not be bent into a radius of less than 8 times the diameter of the wire. Copper split bolts or other appropriate connection hardware shall be used for all test station connections.
- C. Where buried cable is to be placed in existing conduit, the conduit must be of sufficient diameter to accommodate the additional cable. This shall be determined by the number and size of both the existing and new cable in accordance with all applicable codes and standards. This shall also apply where new cable is to be installed in new PVC conduit. PVC conduit shall be installed to a minimum depth of 24 inches below grade.
- D. Red caution tape, 3 inches in width, or colorized slurry shall be installed above buried wire and conduits at a maximum depth of 18 inches below grade over the wire and conduit location

3.05 WIRE IDENTIFICATION

- A. Brass wire identifiers or wrap around cable markers shall be placed on the wires prior to backfill.

3.06 EXOTHERMIC WELD CONNECTIONS

- A. Exothermic weld connections shall be installed in the manner and at the locations indicated. Coating materials shall be removed from the surface over an area of sufficient size to make the connection. The steel surface shall be cleaned to white metal by grinding or filing prior to welding the conductor. The use of resin impregnated grinding wheels will not be allowed. The conductor shall be welded to the pipe by the exothermic welding process with a copper sleeve fitted over the



conductor. Only enough insulation shall be removed such that the copper conductor can be placed in the welding mold.

- B. After the weld has cooled, all slag shall be removed and the metallurgical bond shall be tested for adherence to the pipe or casing. All defective welds shall be removed and replaced. All exposed surfaces of the copper and steel shall be covered with insulating materials as indicated. No connections to the piping shall be buried prior to inspection and approval of the Engineer.

3.07 COATING OF WELDS

- A. The Contractor shall furnish all materials, clean surfaces and repair any damage to protective coatings and linings damaged as a result of the welding.
- B. A coating shall be applied to all exothermic weld locations. The coating shall be an epoxy, as shown in the details. All surfaces must be clean and dry and free of oil, dirt, loose particles and all other foreign materials prior to application of the coating.

3.08 JOINT BONDS

- A. Bond cables shall be provided across flexible couplings, A/C insulators and nonwelded joints on steel pipe, on cement mortar coated steel cylinder pipe joints and ductile iron pipe joints as necessary to ensure electrical continuity. Joint bonds shall be installed as indicated. A minimum of two bonds shall be installed per joint. Joint bonds shall not be installed immediately across dielectric flange kits but shall be required around appurtenances, which are isolated, in order to provide electrical continuity along the main pipeline.

3.09 DEEP ANODE WELL INSTALLATION

- A. The Contractor shall obtain and pay for all fees and permits required for well drilling. Contractor shall log the well in accordance with local and State agency requirements.
- B. Anodes shall be installed in the deep anode well at the approximate location indicated. All drilling shall be done in strict conformance to California State Bulletin Number 74 regulating the classification, construction and sealing of wells. In addition, a well permit shall be obtained by the Contractor from the local, state or federal agency, as required prior to well construction. The Contractor shall provide a grout seal for a minimum of 50 feet.
- C. The impressed current system anode holes shall be drilled by means of a rotary drill rig using circulating water based drilling mud or air, as required. Holes shall be drilled to obtain a nominal 8 inch diameter anode well at a minimum. The well shall be drilled to the minimum depth indicated and shall be essentially straight and plumb. Drilling mud may be circulated through a portable sump or through a sump dug in the



ground at the drill site. If a "dug sump" is used, it shall be emptied and backfilled upon completion. Backfilling shall be such that the sump is safe for vehicle traffic without settling. Drilling mud and cuttings shall be disposed by the Contractor at a suitable disposal site at no additional cost to the Owner, unless it is determined that the cuttings contain hazardous materials. If hazardous materials are suspected, the cuttings will be tested and disposal and chain of custody would be the responsibility of the District.

- D. When the hole has been drilled to specified depth, and in the presence of the Engineer, fresh water shall be circulated from the bottom of the hole to clear the hole of drilling mud and cuttings. The hole shall be flushed until fluid is thinned as much as possible without danger of cave-in. The Engineer shall determine the degree to which the hole is flushed. The hole shall be maintained full to the top with fresh water throughout the entire loading operations. Preparation of the impressed current system anode hole and loading of anodes and other equipment in the hole shall be done in the presence of the Engineer. Loading of the anode hole shall be begun early enough in the day to ensure completion of all loading, including backfilling, to accommodate inspection by County Health inspectors.
- E. Anode assemblies shall be lowered into the hole supported by the attached lead wires. The Engineer shall visually inspect the insulation on the anode lead wire for abrasion or other damage to the insulation and wire as the anode is lowered into place. Splices and/or any form of wire repair shall not be allowed on the anode lead wire from the point of connection at the anode to the top of the deep well anode bed hole. In the event that an anode must be retrieved after it has been lowered into the hole, the entire length of the anode lead wire shall be inspected by the Engineer for abrasion or other forms of damage to the insulation and wire. Anodes with damaged wires shall be rejected by the Engineer and shall not be reinstalled.
- F. When an anode has been placed at specified depth, it shall be securely fixed in that position by tying the anode lead wire to a rack, sawhorse, etc., placed over or adjacent to the anode hole.
- G. All anodes shall be loaded prior to coke breeze backfill. No anodes shall be buried until the Engineer has inspected the placement of the anodes and given permission to backfill.
- H. Coke breeze shall be placed in the hole by pouring directly from the bag into the anode hole or by pumping. Pouring shall be at a steady rate and shall be slow enough to insure that the coke breeze does not bridge or block in the hole. The hole shall be kept completely full of water during placement of backfill. The top of the hole shall be kept free of floating coke breeze particles.



- I. Settling of the backfill and coverage of the anode shall be determined by observing the measurement of anode current output or circuit resistance through a 12V DC power source circuit.
- J. Backfill of the hole above the coke breeze column shall be sealed with 5 feet of sand. Following placement of the sand, the hole shall be sealed within 3 feet of the top with premixed grout or bentonite as specified in California State Bulletin Number 74. Backfill of the uppermost 3-foot portion of the anode hole shall consist of round drain rock as indicated. Round drain rock used for backfill shall be 3/4-inch to 1/2-inch diameter thoroughly washed to insure removal of sand and fines.
- K. A concrete traffic box shall be set near the top of the anode hole for termination of the vent pipe. From the top of the anode hole, the anode leads shall be run to the rectifier location. Anode leads shall be permanently marked with cable identifiers.

3.10 WIRE CONNECTIONS

- A. After installation, all wire connections shall be tested at the test station, junction box locations, or at rectifiers to ensure that they meet the requirements of the Contract Documents.

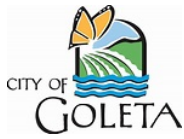
3.11 EXOTHERMIC WELDS

- A. Exothermic welds shall be tested by the Contractor for adherence to the pipe or casing and for electrical continuity between the pipe or casing and wires. A 22-ounce hammer shall be used for adherence testing by striking a blow to the weld. Care shall be taken to avoid hitting the wires.

3.12 JOINT BOND TESTING

- A. Upon completion of the installation, the Contractor shall provide testing of the system by a qualified corrosion engineer to ensure compliance with the Contract Documents. The testing shall include, but not be limited to the following, at the discretion of the Engineer, measurement of all anode currents and potentials, potentials of metallic pipelines prior to and after connection of anodes. Measurements shall be made at all test station locations. Any deficiencies of systems tested shall be reported to the Engineer and retesting of systems and repairs to the systems shall be at no additional cost to the District.

END OF SECTION



SECTION 21 13 13 FIRE-SUPPRESSION SPRINKLER SYSTEM

PART 1 - GENERAL

1.01 SUMMARY

A. Work Scope:

1. Complete wet automatic sprinkler system provision.
2. The system is intended to be designed as a NFPA 13 Light Hazard occupancy, as the structural frame and building interior/exterior are of low hazard, non-combustible construction. The contractor shall review and confirm the building construction, before proceeding with their final hydraulic design and final selection of the hazard occupancy. The final design shall be code compliant, per the subcontractor's independent design and review of the A/E complete set of drawings.
3. All sprinkler heads are to be centered between light fixtures or in the center of tiles, and NOT independent of the reflected ceiling plan elements. Note sprinkler heads may be relocated by contractor preference, but shall follow the placement rule in the preceding sentence. This requires effort by the sprinkler to center the heads between the ceiling elements including lighting fixtures and ceiling grids in an aesthetic manner.
4. Painting of all exposed sprinkler piping (in finished spaces and viewable from public or back of house no ceiling areas) is to be included. Color to be matching paint color of exposed arch. finishes. The General Contractor is to have this primary cost provision responsibility of the sprinkler painting, unless they assign it to a subcontractor. This will not be a negotiable point. Bottom line, the exposed pipes visible to view from the public spaces are to be painted.
5. For sprinkler coverage under the three roof skylight areas, it will be acceptable to utilize sidewall heads, to minimize the routing and hanging of sprinkler pipes from the skylight structural members. Note the contract documents may show an intention preference of sidewall heads, to minimize any pipes under the skylights. The arch. submittal review comments on aesthetics on the submitted automatic sprinkler shop drawings shall be incorporated into the final contractor's design, in particular the skylight protection. This is a primary intent for the overall aesthetics.
6. The sprinkler contractor shall be responsible for the water pressure hydrant test performance, if a recent test is not provided. FYI – the Goleta Water District conducted a hydrant test for Hydrant #394 on 10-28-20 showing 1600 gpm at 44 psi residual pressure, and a 2nd one for Hydrant #1194. If the contractor needs this report, contact the Water District or the Architect.



7. Submission of sprinkler-contractor generated engineered shop drawings shall be submitted showing sprinkler head placement and branch pipe sizing for Arch. review and comment. The shop drawings shall be also submitted to the City Fire Dept. for their review.B. Related Requirements: The requirements of this Section, NFPA 13 and NFPA 14 shall take precedence over requirements found in the following:
 1. Division 01 - General Requirements.
 2. Section 07 84 13 Penetration Fireproofing.
 3. Section 10 44 13 Fire Extinguishers and Cabinets
 5. Section 22 05 00 Common Work Results for Plumbing.
 6. Section 22 05 13 Basic Plumbing Materials and Methods.
 7. Section 28 31 00 Fire Detection and Alarm.
 8. Section 31 23 23 Excavation and Fill for Utilities.
 9. Section 33 11 00 Site Water Distribution Utilities.

1.02 SUBMITTALS

A. Manufacturer's Data:

1. Submit complete and detailed equipment and material list of items to be furnished and installed under this section.
2. Submit manufacturer's specifications and other data required to demonstrate compliance the plans and specified requirements.

B. Drawings:

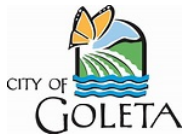
1. Submit shop drawings of wet pipe fire protection sprinkler system in compliance to NFPA 13, Standard for the Installation of Sprinkler Systems, Sprinkler systems shall comply with the provisions of NFPA 13 and 14.
2. Shop drawings shall fully comply with the most stringent provisions of this specification and plans, and with the applicable codes and standards.
3. Shop drawings shall be same size as the Contract Drawings and shall be produced using Revit or AutoCAD. Paper print submission of shop drawings will be acceptable, with a paper and electronic PDF format for record drawings.

C. Regulatory Requirements:

1. Installation of fire sprinkler system shall not vary from the submitted plans unless alterations have been approved by the State Fire Marshal.
2. Complete standard testing forms and get sign-off by the Project Inspector.

D. Closeout Submittals: Submit in accordance to Section 01 7700, Contract Closeout, and as specified herein:

1. Record Drawings:



- a. Record drawings of installed Work shall be maintained current on the Project site, available for Fire Marshal and the Project Inspector to review.
- b. At completion of installation submit Record Drawings signed by installing Contractor in pdf format produced in AutoCad or Revit format, including:
 1. Record Specifications.
 2. Record Product Data: Include specific model, type and size for equipment and material installed.
 3. Record Test Results.
 4. Maintenance Manuals.

1.03 QUALITY ASSURANCE

- A. Comply with applicable national or local codes and standards.
- B. Except where exceeded by the requirements of these specifications, the following are made part of this section: prints and details, and provisions of the NFPA 13 Standard for Installation of Sprinkler Systems and NFPA 14 Standard for the Installation of Standpipes and Hose Systems.
- C. Qualifications of Manufacturer: Products used in work of this section shall be produced by manufacturers regularly engaged in manufacture of similar items and with a 5 year history of successful production that is acceptable to the Architect.
- D. Qualifications of Installer: Installer shall have a current C-16 license in the State of California in the installation of fire sprinkler systems.

1.04 FIRE SERVICE WATER CONNECTION

- A. The Owner shall pay fees and provide for the fire main POC (point of connection), consisting of the installation of a detector check valve (if one is required) and meter shut off valve inside a meter vault.
- B. Fire Service Mains shall be provided with approved Meter Service Backflow protection. An approved Reduced Pressure Principle Backflow Prevention Assembly (RP) to meet minimum backflow protection requirements for meter service protection (MSP) shall be provided on the fire main, according to the California Plumbing Code (CPC), NFPA 13 and 14, and according to the current City rules for backflow assemblies).

1.05 PRODUCT HANDLING

- A. Comply with the provisions specified in Sections 22 0500 and 22 0513.

1.06 COORDINATION

- A. Coordinate activities in accordance with provisions of Section 22 0500.

1.07 JOB CONDITIONS



- A. Unscheduled utility flow interruptions are not permitted. Schedule service interruptions in advance.

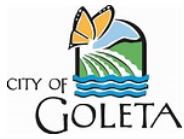
1.08 EXTRA MATERIALS FOR MAINTENANCE

- A. Provide spare sprinkler heads in quantity equal to 2 percent of total number of each type of sprinkler head installed. There shall be no less than two heads of each type and temperature rating provided, and in no case less than six spare sprinkler heads per building. There shall be no fewer than 4 spare sprinkler heads for up to 300 sprinkler heads installed. Spare sprinkler heads shall be kept inside of spare sprinkler head box(s). A spare sprinkler wrench for each type of sprinkler head shall also be provided inside of each spare sprinkler head box, at each building. Locations of spare sprinkler boxes shall be located at:
 - 1. Mech. Plumbing room, when enclosed and secure.

PART 2 - PRODUCTS

2.01 WET AUTOMATIC SPRINKLER SYSTEM SCOPE

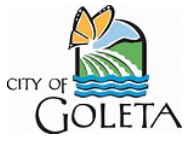
- A. General: Provide system complete including, but not limited to:
 - 1. Provide underground and above ground sprinkler piping including trenching and backfilling. Materials and equipment shall be UL/FM listed and approved as required by NFPA for their application. Required signage shall be provided and installed as required by NFPA 13 and NFPA 14.
 - 2. Provide overhead sprinkler system with sprinklers installed as required according to type, location and temperature rating.
- B. Sprinkler Heads:
 - 1. Provide concealed chrome pendant spray type sprinkler heads with matching escutcheons in areas with finished ceilings. Exterior escutcheons shall be poly-coated or concealed type to prevent rusting and oxidation.
 - 2. Provide upright sprinklers in areas with exposed piping.
 - 3. Provide poly-coated glass bulb corrosion resistance type sprinklers heads in areas exposed to a corrosive environment of coastal air (all outside areas under canopy).
 - 4. Sprinklers shall be glass bulb type, with hex-shaped wrench boss integrally cast into the sprinkler body to reduce the risk of damage during installation,
 - 5. Sprinklers in concealed spaces, exterior locations, and other areas that will experience over 100 degrees F ambient temperature shall be furnished with 200 to 225 degree rated sprinklers. Sprinkler heads in other locations, unless otherwise noted, shall be 155 to 165 degrees F rated.
 - 6. Automatic fire sprinkler head type shall be as follows:
 - a. In areas with ceiling heights of nine-feet or lower, sprinkler heads installed shall be or fully recessed or concealed.
 - 7. Sprinkler heads in light hazard occupancies are required to be Quick Response sprinklers as required in NFPA 13. Sprinkler heads shall be of the same manufacturer throughout the building/site as indicated. Sprinklers shall



- typically be ½ inches NPT, standard orifice, minimum 5.6 nominal K factor, UL listed for 175 psi, and listed for light and ordinary hazard occupancies.
8. Sprinkler head location shall be designed and installed in an aesthetically pleasing manner and shall be located in center of ceiling tiles and in center of 24-inch by 48-inch ceiling tiles in the 24-inch direction and no closer than 12-inch from the edge in the 48-inch direction.
 10. UL/FM listed Sprinkler head guards shall be provided on Sprinkler heads installed at seven feet six inches above floor or lower in exposed locations, or that are deemed subject to damage. Sprinkler head guards shall securely fasten with bolt-on feature to the base of the sprinkler or be a factory installed guard. Guards shall also be provided on upright and sidewall heads where sprinklers are installed at seven feet six-inch heights or lower.

C. Fire Sprinkler Systems:

1. Underground piping: Comply with the requirements of Section 33 1100, Site Water Distribution Utilities.
2. Provide an underground UL/FM listed PVC or Ductile iron supply line connected to detector check meter or water main as indicated. Install site water mains no closer than 10'- 0" parallel to the building foundations. Underground fire water lines shall be installed 36 inches below grade. Tracer wire shall be installed in accordance with Section 33 1100: Site Water Distribution Utilities.
3. Fire Department Connection (FDC) with check valve (wafer type) shall be provided after the backflow preventer, and before the building fire sprinkler riser(s), located where the FDC will be accessible to the fire department from the street or sidewalk without obstructions. No shut off valve shall be allowed on the FDC line as per NFPA 13. FDCs shall have a height between two and four-foot above the ground.
4. Provide a UL listed, FM approved FDC, approved RP type backflow assembly, check valves, shut-off valves, drain valves, ITV, and flow indicator at the locations required. (Test-and-drain combination valves are prohibited.)
5. Flow indicator shall activate the fire alarm system between 45 and 90 seconds, and activate a local alarm on the outside of the building continuously with water flow. Connection of this switch is a part of the Work of Division 26 fire alarm work. Shut-off including valves on the fire main backflow preventer shall be electrically supervised according to CBC 903.4., NFPA 13 and Section 28 3100 – “Fire Detection and Alarm”.
6. Pipe through ceilings at head locations shall be furnished with a two piece, or fully concealed escutcheon. Unless otherwise designated, escutcheons shall be identical and match the other escutcheons of the same type throughout the building or site. Piping through walls and ceilings shall have a split ring chrome escutcheon.
 - a. Flexible stainless steel sprinkler head drop system may be used. Flexible drops shall be UL listed, FM approved, and shall be compatible with ceiling systems. Flexible drop length shall be included



in the Hydraulic Calculations. The drop system shall include the required support bracing.

7. Furnish and install required signs, spare heads, special wrenches, and spare sprinkler head boxes as required to satisfy NFPA 13, NFPA 14 and this specification.
8. Sprinkler system piping shall be provided with complete drainage as required by NFPA. Test valve discharge shall be piped away from planters to asphalt areas. Furnish protection of piping against accidental or malicious damage.
9. Upon completion of the Work of this section, and before Substantial Completion, subject system, including underground supply connection, to tests required. A minimum hydrostatic test shall be two hundred pounds (200 psi) or fifty pounds (50 psi) in excess of the maximum system working pressure, whichever is greater, for two hours with no leaks or loss of pressure per NFPA 13. The Project Inspector shall be furnished with a NFPA 13 test certification.
10. Local fire sprinkler alarm requirements shall be accomplished with a vane or paddle type water flow detector switch and an electrically powered fire sprinkler horn located on the street side of the building and connected to the fire alarm control panel with secondary power provided from the fire alarm batteries. The drilled out disk shall be attached to the mounting U-bolt. Time delay shall be set at 45 to 60 seconds. Mechanically activated water bells with alarm valve and pressure switch are prohibited.
11. Hanging, bracing and support shall utilize only UL/FM listed approved products, and comply with NFPA 13, Chapter 9 requirements for rod and bolt sizes except for the following: 4 and 6 inch pipe shall be supported by a minimum 1/2 inch hanger rod, 8 inch pipe shall be supported by a minimum 5/8 inch hanger rod, 10 and 12 inch pipe shall be supported by a minimum 3/4 inch hanger rod. Hanger rods in exterior locations and in parking structures shall have Electrodeposited Zinc Coating per ASTM B633 to prevent rusting.
12. Building Fire Sprinkler assemblies shall be provided as follows. Building shall be provided with an accessible and electrically supervised shut off valve at a height not to exceed five-feet above the floor. Assembly shall be equipped with a check valve followed by a main drain valve and then the flow indicating switch and pressure gauge immediately after the shut-off valve.

2.02 MATERIALS

A. Globe or Angle Valves: UL/FM listed.

AV-1 Bronze angle valve: 2 inches and smaller, screwed-in bonnet, threaded ends, rising stem:

Nibco	Kennedy	Fairbanks	United	Or equal
T-301	98 SD	0210	126T	

B. Automatic Fire Sprinkler Head, UL/FM listed:

Brass pendant type for areas with suspended ceilings:



Victaulic V27	Tyco TY 3231	Viking VK302	Reliable F1FR56	Or equal
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Brass upright type for areas with no ceilings:

Victaulic V27	Tyco TY3131	Viking VK300	Reliable F1FR300	Or equal
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Chrome or poly coated semi recessed type with semi-recessed escutcheon:

Victaulic V27	Tyco TY3231	Viking VK302	Reliable F1FR56	Or equal
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Fully concealed type sprinklers; chrome cover:

Victaulic V38	Tyco TY3531	Viking VK462 VK404	Reliable F4FR G4A	Or equal
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D. Backflow Prevention Assemblies:

BPV-1 Reduced Pressure Principle Backflow Prevention Assembly (RP) type for meter service protection (MSP) requirements:

Ames 4000SS C400 M400	Febco 860 OS&Y 880 OS&Y	Watts 909 RP 957 RP 994 RP	Wilkins 975 RP 375 RP	Or equal
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E. Butterfly Valves:

GOBFV-1 Grooved end Gear Operated Butterfly Valve, 300 psi, for fire protection sprinkler risers. UL listed, FM approved, with weatherproof gearbox and double pole/double throw monitor switch, double seal design for bubble tight shut off at 175 psi. Corrosion-resistant, fusion-bonded nylon II body coating, easy to read position indicator:

Kennedy Figure 82M	Nibco GD-4765-8N, 300 psi	Victaulic 705W 300 psi	Tyco 580 300 psi	Or equal
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GOBFV-2 Wafer Type Gear Operated. Butterfly Valve, same requirements as GOBFV-1:

Kennedy Figure 82W	Nibco WD-3510 300 psi	Or Equal
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F. Check Valves:



- CV-1 Bronze check valves: 2 inches and smaller, 200 psi WOG, bronze disc, swing type, conforming to MSS-SP-80-97, threaded ends:
- | | | | | |
|-------|---------|----------|--------|----------|
| Crane | Nibco | Stockham | United | Or Equal |
| 37 | T-433-Y | B-319 | 62T | |
- CV-2 Iron check valves: 2-1/2 inches and larger, class 175, composition disc, swing type, bolted cap, UL listed, FM approved flanged ends:
- | | | | | |
|----------|---------|---------|-------|----------|
| Stockham | Kennedy | Tyco | Clow | Or Equal |
| G-940 | 126 | Model G | F5380 | |
- CV-3 Wafer Type Check Valve:
- | | | |
|------------------------|----------------|----------------|
| United Wafer Check #90 | Nibco KW-900-W | Mueller A-2102 |
|------------------------|----------------|----------------|
- Or equal.
- CV-4 Grooved Check valve 2 1/2 inch and larger:
- | | | | | |
|--------|----------|----------|------------|------|
| United | Gruvlock | Reliable | Victaulic | Tyco |
| 67 | 7800 | Mode "G" | Series 717 | 590F |
- Or equal.

G. Escutcheons

- ES-1 Chrome plated, or white poly-coated, 2-piece canopy (escutcheon), 2.25 to 3.5 inches in extended position:
- | | | | |
|-----------|-----------|--------------|----------|
| FPPI | Tyco | Reliable | Or equal |
| 01 - 401 | No. 401 | HBC (chrome) | |
| Chrome or | Chrome or | HBW (white) | |
| White | White | | |
- ES-2 Chrome plated or white poly coated, 2-piece recessed:
- | | | | |
|----------|------|--------------------------|----------|
| FPPI | Tyco | Reliable (semi recessed) | Or equal |
| 01 - 400 | 410 | GF2-C (chrome) | |
| 01 - 402 | 420 | GF2-W (white) | |

H. Fire Department Connections:

- FDC-1 UL listed, FM approved, type, 4 inch by 2-1/2 inches by 2-1/2 inches bronze body fire department hose connection (FDC):
- | | | | | |
|---------|---------------|------|-----------|----------|
| Crocker | Potter-Roemer | Tyco | Powhatten | Or equal |
| 6405 or | 5710 or | 86 | 21-201 or | |
| 6420 | 5730 | | 31-133 | |

I. Flow Indicators:



FIA-1 Listed by State Fire Marshal, with double pole, double-throw switch, one normally open and one normally closed, UL listed and FM approved:

Potter-Roemer	Notifier	Or equal
VSRF Series	WFR Series	

J. Outside Stem and Yoke Gate Valves:

OS&Y-1 Bronze Gate Valves: 2 inches and smaller, class 175, solid bronze wedge disc, OS&Y, copper silicon alloy stem, UL/FM listed, threaded ends:

Stockham	Crane	Nibco	United	Or equal
B-133	459	T-14	18	

OS&Y-2 Iron gate valves: 2 ½-inch and larger, class 175, IBBM, OS&Y, solid wedge disc, Teflon-impregnated packing, UL/FM listed, flanged ends:

Stockham	Crane	Kennedy	Mueller	Victaulic
G-634	467	68	A-2073	771

Or equal.

OS&Y-3 2 ½-inch and larger, epoxy coated, resilient wedge, 175 pounds gate valve for riser valves, P.I.V., and shut off:

Clow	Nibco	Kennedy	Mueller	Or equal
F-6136	617-0	KV-4068	A-2360	

K. Gate Valves:

GV-1 Bronze gate valves: 2-inch and smaller, class 175, solid bronze wedge disc, rising stem copper silicon alloy stem, UL/FM listed, threaded ends:

Stockham	Crane	Grinnell	United	Or equal
B-133	459	Fig. 66	14	

GV-2 Iron gate valves: 2 ½-inch and larger, class 175, IBBM, solid wedge disc, Teflon impregnated packing, UL/FM listed, flanged ends:

Stockham	Crane	Kennedy	Mueller	Victaulic
G-634	467	68	A-2052	772

Or equal.

L Sprinkler Guards:

SPG-1 Sprinklers installed at seven feet six inches above floor or lower in exposed locations, or that are deemed subject to damage shall be equipped with a UL/FM listed, head guard. Guards shall be listed, supplied and approved for use with the sprinkler by the sprinkler manufacturer. Sprinkler head guards shall securely fasten with bolt-on



feature to the base of the sprinkler or be a factory installed guard. Guards shall also be provided on upright and sidewall heads where sprinklers are installed at seven feet six-inch heights or lower.

Reliable Viking Tyco FPPI Victaulic
Or equal.

M. Sprinkler Horn:

SPH-1 UL/FM approved, surface-mounted, weatherproof and red finished:

Horn:	Bell:	Wheelock equal
HRK System Sensor	SSM-24-10 System Sensor	
24 V-DC	24 V-DC	
Weatherproof with	Weatherproof with	
BBS-2 back-box for	WBB box for	
Surface mount	Surface mount installation	
Or equal		

N. Hangers, Supports, Bracing:

HSB-1 Tolco products or UL listed and FM or equal.

O. Threaded fittings:

TF-1 Ductile iron, 300 psi rated, UL listed, FM or NFPA approved.

TF-2 Cast iron fittings, 175 psi rated, UL listed, FM or NFPA approved:

Anvil Ward Taylor Or equal

TF-3 Malleable Iron, 300 psi rated, UL, Listed, FM or NFPA approved

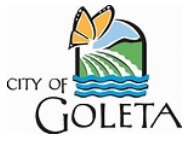
TF-4 Galvanized, 175 psi rated, UL Listed, FM or NFPA approved

P. Fire Sprinkler Pipes and Standpipes:

FSP-1 Aboveground fire sprinkler pipe: 1 inch through 8-inch, Schedule 10 or 40, black or galvanized steel meeting ASTM Standards A53, A135, or A795. Pipe Corrosion Resistance Ratio (CRR) shall be 1.00 or greater. Pipe may be threaded or grooved.

a. Piping 2 inches and smaller shall have threaded joints and fittings in concealed, non-accessible locations. Groove coupler connections (Victaulic, Viking VGS, or equal) on pipe sizes 1 inch through 2 inches are acceptable in accessible areas with required seismic bracing provided. Plain end connections such as “Plainlock” and “FIT” are prohibited.

b. For pipe sizes 2 ½-inch and larger, grooved type (Victaulic, Viking VGS, or equal), welded, threaded and flanged



connections may be used. Any connection that does not utilize a threaded, welded or grooved connection is prohibited, except for mechanical tee bolt-on branch outlet fittings sizes 2-inch and smaller (Victaulic 920 and the 920N).

- c. Submit Verification from manufacturer stating that piping material furnished meets above criteria; (i.e.: threadable pipe has a UL assigned CRR of 1.00 minimum, that it meets ASTM A53, A135 or A795, and it is UL listed, FM or NFPA approved.)

FSP-2 Ductile iron pipe, AWWA C151 (for pipes below grade). Gasketed self retaining joints per ASME/ANSI B16.4.

FSP-3 Flexible Fire Sprinkler Head Connectors: 1 inch pipe size flexible stainless steel fire sprinkler head connectors “Flex Head Industries” Models 2024, 2036, 2048, 2060 and 2072, or equal.

2.03 ACCESSORIES AND APPURTENANCES

- A. Escutcheons: Polished chrome plated split-ring type for exposed piping at every penetration inside finished rooms.
- B. Guards: Provide sprinklers with guards at ceiling at or under seven feet six-inch high and where subject to damage or vandalism.
- C. Miscellaneous: Provide accessories and appurtenances for a complete system.

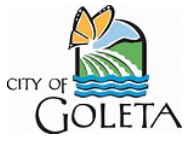
2.04 FIRE HOSE VALVES

- A. Schedule Numbers:

SPV-1 Valve, Fire Hose, cast brass angle valve, UL listed and Factory Mutual approved; 1 ½-inch at 175 psi, female NPT outlet with 1 ½-inch male NPT by 1 ½-inch male NST adapter nipple.

POTTER-ROEMER	POWHATAN	UNITED
4070	500	88
Or equal		

SPV-2 Valve, Standpipe for 2 ½-inch for 150 or higher psig working pressure, male NST outlet for fire department hose connection. Cast brass, replaceable composition disc, and rough chromium-plated body (unless provided inside UL listed valve cabinet) with hand wheel.



POWHATAN	UNITED	POTTER-ROEMER
DXWDGV-250F DXAV5-250F	88H	4065
Or equal		

PART 3 - EXECUTION

3.01 EXAMINATION

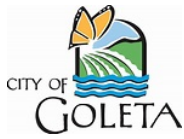
- A. Examine areas and conditions under which Work of this section shall be performed. Correct conditions detrimental to proper and timely completion of Work. Do not proceed until unsatisfactory conditions have been corrected.

3.02 PREPARATION

- A. Ream pipe and tube ends. Remove burrs. Bevel or groove plain end ferrous pipe ends.
- B. Remove scale and foreign matter, from inside and outside of pipes, before assembly.
- C. Provide piping connections to equipment with flanged or grooved connections.

3.03 INSTALLATION

- A. Install underground supply line connected to detector check or water main indicated. Braced or clamped bends shall be in accordance with requirements of NFPA 24. Provide vertical clamp rods at flange and spigot piece of risers, long enough to pass through riser's base flange where required. Furnish concrete thrust blocks where required. Tracer wire shall be installed as per Section 22 0553: Plumbing Identification on PVC underground piping.
- B. Install FDCs, check valves, shut-off valves, gauges, Inspector's test and drain assemblies and flow indicator. FDC must be installed so that it is unobstructed and accessible for the Fire Department's first response unit.
- C. Pipe through floors, wall, and ceilings, at head locations, shall be furnished with required sleeves, and escutcheons and fire caulking where indicated and/or required by code. Escutcheons shall be polished chrome plated unless other finish is selected by the Architect.
- D. Sprinkler system shall be provided with complete drainage facilities in accordance with CBC standards. Drain discharge may discharge into a sewer, storm drain, sump pit or street gutter. Fire sprinkler drains shall not discharge onto a playground or across a sidewalk. Discharge to plumbing fixtures is prohibited due to the inability of a plumbing fixture to receive a full flow of water from a fire sprinkler drain valve under working pressure.



- E. Upon completion of the Work of this section, and before Substantial Completion, subject the entire system, including underground supply connections, to tests as required by NFPA 13, and CBC standards and furnish the City of Goleta and Owner with a certificate of compliance as required.
- F. Close nipples are prohibited. Threaded unions are prohibited. Where a threaded union or coupling is needed, a groove type fitting (Victaulic or equal) shall be used instead. If a groove style coupling is used in a concealed area, an access panel allowing full access to that connection shall be provided.
- G. Fire sprinkler systems piping hangers, seismic bracing, anchors and supports shall conform to NFPA 13, CBC and other applicable codes and the requirements of this specification.
- H. Grooved joints shall be installed in accordance with the manufacturer's latest published installation instructions. Grooved ends shall be clean and free from indentations, projections, and roll marks in the area from pipe end to groove. Gaskets shall be of an elastomer grade suitable for the intended service, and shall be molded and produced by the coupling manufacturer.
- I. Tee branch outlets on fire sprinkler mains shall be by the use of a threaded ductile iron tee fitting, a groove type tee fitting, (Victaulic or equal), or by the use of a thread-a-let welded on by a certified welder as required by NFPA. Mechanical tee bolted branch outlet fittings are prohibited except for branch outlet sizes 2-inch and smaller.
- J. Sprinkler lines within the building shall be concealed within the structure. Risers shall be installed in utility, supply rooms or similar service areas whenever possible, and shall not obstruct access, or maintenance of other equipment within the space. Mains and risers shall be located within the area protected by the sprinkler system unless otherwise approved by fire authorities having jurisdiction.
- K. Sprinklers that have been dropped, damaged, have cracked bulbs, or show a visible loss of fluid shall not be installed.
- L. Sprinkler bulb protectors shall be removed by hand after sprinkler installation. Tools or other devices to remove the protector that could damage the bulb in any way shall not be used.
- M. Routing of piping in non-concealed exposed areas shall be subject to the Architect's review in the final shop drawings. This review will include the glazing skylight areas at the roof level.
- N. Underground piping shall have a minimum of 36 inches of cover to grade. Underground pipe shall be installed on a flat not less than 6-inch thick undisturbed sand bed. After required pressure-leak test, pipe shall be covered with sand not less than 6 inches thick, before backfilling. Comply with NFPA Standards. Piping is not allowed to be underground below the building floor slab.
- O. Provide approved backflow prevention assemblies. Installations of backflow prevention assemblies shall be tested and certified by a certified backflow prevention



device tester prior to Substantial Completion. Tests shall be performed in the presence of the Project Inspector. Test reports shall be turned over to the Project Inspector for mailing to proper agency.

- P. Test valve (ITV) shall be located at the opposite end of the sprinkler system from the supply. Test-and-drain type combination valves are prohibited. ITV discharge and main drain lines shall be piped to a sump pit or to the outside of the building to within a foot from the ground where it will drain away from the building to an exterior storm drain.
- R. Fire sprinkler riser shall be furnished with an accessible shut off riser valve installed no higher than five feet from the finish floor. System shall have a separate shut off valve with flow switch, and shall be securely enclosed or secured with a chain and break-a-way lock.

3.04 PROTECTION

- A. Protect the Work of this section until Substantial Completion.

3.05 CLEANUP

- A. Remove rubbish, debris, and waste materials and legally dispose at off-project site.

END OF SECTION



SECTION 22 05 13

BASIC PLUMBING MATERIALS AND METHODS

PART 1 – GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. This Section prescribes basic materials and methods generally common to the Work of Division 22.
- B. Related Requirements:
 - 1. Division 01: General Requirements.
 - 2. Division 22: Plumbing.

1.02 SUBMITTALS

- A. Provide in accordance with Division 01, Section 22 05 00 and specific requirements of each section of Division 22.
- B. Submit all fixtures and equipment shown on Plumbing drawing P-002 Equipment Schedules, providing submittals for all listed items shown.

1.03 QUALITY ASSURANCE

- A. Standards: Comply with applicable national, state, and local codes and standards: ASTM, ASME, and ANSI. Federal Specifications, AWWA, SISPI, NFPA, FM, UL, CPC (California Plumbing Code), CMC (California Plumbing Code), CSA.
- B. Conform to provisions of Section 22 05 00: Common Work Results for Plumbing.
- C. Manufacturer of plumbing products must be third-party certified to ANSI/NSF Standard 61, Section 9 certification, and ANSI/NSF 372 to demonstrate compliance with the federal requirements for lead contribution to drinking water, the Safe Drinking Water Act SDWA, and the California Health and Safety Code Section 116875.
- D. Qualifications of Manufacturer: Products used in the Work of this Section shall be produced by manufacturers regularly engaged in manufacture of similar items and with a history of successful production as reviewed by the ARCHITECT.

1.04 COORDINATION

- A. Coordinate related Work in accordance with provisions of Section 01 31 13: Project Coordination.



PART 2 – PRODUCTS

2.01 GENERAL

- A. Provide the following products if they are indicated in the Contract Documents or if they are required for the proper installation, function or operation of equipment, systems or components indicated in the Contract Document.
- B. Provide the following products as a complete assembly with required accessories for a complete and functioning entity in compliance with governing codes and applicable standards as specified in Section 22 05 00, manufacturer's instructions or as required.
 - 1. Omission of minor details in the Contract Documents does not waive and/or otherwise relinquish compliance with the above requirements.

2.02 MANUFACTURERS AND MATERIALS

- A. Plumbing Fixtures: Submit for approval all schedule info shown on Equipment Schedule Drawing P-002: Bottom-line, submit all fixtures and equipment shown are to be from major recognized manufacturers.
- B. Ball Valves: 2-inch and smaller:
 - Class 150, 600 psi, Bronze, CWP two piece construction with reinforced TFE seats, full port, adjustable packing gland, (no threaded stem designs allowed), threaded or solder ends. Manufacturer: Apollo Valves 77CLF-100A/77CLF-200A, NIBCO T-685-66-LF/S-685-66-LF, Hammond UP8303A/UP8513, Milwaukee UPBA400S/UPBA450S, or equal.
 - Class 150, 600 psi, Stainless Steel, CWP two piece construction with reinforced TFE seats, full port, adjustable packing gland, (no threaded stem designs allowed), threaded or solder ends. Manufacturer: Apollo Valves 76F-100, NIBCO T-585-S6-R-66-LL, Milwaukee BA260, or equal.
 - Ball Valves in Insulated Piping: Use extended operating handle of non-thermal conducive material, and protective sleeve that allows operation of valve without breaking the vapor seal or disturbing insulation and memory stops that are fully adjustable after insulation is applied. Apollo Valves Therma-Seal, NIBCO Nib-Seal Handle.
- C. Butterfly Valves:
 - Centerline Series A, 200 psi CWP tight shut-off.
 - 1. Body: Lug type ductile iron. Suitable for bi-directional dead-end service at rated pressure without use of downstream flange.
 - 2. Disc: Bronze, or aluminum bronze.
 - 3. Stem: One or two-piece, 400 series stainless steel.
 - 4. Seat and O-Rings: EPDM.
 - 5. Upper and Lower Stem Bearings: Copper alloy or non-metallic material.



6. Operators: Valves 6 inches and smaller, with lever handle. Valves 8 inches and larger, with manual gear operator and disc position indicator.
 7. Manufacturers:
 - a) Valves 2.5 to 6-inch: Apollo Valves LD141, Milwaukee ML 233E, Hammond 6411-03, or equal.
- D. Check Valves:
1. Bronze, 2-inch and smaller:

200 psi, CWP horizontal swing, Y pattern, renewable seat and disc, threaded ends. Manufacturer: Apollo Valves 163T-LF, NIBCO T-413-Y-LF, Milwaukee UP-509, Hammond UP-904, or equal.

200 psi, CWP, bronze body, horizontal swing, Y pattern, renewable seat and disc, solder ends. Manufacturer: Apollo Valves 163S-LF, NIBCO S-413-Y-LF, Hammond Up-943, or equal.

Class 125, 200 psi, swing check, bronze body, Teflon disc, soldered ends. Manufacturer: Apollo Valves 163S, Stockham B-310TY, Crane 1340, NIBCO S-413-Y, Milwaukee 1509-T, Hammond IB-912, or equal.
- E. Earthquake Gas Valve:
- Mechanically triggered by seismic movement, complying with state of California seismic response specifications, UL listed and certified by D.S.A. Size and pressure as required or indicated on Drawings. (Minimum 1/4 psi, maximum 10 psi. Earthquake valve shall shut off gas automatically during an earthquake to prevent an explosion or fire. Acceptable Manufacturers: California Valve (former Koso), or equal.
1. Sensitive to wide amplitude G's only. Preset at factory for the correct G-rating.
 2. Positive sealing from minus 10 degrees F. to 150 degrees F.
 3. Visual open-close indicator.
 4. Manual reset.
 5. Tripping mechanism has non-creeping rolling latch.
 6. Install valve per manufacturer's recommendations only.
- F. Domestic Heating Hot Water Diaphragm Expansion Tank:
- Pressurized, vertical, steel expansion tank for potable water systems with FDA approved, replaceable, heavy duty, butyl rubber blend diaphragm, polypropylene lined dome, 1/2 inch, 3/4 inch, 1 inch or 1 1/2-inch NPT system connection, 1/2 inch or 3/4 inch drain, 0.302 inch-32 standard automobile tire valve type charging connection, lifting rings and a floor mounting skirt for vertical installation. The tank must be constructed in accordance with Section VII of the ASME Boiler and Pressure Vessel Code and stamped for 125 psi working pressure. The tank must be also rated for a continuous working temperature of 240 degrees F. Provide weather and rust resistant



coating. Manufacturer: Apollo Valves 16XT, Bell and Gossett, Wheatley, Taco, Amtrol, or equal.

G. Flow Control Valve – Manual:

Flow control valves: Bell and Gossett Series CB circuit setter balancing valve, line size, with integral pointer (to register degree of valve opening), differential pressure meter connections with built-in check valves and lockable memory stops. Manufacturer: Apollo Valves 58A, Armstrong ARMFLO circuit-balancing valves, series CBV, or equal.

H. Gate Valves:

1. Bronze, 2-inch and smaller:

Class 125, 200 psi, CWP, bronze body and bonnet, non-rising stem, inside screw, screw-in bonnet, solid disc, threaded ends: Manufacturer: Apollo Valves 101T-LF, NIBCO T-113-LF, Milwaukee UP105-P2, Hammond UP645, or equal.

Manufacturer: Apollo Valves 101S-LF, NIBCO S-113-LF, Milwaukee UP115, Hammond UP647, or equal.

2. Iron, 2-1/2-inch and larger:

GV-3: Class 125 250 psi CWP iron body, flanged ends, bolted bonnet with wheel handle, resilient wedge, non-rising stem. Manufacturer: Apollo Valves 610F-LFA, NIBCO F-619-RW, or equal.

GV-4: Class 125, 250 psi CWP iron body, flanged ends, bolted bonnet with 2-inch operating nut, resilient wedge, non-rising stem, fusion bonded epoxy coated. Manufacturer: NIBCO F-619-RW-SON, or equal.

I. Globe Valves:

1. Bronze, 2-inch and smaller: Class 125, 200 psi, CWP, screw-in bonnet, press ends: Manufacturer: Apollo Valves 120T-LF, Milwaukee UP502-P2, Hammond UP440-P2, or equal.

Class 125, 200 psi, CWP, screw in bonnet, soldered ends. Manufacturer: Apollo Valves 120S-LF, Hammond UP418, Milwaukee UP1502, or equal.

J. Gas Heater Vent Pipe:

Shall be UL approved for service specified. Concealed heater vent pipe, including pipe in or through attic spaces, shall be City approved Type B double wall metal vent pipe. Clearances must comply with code and conditions of UL listing. Manufacturer: American Metal Products Co., Inc., Simpson Dura-Vent, AmeriVent, Hart & Cooley Mfg. Co., Metalbestos, or equal.



K. Piping and fittings:

1. Piping shall be continuously and permanently marked with manufacturer's name, type of material, size, pressure rating, and the applicable ASTM, ANSI, UL, or NSF listing. On plastic pipe, date of extrusion must also be marked.
2. Underground non-ferrous pressure pipes shall be installed with proper color tracer wires. Refer to color code provisions in Section 22 05 53: Plumbing Identification.

P-1: Cast iron: Hubless, service weight, ASTM A888, CISPI 301, conforming to CISPI 310 and installed in accordance to IAPMO IS 6.

Manufacturer: American Foundry, Tyler, AB & I, or equal.

PF-1a: Cast iron, soil or waste no-hub coupling with neoprene gaskets, stainless steel corrugated shields and stainless steel clamps. 2 bands for size 1 ½-inch thru 4-inch, IAPMO, ASTM C 564 and CISPI 310.

Manufacturer: American Foundry, Tyler, AB & I, or equal.

Cast iron, soil or waste, Heavy-duty no-hub coupling with neoprene gaskets, stainless steel corrugated shields and stainless steel clamps. 4 bands for size 5-inch thru 10-inch. IAPMO, ASTM C564 and CISPI 310.

Manufacturer: American Foundry, Tyler, AB & I, or equal.

Same as PF-1a with Heavy Duty Husky SD 4000 Coupling and stainless steel clamps. IAPMO, ASTM C564 and CISPI 310.

P-2: Copper drainage tube, inside structure and above grade. Type DWV hard temper, ASTM B 306.

Manufacturer: Mueller, Anaconda, Cerro Brass, Cambridge-Lee, Halstead, or equal.

PF-3: Cast brass drainage fittings ASA B 16.23, ASTM B 42.

Manufacturer: Mueller Brass, Nibco, Stanley Flagg, Lee Brass, or equal.

P-4: Copper water tube, Type L hard, ASTM B88. (For above ground use only.)

Manufacturer: Mueller, Cambridge-Lee, Halstead, or equal.

PF-4a: Copper Press-Connect pressure fittings, comply with ASME B16.51 "Copper Alloy Press-Connect Pressure Fittings", with Ethylene Propylene Diene Monomer, EPDM O-Ring Seal in each end. Fittings with the sizes of 2-1/2" and larger shall have cross-section Grab Rings and separation rings.

Manufacturer: Viega, Mueller Industries, Apollo, or equal.

Wrought copper - solder type ANSI B 16.22.

Manufacturer: Mueller Brass, Nibco, Lee Brass, or equal.



Grooved end type– ASTM B75 or B152 and ANSI B16.22 wrought copper, bronze sand casting per ASTM B584-87 copper alloy CDA 836 per ANSIB16.18. Couplings shall be CTS style 606 supplied with angle pattern bolt pads for rigidity, coated with copper coated alkyd enamel. Gaskets shall be pre-lubricated Flush seal type.

Manufacturer: Apollo Shurjoint, Victaulic, or equal.

P-5: Copper water tube, Type K hard, ASTM B88.

Manufacturer: Mueller, Cerro Brass, Cambridge-Lee, Halstead, or equal.

P-7: Black steel pipe, Schedule 40, ASTM A53, Type E, ERW threaded or welded.

Manufacturer: US Steel, or equal.

Malleable iron, Class 125, ANSI B 16.3, threaded or welded Schedule 40 black steel for 2-inches and below and welded for 2 ½-inch and above.

Manufacturer: Stockham, or equal.

Press fittings, ASME B31, Carbon Steel, – For aboveground piping 2-inches and below. Provide fittings with Hydrogenated Nitrile Butadiene Rubber, HNBR Sealing Element.

Manufacturer: Apollo Valves: Power Press, Viega: MegaPressG, or equal.

P-8: Underground site water service pipe sizes 4-inch and larger shall be C900 water service pipe material. Refer to guide specification section 33 11 00 “site water distribution utilities”.

PF-9: Ductile Iron. Refer to guide specification section 33 11 00 “site water distribution utilities”.

Manufacturer: Spears, Charlotte, or equal.

L. Pipe and Fitting Requirements Schedule: Unless otherwise specified or indicated on Drawings, pipe and fittings shall be installed in accordance with the following table:

TABLE I
PIPE AND FITTING SCHEDULE

Use	Limits	Pipe	Fittings
Domestic Cold Water, underground	Within 5’ from building, All sizes	P-5	PF-4a, or PF-4b
Domestic Cold Water, underground	Site distribution only, sizes up to 3”	P-5 Refer to 33 1100	PF-4a, PF-4b, Refer to 33 1100
Domestic Cold Water, underground	Site distribution only, 4” and over	Refer to 33 1100	Refer to 33 1100



Use	Limits	Pipe	Fittings
Domestic Hot and Cold water, aboveground	Interior only	P-4	PF-4a, or PF-4b
Downspouts, Interior Storm Drainage	Within 5' from building, All sizes	P-1	PF-1a, or PF-1b
Exposed Downspouts, Interior Storm Drainage	Aboveground only	P-2	PF-2
Natural Gas, Interior, aboveground	All sizes	P-7	PF-7a, PF-7b, or PF-7c
Waste and Vent - Indirect	All sizes	P-1	PF-1a or 1b
Waste and Vent – Sanitary	All sizes	P-1	PF-1a, or 1b
Waste and Vent – Sanitary, underground	Underground, site only	P-1 Refer to 33 3000	PF-1a, or 1b Refer to 33 3000

M. Pipe Isolators:

PLA-1 Absorption pad shall be not less than ½ inch thick, unloaded. Pad shall completely encompass pipe.

Manufacturer: Holdrite, LSP, Stoneman, Potter-Roemer, Trisolator, PR-Isolator, or equal.

Manufacturer: Hydra-Zorb Cushion Clamps, Acousto-Clamp, or equal.

N. Pressure Gage: Aluminum or steel case, minimum 4 ¼-inch dial; pressure type or combination vacuum-pressure type, with provisions for field calibration. Dial indicator to indicate pressure in psi with accuracy to within plus or minus 0.5 percent of maximum dial reading. Furnish gages with restriction screw, size 60, to eliminate vibration impulses. Black case and ring, bourdon tube of seamless copper alloy with brass tip and socket. Three way gage cock, constructed of brass with stuffing box, 1/2 inch couplings, with fixed or movable cap nut to shut off pressure gage.

PG-1 Pressure type, black drawn steel case, 4-1/2-inch glass dial, range approximately twice line pressure.

Manufacturer: Marsh Keckley, Trerice, Weksler, Weiss, or equal.



O. Plug Valves:

2 inches and smaller: Rockwell No.114, lubricated plug type, 200-pound., water operating gauge pressure iron body and plug, regular pattern, threaded, with indicating arc. Manufacturer: Walworth, Homestead, WKM, or equal.

P. Safety Relief Valves:

Combination temperature and pressure relief type. CSA approved. Set to open at 125 psi pressure. Manufacturer: Apollo Valves: 18C, Watts: 40L, Cash-Acme: NCLX-1, or equal.

Q. Strainers:

STR-1 Description: Wye type with monel or stainless steel strainer cylinder (manufacturer's standard mesh), and gasketed machine strainer cap. Where indicated on Drawings, provide with valved (globe valve) blowout piping, same size as blowout plug.

1. 2-inch and smaller:

C.M. Bailey No.100-A, 250 lb., cast iron body, threaded, Keckley: Style B, Spirax Sarco Y-type, or equal.

2. 2 ½-inch and larger:

C.M. Bailey No.100-A, 125 lb., cast iron body, flanged, or Victaulic style 732, 300 psi, ductile iron body, grooved, fusion bonded epoxy coated.

Manufacturer: C.M.Bailey, Armstrong, Muessco, Keckley 'A', or equal.

STR-2 Y pattern cast iron bodies, 125 psi, monel screen. Open area at least twice the cross-sectional area of IPS pipe in which strainer is installed and may be woven wire or perforated type. Screwed ends for sizes up to 2 inches, flanged ends fusion bonded epoxy coated for 2 ½-inch and larger perforations, in accordance with the following:

1. Steam service - 40 square mesh.

2. Other services - 16 square mesh.

Bailey No.100, Armstrong, RP&C, Keckley or equal.

R. Vent Caps:

VC-1 Vandal-proof hood type, for plumbing vent lines.

Manufacturer: Stoneman Engineering and Mfg., Semco 1550, or equal.

P. Protective Coating for Underground Steel Piping Applied to Underground Gas:

a. Black steel or galvanized steel piping indicated for below grade installation, shall be protected as specified prior to delivery to the Project site:

i. Sandblast black steel pipe to a gray finish. Sandblast galvanized steel pipe lightly only.



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- ii. Install one coat of cut back asphalt to galvanized pipe immediately after sandblasting. Pre-heat black pipe to 180 degrees F. immediately before coating.
 - iii. Install one coat of high-temperature (melting point of 240 degrees F. minimum) Grade B asphalt enamel.
 - iv. Install one wrapping of 20 mils thick glass, fiber mat, Owens-Corning Coromat or L.O.F. Blueflag with 1/4 inch overwrap. Glass fiber shall be dry at time of installation.
 - v. Install a second coat of asphalt enamel as specified above. Glass fiber mat shall be centered in the asphalt enamel.
 - vi. Install an overwrap of Kraft ripple paper.
- b. Total thickness of pipe wrapping shall be not less than 1/8 inch. Entire coating operation shall be accomplished by mechanical means in a continuous operation. Hand installation of protective coating is not permitted.
 - c. Each piece of wrapped pipe shall be legibly identified at no greater than 5 feet intervals by fabrication company. Each material installed shall include the name of the fabrication company.
 - d. Acceptable manufacturers of wrapping are: Hunt, Mobile, Conway or equal.
 - e. Fittings (including couplings), unprotected pipe adjacent to fittings, and damaged pipe protection shall be wrapped at Project site as follows:
 - i. Fittings and pipe to be wrapped shall be thoroughly cleaned of material foreign to pipe manufacturer.
 - ii. Install one coat of Plicoflex No. 105 or Protecto Wrap No. 1170 adhesive primer to metal.
 - iii. Wrap pipe and fittings with a minimum thickness of 3/32 inch of Plicoflex No. 310 pipe line butyl molding tape, or Protecto Wrap No. 200 molding tape. Install 3 layers, each layer overlapping next approximately 2/3 width of tape, without stretching. Tape and primer shall be of the same manufacturer.
 - iv. Wrap vinyl tape, 10 mil thickness, over molding tape with 1 inch minimum overlap.
 - v. Manufacturer: J.M. Trantex, 3M Scotchwrap or equal.
5. Pipe and fittings specified to be wrapped shall be tested with a holiday detector, after pipe has been installed in trench and before backfilling, in presence of the Project Inspector. Furnish a Tinkler and Raser model E-P holiday detector, or similar equipment for this test. Work, which is deemed defective, shall be repaired or replaced. The Project Inspector may test for damaged pipe wrapping after backfilling.



6. Instead of wrapping underground steel pipe as specified above, pipe may be machine-wrapped before delivery to the Project site as follows:
 - a. Pipe shall be cleaned of moisture, oil, grease, scale, and other foreign material by cleaning with non-oily solvent and wire brushing. Remove metal burrs and projections.
 - b. Install one coat of Plicoflex No.105 adhesive primer to cleaned pipe. If thinning is required, furnish only non-oily thinners as recommended by tape manufacturer.
 - c. Wrap coated pipe with Plicoflex No.340-25 tape (15 mil butyl and 10 mil vinyl laminate) Tape shall be installed by machine wrapping at approved plant only. Maintain tension (minimum of 5 pounds per inch of width) on tape over entire diameter of pipe. Tape shall be permanently identified and visible on vinyl side.
 - d. Fittings, unprotected pipe, and damaged pipe protection shall be wrapped as indicated above.
- Q. Flanges: Flanges shall be furnished and installed at each flanged connection of each type of equipment, tanks, and valves. Faces of flanges being connected shall be furnished alike. Connection of a raised face flange to a flat-faced flange is not permitted. Flanges shall conform to following schedules:
 1. Gasket material for flanged connections shall be full faced or ring type to suit facing on flanges and shall be furnished in accordance with following schedule:

Grooved end flange adapters supplied with pressure responsive elastomeric Gaskets supplied with grooved flange adapters shall be pre-lubricated by the manufacturer. Grade of gasket to suit intended service.
- R. Unions:
 - a. Unions shall be furnished and installed in accordance with the following requirements (unless flanges are furnished):
 - i. At each threaded or soldered connection to equipment and tanks, except in Freon or fuel gas, piping systems, whether indicated or not.
 - ii. Immediately downstream of any threaded connection to each manually operated threaded valve or cock, and each threaded check valve, yard box or access box except those in Freon piping systems, whether indicated or not.
 - iii. At each threaded connection to threaded automatic valves (except those in Freon piping systems) such as reducing valves and temperature control valves, whether indicated or not.
 - iv. If grooved piping is used, couplings shall serve as unions. Additional unions are not required



- b. Unions shall be located so that piping can be easily disconnected for removal of equipment, tank, or valve.

PART 3 – EXECUTION

3.01 EXAMINATION

- A. Examine areas and conditions under which Work of this Section shall be performed. Correct conditions detrimental to proper and timely completion of Work. Do not proceed until unsatisfactory conditions have been corrected.

3.02 INSTALLATION

- A. Provide all materials and equipment for the Work. Furnish and install necessary apparatus, parts, materials, and accessories.
- B. Pipe Installation:
 1. Install piping parallel to wall and provide an orderly grouping of proper materials and execution.
 2. Piping shall clear obstructions, preserve headroom, provide openings and passageways clear, whether indicated or not. Verify the Work of other Divisions to avoid interference.
 3. If obstructions or the Work of other Divisions prevent installation of piping or equipment as indicated by the Drawings, perform minor deviations as required by the ARCHITECT.
 4. Install piping after excavation or cutting has been performed. Piping shall not be permanently enclosed, furred in, or covered before required inspection and testing is performed.
 5. Exposed polished or enameled connections from fixtures or equipment shall be installed with no resulting tool marks or threads at fittings. Residue or exposed pipe compound shall be removed from exterior of pipe.
 6. Piping shall be concealed in chases, partitions, walls, and between floors, unless otherwise directed or specifically noted on Drawings. When penetrating wood studs, joists, and other wood members, provide such members with reinforcement steel straps of Continental Steel & Tube Co., ULINE, Independent Metal Strap, or equal.
 7. Reduce fitting where any change in pipe size occurs. Bushings shall not be furnished unless specifically reviewed by the ARCHITECT, or indicated on Drawings.
 8. Piping subject to expansion or contraction shall be anchored in a manner, which permits strains to be evenly distributed. Swing joints or expansion loops shall be installed. Seismic restraints shall be installed so as not to interfere with



expansion and contraction of piping. Seismic loops required at all building separations.

9. Immediately after lines have been installed, openings shall be capped or plugged to prevent entrance of foreign materials. Caps shall be left in place until removal is necessary for completion of installation.
10. Couplings shall not be installed except where required pipe runs between other fittings are longer than standard length of type of pipe being installed and except where their installation is specifically reviewed by the ARCHITECT.
11. Water piping shall be installed generally level, free of traps, unnecessary offset, arranged to conform to building requirements, clear of ducts, flues, conduits, and other Work. Piping shall be arranged with valves installed to provide for complete drainage and control of system. Piping shall not be installed which causes an objectionable noise from flow of water therein under normal conditions. Refer to Section 23 0500: Common Work Results for Plumbing.
12. Water lines may be installed in same trench with sewer lines, provided bottom of water line is 12 inches minimum above top and to the side of sewer line.
13. Changes in pipe sizes shall be furnished with eccentric reducers, flat on top. Offsets to clear obstruction shall not be installed so as to produce air pockets.

C. Pipe Sleeves and Plates:

1. Provide pipe sleeves of Schedule 40 black steel pipe or Schedule 40 PVC plastic pipe in concrete or masonry walls, footings, and concrete floors below grade. Provide adjustable submerged deck type sleeves at locations where pipes pass through concrete floors, except concrete slab floors on grade, and at locations where soil pipe for floor type water closets passes through concrete floors.
2. Sleeves shall provide ½ inch clearance around pipes, except plastic pipe shall have 1 inch clearance. Caps of deck type sleeves shall be removed just prior to installation of pipe. Area around sleeves shall be smooth and without high or low spots. Sleeves in walls shall not extend beyond exposed surface of wall. Sleeves in concrete floors and walls shall be securely fastened to forms to prevent movement while concrete is being placed.
3. Piping installed on a roof shall clear the roof surface by 10 inches minimum, with or without insulation. Bottom of individual fittings may infringe on 10 inches clear space but not groups of fittings or fittings located within 27 inches of each other.
4. Stiles shall be provided to facilitate crossing of piping when parallel piping runs are laterally greater than 12 inches out-to-out, or any pipe is higher than 18 inches, and more than 40 feet long or runs between two or more major pieces of equipment or housings greater than 20 feet apart. Stiles shall be not less than 20 inches wide with a minimum tread depth of 10 inches. Where



stiles are required, they shall be located so greatest obstructed distance is 30 feet.

5. Where pipes pass through waterproofed walls, floors, or floors on grade, sealant with Link-Seal Modular Seals, or equal, between pipe and sleeve to provide a waterproof joint. Where earth is in contact with pipe on both sides of a wall or foundation, the waterproof joint is not required. Commercial rubber compression units may be furnished instead of sealed sleeves if reviewed by the ARCHITECT.
6. A swing joint, or other required device, shall be furnished and installed in hot water lines with 10 feet of sealant or compression joint to allow for expansion.
7. Provide polished, chrome-plated flanges when plumbing pipes pass through walls at plumbing fixtures, etcetera as specified in Section 22 1000 Plumbing. Provide polished steel, chromium-plated split floor and ceiling plates at locations where pipes pass through walls, floors, ceilings, and partitions in finished portion that neatly conceals pipe insert.
8. Pipe sleeves shall be provided where pipes intersect footings or foundation walls and sleeve clearances shall provide for footing settlement, but not less than one inch all around pipe.

D. Welding of Pipe and Qualifications of Welder:

1. Joints above grade or accessible conduit or tunnels in steel piping may be either welded or screwed unless specifically indicated otherwise on Drawings or specified. Joints in below grade steel piping, whether in insulation or not, shall not be welded, unless otherwise indicated.
2. Welded joints in pipe shall be continuous around pipe and shall comply with ASME B31: Code for Pressure Piping, unless otherwise specified.
3. Each pipe weld shall be stamped with welder's identification mark. Welding shall be performed by welders possessing a valid certificate of qualification for welding carbon steel welding pipe in horizontal position (2G) and horizontal fixed position (5G) in accordance with the requirements of Section IX of the ASME Boiler and Pressure Vessel Code, by an approved testing laboratory.
4. Before any welder performs welding on the Work, furnish the INSPECTOR with a copy of welder's valid qualification papers and obtain verification. Welder qualification is not valid unless it has been issued while welder was performing work for current employer, and has performed type of work described by qualification in the preceding 3 months.
5. Welding performed under these Specifications is subject to special tests and inspections including rigid Ultra Sonic Testing (UT) and radiographic inspection at random, in accordance with Technique for Radiographic Examination of Welded Joints by an approved testing laboratory.

E. Unacceptable Welds and Repairs to Welding:



1. Welds containing any of the following types of imperfections shall be deemed defective Work:
 - i. Cracks of any type.
 - ii. Zones of incomplete (in excess of 1/32 inch) fusion or penetration.
 - iii. Elongated slab inclusions longer than 1/4 inch.
 - iv. Groups of slag inclusions in welds having an aggregate length greater than thickness of parent metal in a length 12 times the thickness of the parent metal.
 - v. Undercuts greater than 1/32 inch.
 - vi. Overlaps, abrupt ridges or valleys.
 2. When a defective weld is detected by examination as outlined above, two additional welds shall be radiographed at locations selected by the Project Inspector. If the two selected welds demonstrate compliant welding, then the two tested welds shall be deemed to be in compliance. Welding revealed by radiographs to be defective Work shall be removed, repaired, and tested by radiograph.
 3. If either of the two selected welds demonstrates welding deemed to be defective Work, all welding in that portion of the Work shall be deemed defective Work and either: all welds shall be cutout, prepare new ends for welding and weld to comply with this Specification, or radiograph all welds, removing and repairing only such welding deemed to be defective Work.
 4. Repair welding shall be performed in a manner in full compliance with ASME B31. The welded joints or repairs shall be spot examined with UT or radiographic tests in accordance with foregoing requirements.
 5. Installer shall be responsible for the costs of UT and radiographic re-examinations of welds deemed defective Work and not in compliance with this Specification, and shall repair or replace said welds in accordance with specified requirements.
- F. Qualification Tests for Low-pressure Welding:
1. Tests shall be performed on 3-inch standard weight pipe ASTM A53, Grade A, and shall be welded by acetylene and electric arc. Each sample shall consist of 2 pieces, each 10 inches long, with 30-degree bevel at point weld.
 2. Two 20-inch samples shall be performed in the 2G and two 20-inch samples in the 5G positions, with positions defined in Section IX, ASME Boiler and Pressure Vessel Code. Welds shall have the reinforcement ground or machined flush to the surface of the pipe before testing. Samples shall be tested as full section tensile.
 3. Weld shall develop a load of 90 percent of 50,000 psi, i.e., 45,000 psi or shall develop a fracture in parent metal.



4. Each qualified welder shall carry an identification card listing welder's name, date of test, and type of welding tests passed; signed by the welder and the laboratory.
 5. A valid certificate of qualification issued in compliance with requirements of the ASME Boiler Pressure Vessel Code Section IX shall qualify a welder for issuance of a certificate for low-pressure pipe welding.
- G. Pipe Joints and Connections:
1. Pipe and tubing shall be cut per IAPMO Installation Standards. Pipe shall have rough edges or burrs removed so that a smooth and unobstructed flow shall be provided.
 2. Hot tapping of gas lines is strictly prohibited.
 3. Threaded Pipe: Joints in piping shall be installed according to the following service schedule:
 - i. Soap Piping: Litharge and glycerine, or Expando, Gasoila, or equal.
 - ii. Plastic Piping: Teflon pipe joint compound tape.
 - iii. Oxygen Piping: Wash treads with S.P., rinse, blow-dry and apply litharge and glycerine.
 - iv. Cleanout Plugs: No compound shall be used. After inspection and test, plugs shall be removed, cleaned, greased, and replaced.
 - v. Other services furnish sealant, suitable and as reviewed by the ARCHITECT.
 4. Threads on pipe shall be cut with sharp, clean, unblemished dies and shall conform to ANSI/ASME B2.1 for tapered pipe threads.
 5. Joint compounds shall be smoothly placed on male thread and not in fittings. Threaded joints shall be installed tight with tongs or wrenches and sealant of any kind is not permitted. Failed joints shall be replaced with new materials. Installation of thread cement or sealant to repair a leaking joint is not permitted.
 6. Sharp-toothed Stillson, or similar wrenches, is not permitted for the installation of brass pipe or other piping with similar finished surfaces.
- H. Copper Tubing and Brass Pipe with Threadless Fittings:
1. Silver brazed joints shall be used for attaching fittings to non-ferrous metallic refrigerant piping.
 2. Non-pressure gravity fed condensate lines may be soldered with 95/5 solder.
 3. Silver brazing alloy, Class BCUP-5. Surfaces to be joined shall be free of oil, grease, and oxides. Socket of fitting and end of pipe shall be thoroughly cleaned with emery cloth and wiped to remove oxides. After cleaning and before assembly or heating, flux shall be installed to each joint surface and



spread evenly. Heat shall be applied in accordance with instructions in the Copper Tube Handbook issued by Copper Development Associates. Joints constructed of rough bronze fittings shall be provided as recommended by manufacturer.

4. Do not overheat piping and fittings when installing silver brazing.
5. Joints in non-ferrous piping for services not covered above shall be installed with solder composed of 95/5 tin/antimony, ASTM B32, Grade 5A. Surfaces to be jointed shall be free of oil, grease, and oxides. Sockets of fitting and end of pipe shall be cleaned with emery cloth to remove oxides. Solder flux shall be sparingly installed and solder added until joint is completely filled. Do not overheat. Excess solder, while plastic, shall be removed with a small brush in order to provide an uninterrupted fillet completely around joint. Random inspection of joints shall be conducted by Project Inspector to ensure joints are lead-free.
6. Grooved end joints for copper piping shall be assembled in accordance with the latest manufacturer recommendations. Pipe ends shall be clean and free from indentations, projections, and roll marks in the area from pipe end to groove for proper gasket sealing. Grooving tools shall be as manufactured by Victaulic, RIDGID, MAG Tool, or equal.
7. Pressed fittings for copper or copper alloy pipe or tubing shall have an elastomeric O-ring that forms the joint. The pipe or tubing shall be fully inserted into the fitting, and the pipe or tubing marked at the shoulder of the fitting. Pipe or tubing shall be cut square, mechanically cleaned and reamed prior to joining to remove all burrs (interior and exterior) and restore full inside diameter and a smooth, chamfered exterior surface. The fitting alignment shall be checked against the mark on the pipe or tubing to ensure the pipe or tubing is inserted into the fitting. The joint shall be pressed using the tool recommended by the manufacturer.
 - a. Press Installation Training Requirement: Installation training shall be provided on site by manufacturer personnel and documented with Engineer. Installation procedures, depth guides, and tool inspection shall be provided by manufacturer for all product types (steel or copper) for reference and safety assurance.
- I. Ring-Type Pipe: Joints shall be installed in accordance with manufacturer's instructions with grooved couplings, fittings and rubber rings. Couplings and pipe shall be compatible and of the same manufacturer. Rings shall be accurately located and installed by grooves in coupling. Pipe shall be installed with zero deflection unless otherwise specified. Pressure pipe shall be furnished with thrust blocks at each offset point.
- J. Welded Pipe Joints:



1. Joints in welded steel pipelines shall be installed by oxyacetylene or electric arc process. Welding shall be continuous around pipe and provided as specified.
 2. Butt welds shall be of the single V-type, with ends of pipe and fittings beveled approximately 37 ½ degrees. Piping shall be aligned before welding is started with the alignment maintained during welding.
 3. Welds for flanges and socket fittings shall be of the fillet type with a throat dimension not less than pipe wall thickness.
- K. Grooved End Pipe Joints: Grooved end joints for carbon steel piping shall be assembled in accordance with the latest manufacturer recommendations. Pipe ends shall be clean and free from indentations, projections, and roll marks in the area from pipe end to grove for proper gasket sealing. Grooving tools shall be as manufactured by Victaulic, RIDGID, MAG Tool, or equal.
- L. Underground Gas Service Polyethylene (Plastic) Pipe:
1. Joints shall be installed by the heat fusion method, in accordance with manufacturer's recommendations and IAPMO installation standard IS 12, for natural gas.
 2. Pipe Riser at Meter, Regulator and Building Wall: Prefabricated, anodeless type, utilizing a grade level transition between underground polyethylene pipe and gas supply steel pipe of riser outlet, GF Piping Systems, or equal. Below grade to above grade transition shall be installed in a welded, epoxy coated, steel casing.
 3. Connections to Existing Pipe Line or Branch:
 - a. Steel-to-plastic (PE): Provide manufacturer's prefabricated standard transition fitting, transition from epoxy-coated steel pipe to plastic, R. W. Lyall Co., or equal.
 - b. Plastic-to-plastic, PVC to PE: Provide manufacturer's prefabricated standard transition fitting, transition from PVC to epoxy-coated steel pipe to PE; R.W. Lyall Co., or equal.
 - c. Plastic-to-plastic, PE to PE: Provide manufacturer's standard fused tapping tee assembly with shut-off feature.
 4. Provide PE reinforcing sleeves where PE pipe is fused to multi-saddles, service punch tee, reducing tees, transition fittings and anodeless risers.
- M. Valves: Valves shall conform to the following:
1. Piping systems shall be furnished with valves at points indicated on Drawings and specified, arranged to provide complete regulating control of piping system throughout building and the Project site.
 2. Valves shall be installed in a neat grouping, so that parts are easily accessible and maintained.



3. Valves shall be full size of line in which they are installed, unless otherwise indicated on Drawings or otherwise specified, and shall be one of types specified.
 4. Provide chain operators on valves 2-inch and larger located 7 feet or more above the servicing floor level.
 5. Valves for similar service shall be of one manufacturer.
 6. Except where otherwise specified, valves shall be Apollo, Belimo, Victaulic, Stockham, Crane, Jenkins, Milwaukee, Hammond, American, NIBCO, Hoffman, or equal.
 7. Ball valves below grade in yard boxes shall have stainless steel handles.
 8. Safety valves and pressure relief valves shall have stamp of approval as required by ASME and shall be provided with annual test lever. Where a hot water storage tank is heated by means of a coil, pressure relief valve shall have a steam BTU discharge rating of the coil. Discharge pipe from safety or pressure relief valves shall be not less than one pipe size larger than inlet pipe size of valve. Discharge pipe shall terminate as indicated and shall be free of traps. In addition to locations specified, pressure relief valves shall be installed in the following locations:
 - a. On discharge side of each pressure-reducing valve.
 - b. On each water heater connected to a hot water storage tank and other pressure vessels.
 - c. On cold water line to each water heater or hot water storage tank when there is a check valve, backflow prevention valve or similar device between water heater or hot water storage tank and meter or relief valve at the pressure reducing valve assembly.
 - d. On discharge side of each air compressor.
 - e. On each air receiver connected to an air compressor.
 9. Temperature relief valves and combination temperature and pressure relief valves shall be as specified and furnished as set forth in this Section. Discharge pipe from relief valves shall be not less than discharge area of valve or valves it connects, based on discharge area of valves, and shall terminate as indicated and free of any traps. Valves shall be installed at following locations:
 10. A combination temperature and pressure relief valve or combination of valves on each heating hot water storage tank. Temperature sending element shall extend into water inside tank.
- N. Strainers: Strainers shall be installed on each water main (except for fire line) downstream of the meter, above grade, when a pressure regulator assembly is not installed. Main strainer shall be of Y-flange or groove type. On closed loop chilled and heating hot water systems pump systems, a strainer shall be installed at each pump



inlet and upstream of each flow control valve assembly. The control valve assembly may include a modulating temperature control valve and a flow-limiting valve, manufactured by Griswold, AutoFlow, Flow Control Industries, Inc., or equal.

O. Hangers and Supports:

1. Piping shall be securely fastened to building structure by approved iron hangers, supports, guides, anchors, and sway braces to maintain pipe alignment to prevent sagging and to prevent noise or excessive strain on piping due to uncontrolled or seismic movement under operating conditions. Hangers and supports shall conform to Manufacturer's Standardization Society Specification SP-69. Hangers shall be relocated as required to correct unsatisfactory conditions that may become evident when system is placed into operation. Appliances, heat exchangers, storage tanks, and similar equipment shall be securely fastened to structure in accordance with seismic requirements. Outdoor metal hangers and supports shall be hot-dipped galvanized steel, unless otherwise specified.
2. Hose faucets, compressed air outlets, and similar items at ends of pipe branches shall be rigidly fastened to building construction near point of connection.
3. Piping shall not be supported by wire, rope, wood, plumbers' tape, or other non-recognized devices.
4. Hangers and supports shall be designed to support weight of pipe, fittings, weight of fluid and weight of pipe insulation, and shall have a minimum factor of safety of five, based on ultimate tensile strength of material installed.
5. Burning or welding of any structural member under load is not permitted. Field welding not specified on Drawings or reviewed Shop Drawings is not permitted without review by ARCHITECT.
6. Burning holes in beam flanges or other structural members is not permitted without review by the ARCHITECT.
7. Pipe hangers on piping covered with low temperature insulation shall be installed on outside of insulation and not in contact with pipe unless otherwise detailed on Drawings. Insulation shall be protected by 18 gage galvanized steel shield, with a minimum length of 10 inches, installed completely around pipe covering between covering and hanger. Installing hangers directly on pipe and butting adjoining sections of insulation against hanger is permitted provided void and hanger rod are properly insulated and sealed so that no sweating occurs at hangers.
8. Hanger rods shall be fastened to structural steel members with suitable beam clamps. Clamps shall be Tolco, Carpenter & Patterson, Fee and Mason, or equal, as follows:
 - a. Tolco I beam, Fig.62 for maximum 1000 pounds.



- b. Tolco I or WF beam, Fig. 329, for maximum of 1290 pounds.
9. Hanger rods shall be fastened to concrete inserts in concrete slabs or beams. Inserts shall be Tolco, Carpenter & Patterson, Fee and Mason, or equal, as follows:
 - a. Tolco Fig.310 for maximum of 600 pounds.
 - b. Tolco Fig. 309 for maximum of 1140 pounds.
10. For fastening to wood ceilings, beams, or joists, furnish Grinnell Fig. 128R, Grinnell Fig. 153, Tolco 78, or equal pipe hanger flange fastened with drive screws. Under wood floors, 3/8 inch hanger rods shall be hung from 2-inch by 2-inch by 1/4 inch angle clips 3 inches long, with 2, staggered 10d nails, clinched over joist.
11. Pipe hanger rod sizes: 3/8-inch for pipe sizes 1/2-inch through 4-inch, 1/2-inch for pipe sizes 5-inch through 8-inch, and 5/8-inch for pipe size 10-inch through 12-inch.
12. Where rod hangers are used with a diameter greater than 3/8-inch, they shall be equipped with swivels or eye nuts to prevent bending in the rod.
13. Turnbuckles, if furnished, shall provide a load carrying capacity equal to that of the pipe hanger with which they are being installed.
14. Pipe hangers shall be of same size, or nearest larger manufactured size available, as pipe or tubing on which they are being installed.
15. Hangers, clamps, and guides furnished for support of non-metallic pipe shall be padded with 1/8 inch thick rubber, neoprene, or soft resilient cloth.
16. Where special pipe-supporting requirements in the Specifications conflict with any standard requirements specified herein, the Specification requirements shall govern.
17. Vertical Piping:
 - a. Vertical pipe risers shall be securely supported with riser clamps of recognized type. Risers in reinforced concrete buildings shall be furnished with extension clamps fastened to pipe above each concrete floor slab with extended arms of clamp to rest on slab. Clamps shall be provided with lead or Teflon liners when installed on copper tubing. Clamps shall be plastic-coated when installed on non-ferrous pipe or tubing.
 - b. Copper tubing in sizes 1 1/2-inches and larger and steel pipelines passing up through building shall be supported at each floor of building or every 15 feet whichever is less.
 - c. Copper tubing sizes 1 1/4-inches and smaller shall be supported at not intervals not more than 6 feet on center. Special provisions shall be



installed for vertical lines subject to expansion and contraction caused by operating temperature differences.

- d. Vertical cast iron pipelines shall be supported from each floor and at its base. Malleable iron or steel pipe clamps with minimum thickness of 1/4 inch shall be furnished and fastened around pipe for support.

18. Horizontal Piping:

- a. Roof Mounted Piping: Pressure and non-pressure piping shall be supported from channels, stands, clamps, trapezes, rollers, or structures mounted on 100% rubber, UV resistant rooftop supports with reflective strips, Dura-Block, or equal. Roller type supports shall be provided below and above pipe to prevent its dislodgement. Bottom of pipes shall clear the roof surface by 10 inches.
- b. Insulated steam and space heating hot water insulated condensate lines, insulated domestic hot water supply and return piping shall be supported with Tolco Figure 4, B-Line Figure B3140, Grinnell Figure 212, or equal, steel hangers with welded eye rods to permit hinge movement at point of attachment of hangers. Hinge movement at point of support shall be provided by welded eye linked rods Tolco Figure 101L, B-Line Figure B3211X, Grinnell Figure 278, or equal.
- c. Domestic cold water piping, water supply and return piping, condenser water piping, insulated refrigerant piping gas piping, compressed air piping, cast iron soil piping, galvanized steel vents, waste and downspout piping and glass to be supported with Tolco Figure 1, B-Line Figure B3100, Grinnell Figure 260, or equal, hangers with rods, turnbuckles and inserts suitable for above hangers.
- d. Maximum hanger and support spacing shall conform to CPC schedule for horizontal piping installed above grade.

19. A hanger or support shall be installed close to the point of change in direction of a pipe run, in either a horizontal or vertical plane.

20. When practicable, supports and hangers for cast iron soil pipe shall be installed as close as possible to joints and when hangers or supports are not located within one foot of a branch line fitting, an additional hanger or support shall be installed at fitting.

21. In systems where grooved piping is used, couplings shall be provided with angle pattern bolt pads to comply with support and hanging requirements of ANSI/ASME B31.1, ANSI/ASME B31.9, and NFPA Pamphlet 13.

P. Flashings:

1. Each pipe, duct, or gas-fired equipment vent passing through roof shall be installed with waterproof flashing.



2. Flashing or flanges on pipes, vents, and ducts passing through a tile or slate roof shall be constructed of sheet lead. Flashing for pipes and heater vents passing through a roof shall be 4 pound soft sheet lead. Flashing and flanges for ducts and heater vents passing through exterior walls shall be 22 gage sheet metal. Install caps on top of heater pipes. Flanges and flashing shall be installed waterproof at point of connection with pipe or duct by welding. No soldered joints on roof flashings will be allowed. No Stoneman lead roof flashings will be allowed.
 3. Lead flashing and flanges shall be constructed of 4 pound sheet lead with burned joints. Flange of lead flashing or lead flange on a duct shall extend out onto roof a minimum of 12 inches from pipe or duct. Lead flashing shall extend up the pipe or duct not less than 8 inches.
 4. Sheet metal flashing shall be constructed of 24 gage galvanized sheet steel. Flanges on these flashings shall extend out onto roof a minimum of 10 inches from pipe or duct. Flanges on ducts through exterior walls shall extend out from duct a minimum of 2 ½ inches. Flanges on gas-fired equipment single-wall vents shall be of ventilated type. Type B gas vents through a roof shall be furnished with non-ventilated flashing as per NFPA Pamphlet 211.
 5. Cast iron, steel, brass, and copper pipe, which terminates less than 18 inches above roof, shall be furnished with a combination counter-flashing and vandal-proof hood for protection against water, birds and foreign matter. Cast iron, steel, brass and copper pipe, which does not terminate within 18 inches of roof, shall be furnished with a counter-flashing sleeve. Pipe, which terminates more than 18 inches above roof, shall be furnished with protection against entrance of water, birds, and foreign matter.
 6. Counter-flashing and combination counter-flashing sleeves and vandal-proof hoods shall be cast iron, vandal-proof, threaded, sealed or approved gas-heated sleeve type. Counter-flashing sleeves on each of these items shall extend down over flashing a minimum of ¾ inch.
 7. Storm collars shall be securely screwed and installed waterproof around appliance vent pipe immediately above flashing.
 8. Vent piping above roof shall be furnished with a combination counter-flashing sleeve and vandal-proof hood.
- Q. Equipment Installation: Install water heater on level platforms, 4-inch housekeeping pads or curbs and provide sound, vibration and seismic control measures per Section 23 0548 even if not indicated on Drawings.

END OF SECTION



SECTION 22 05 53 PLUMBING IDENTIFICATION

PART 1 – GENERAL

1.01 SUMMARY

- A. Section Includes: Marking and identification on mechanical plumbing piping systems, controls, valves, and apparatus.
- B. Related Requirements:
 - 1. Division 01: General Requirements
 - 2. Section 22 05 13: Basic Plumbing Materials and Methods.
 - 4. Section 22 10 00: Plumbing.

1.02 SUBMITTALS

- A. Submit in accordance with Division 01 and Section 22 05 00: Common Work Results for Plumbing.
- B. Submit product data and installation instructions for each item specified.

1.03 QUALITY ASSURANCE

- A. Comply with provisions of:
 - 1. Section 22 05 00: Common Work Results for Plumbing.
 - 2. ANSI/ASME A13.1: Scheme for the Identification of Piping Systems.
 - 3. APWA: Uniform Color Code.
 - 4. IAPMO: Uniform Plumbing Code (UPC)

PART 2 – PRODUCTS

2.01 MATERIALS

- A. General: Piping systems, controls, valves, apparatus, etc., except those that are installed in inaccessible locations in partitions, walls, and floors, shall be permanently identified.

2.02 VALVES

- A. Furnish prepared chart or diagram for each piping system, indicating by identifying letter or model number of each valve in the system, its location, and function.
- B. Install charts in aluminum frame with clear glass front and secure on wall.
- C. Bind copies of each chart in operating instructions manual.
- D. Provide each valve with a brass, aluminum, or plastic disc, not less than 1-1/4 inches diameter bearing engraved numbers corresponding to those indicated on chart. Fasten discs to valve with No. 14 brass wire.



- E. Provide an additional tag for safety valves and other valves that could be hazardous to safety and health of occupants. Distinguish these tags from regular valve tags by color (such as yellow with black letters and marked "Danger").

2.03 INSTRUMENTS AND CONTROLS

- A. Identify panel-mounted instruments and controls with engraved bakelite nameplates permanently affixed to panel boards.
- B. Identify alarm indicating devices and alarm reset devices by nameplates.
- C. Identify automatic valves, flow switches, and pressure switches, with embossed aluminum or plastic tape affixed to controller, indicating service and setting.

2.04 EQUIPMENT

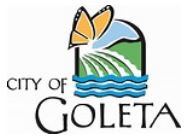
- A. Identify each major piece of equipment with engraved bakelite nameplates permanently affixed to the equipment, indicating the room numbers it services, Equipment identification designation shall be the same to its designation indicated on the "As-Built Drawings". Room numbers in the nameplates shall correspond to the final room numbers.

2.05 ABOVE GRADE PIPE IDENTIFICATION

- A. Identify pipes by means of colored labels with directional flow arrows and identification of the pipe content, in conformance to ANSI/ASME A13.1 or the UPC.
- B. Materials: Precoiled acrylic plastic with clear polyester coating, all-temperature, self-adhering, as manufactured by Brady, Brimar Industries, Seton, Stranco, Inc., or equal.
- C. Size:

Outside Diameter of Pipe or Insulation (in inches)	Length of Color Field (in inches)	Size of Letter (in inches)
¾ to 1 ¼	8	½
1 ½ to 2	8	¾
2 ½ to 6	12	1 ¼
8 to 10	24	2 ½
over 10	32	3 ½

- D. Locations:
 - 1. On accessible piping, whether insulated or not (including mechanical rooms, attic and ceiling spaces); except that labels shall be omitted from piping where



- contained material is obvious due to its connection to fixtures (such as faucets, water closets, etcetera.).
2. Near each valve and branch connection in such accessible piping.
 3. At each pipe passage through wall or floor.
 4. At not more than 20 feet spacing on straight pipe run between bands required in 2 and 3 above.
 5. At each change in direction.
- E. Application: Install on clean surfaces free of dust, grease, oil, or any material that will prevent proper adhesion. Replace non-adhering or curling labels with new labels.
- F. Color Schedule:

Content of Pipe	Legend	Background Color	Lettering Color
Domestic cold water	Domestic. C.W.	Green	White
Domestic hot-water 140°F	Domestic H.W. 140°F	Blue	Black
Sanitary waste	San waste	Green	White
Sanitary vent	San vent	Green	White

PART 3 – EXECUTION

3.01 INSTALLATION

- A. Correct detrimental conditions prior to commencing the Work of this Section. Install markers and identification tags as specified with materials and installation procedures recommended by manufacturer.
- B. Install underground detectable pipe marking tape continuously buried 8 to 10 inches above the buried utility pipe. Wrap tape on pipe risers up to a height of 12 inches above grade.

3.02 CLEANUP

- A. Remove rubbish, debris, and waste materials and legally dispose of off the Project site.

END OF SECTION



SECTION 22 07 00 PLUMBING INSULATION

PART 1 – GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Insulation for plumbing piping.
- B. Related Requirements:
 - 1. Division 01: General Requirements.
 - 2. Section 22 05 00: Common Work Results for Plumbing.
 - 3. Section 22 05 13: Basic Plumbing Materials and Methods.
 - 4. Section 22 05 53: Plumbing Identification.
 - 5. Section 22 10 00: Plumbing.

1.02 REFERENCES

- A. American Society for Testing and Materials International (ASTM):
 - 1. ASTM C302 - Standard Test Method for Density and Dimensions of Preformed Pipe-Covering-Type Thermal Insulation.
 - 2. ASTM C411 - Standard Test Method for Hot-Surface Performance of High-Temperature Thermal Insulation.
 - 3. ASTM C423 - Standard Test Method for Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method.
 - 4. ASTM C547 - Standard Specification for Mineral Fiber Pipe Insulation.
 - 5. ASTM C1104 - Standard Test Method for Determining the Water Vapor Sorption of Unfaced Mineral Fiber Insulation.
- B. Underwriters Laboratories, Inc.
 - 1. UL 723 - Test for Surface Burning Characteristics of Building Materials.
- C. National Fire Protection Association:
 - 1. NFPA 255 - Standard Method of Test of Surface Burning Characteristics of Building Materials.
- D. California Code of Regulation Title 24.
 - 1. California Green Building Standards Code.

1.03 SUBMITTALS



- A. Submit in accordance with Division 01 and Section 22 05 00: Common Work Results for Plumbing.
 - 1. Complete material list of items to be furnished and installed under this Section.
 - 2. Manufacturer's specifications and other data required demonstrating compliance with the specified requirements.
 - 3. Shop Drawings, catalog cuts and manufacturer's data indicating insulation, jacketing, adhesives, and coating. Insulating materials shall be certified by manufacturer to comply with the California quality standards for insulating materials.
 - 4. Manufacturer's recommended method of installation procedures, which will become part of this Section.

1.04 QUALITY ASSURANCE

- A. Qualifications of Manufacturer and Installer, Materials, Fabrication, Execution, and Standard of Quality: Comply with provisions stated under Section 22 05 00: Common Work Results for Plumbing and Section 22 05 13: Basic Plumbing Materials and Methods.
- B. Insulation Work shall be in accordance with the California Building Energy Efficiency Standards, CBC, and the California Green Building Standards Code.
- C. Test Ratings:
 - 1. Comply with provisions stated under Section 22 05 00 and 22 05 13 with emphasis on ASTM E84, NFPA 255, or UL 723. ASTM C167, ASTM C302, UL label or listing of satisfactory test results from the National Institute of Standards and Technology, or a satisfactory certified test report from an acceptable testing laboratory. Approval by the State Fire Marshal is required.
 - 2. Furnish labels, legibly printed with the name of the manufacturer or listings indicate that fire hazard ratings do not exceed those specified for materials proposed for installation. Flame spread index of not more than 25 and smoke developed rating not exceeding 50.
 - 3. Tests shall be performed on each item individually when insulation, vapor barrier covering, wrapping materials, or adhesives are installed separately at the Project site.
 - 4. Test insulation, vapor barrier covering, wrapping materials and adhesives as an assembly when they are factory composite systems.
- D. Regulatory Requirements: Insulation furnished and installed under this Section shall meet minimum legal requirements of the Building Energy Efficiency Standards adopted and incorporated in the California Energy Commission, Title 24, Part 2, Chapters 2 through 53 and the California Green Building Standards Code unless otherwise noted, for the piping,
- E. Chemically based products such as sealers, primers, fillers, adhesives, etcetera must meet the California air quality regulations.

1.05 PRODUCT HANDLING



- A. Protection, Replacement, Delivery and Storage: Comply with provisions stated under Sections 22 0500: Common Work Results for Plumbing and 22 05 13: Basic Plumbing Materials and Methods.

PART 2 – PRODUCTS

2.01 MATERIALS

- A. General:
 - 1. Insulating material shall be fire resistant, non-corrosive, shall not break, settle, sag, pack or disintegrate under vibration, nor absorb more than 1 percent moisture by weight.
 - 2. Insulating material shall be furnished with thickness indicated in Table 1, and shall furnish thermal resistance in the range of R-4.0 to 4.6 in accordance with inch at 75 degrees F. For any other value of R, insulation thickness shall be calculated accordingly and submitted for review.
 - 3. Provide insulation materials, adhesives, coatings, sealants, fitting covers, and other accessories with a fire hazard rating not to exceed 25 for flame spread, 25 for fuel contributed and 50 for smoke developed, except for materials listed as follows:
 - a. Nylon anchors for installing insulation to equipment.
 - b. Treated wood blocks.
 - 4. Flame-proofing treatments subject to moisture damage are not permitted.

TABLE 1 - MINIMUM PIPING INSULATION THICKNESS ⁽¹⁾

Insulation Thickness Required (in inches)

Piping System Type	Temp. Range (degrees F)	Runouts up to 2 ⁽²⁾	1 and less	1.25 to 2	2.5 to 4	5 to 6
Domestic Hot Water, and Recirculated Line	Up to 180	0.5	1.0	1.0	1.5	1.5

- B. Lagging Adhesives: Shall be nonflammable and fire-resistant and shall have a maximum flame spread index of 25 and a maximum smoke developed index of 50 when tested in accordance with ASTM E84. Insulation finished with canvas shall be provided with laps adhered in accordance to manufacturer’s recommendation. A finish coat of same material shall be applied to entire outer surface of lagging cloth at coverage specified by manufacturer.
- C. Canvas Jackets: Provide 6 ounce, in accordance with square foot minimum, 48 by 48 thread count canvas jacketing.



D. Insulation Jackets:

1. Exterior insulation exposed to weather shall be weatherproofed with Childers aluminum jacketing as basis of design, or Pabco, RPR, or equal. Jacketing shall be manufactured from 1100, 3105 or 5010 aluminum alloy with 3/16 inch corrugations. Smooth or embossed jackets may be permitted in special situations to match an existing installation. Jacketing shall be furnished with an integrally bonded moisture barrier over entire surface in contact with insulation. A minimum thickness of 0.016 aluminum jacketing is to be provided on ducts and piping. A minimum thickness of 0.020 shall be provided on tanks, equipment, and heat exchangers.
2. Insulated elbows, of 90 degrees and 45 degrees, with a nominal iron pipe size of ½ inch to 8-inch shall be provided with Childers aluminum Ell-Jacs insulation covers as basis of design, or Pabco, RPR, or equal, manufactured from 1100 aluminum alloy of 0.024 inch thickness. Insulated elbows with a nominal pipe size of 10-inch to 18-inch shall be provided with Childers 4-piece aluminum Ell-Jacs as basis of design, or Pabco, RPR, or equal.
3. Tees, Flanges, and Valve Insulation in Conjunction with Aluminum Jacketing: Furnish Childers Aluminum Special Fabrications Insulation Covers as manufactured by Childers Products Company, Pabco, RPR, or equal.

E. Adhesives: Adhesives shall be water based, UL Classified, meet the requirements of NFPA 90A and NFPA 90B, have been tested according to relevant ASTM requirements, and be acceptable to the State Fire Marshal. Name, type and method of installation shall be submitted for review.

F. Valve and Fitting Cover: When installed in conjunction with PVC jacketing, furnish Zeston 25/50 rated polyvinyl chloride fitting covers as manufactured by Johns Manville, Knauf Insulation, Speedline, or equal.

2.02 DOMESTIC HOT WATER PIPING SYSTEM INSULATION

A. General: Insulate domestic hot water supply and return piping, including valves, strainers and fittings with insulation thickness as indicated on Table below.

B. Materials:

1. Classes of Insulation:
 - a. Class A: Glass fiber molded pipe insulation suitable for service temperatures up to 850 degrees F. Pipe insulation shall be one piece, preformed, and provide a minimum R factor of 4.0 at 75 degrees F mean temperature. Insulation shall be faced with all-purpose fire retardant vapor barrier jacket. Pipe insulation shall be Johns Manville Micro-Lok, Knauf Redi-Klad 1000, Owens Corning FIBERGLAS Pipe Insulation SSL II-ASJ, or equal.
2. Locations and Class of Insulation Required:

TABLE – LOCATIONS AND CLASS OF INSULATION REQUIRED



<u>LOCATION</u>	<u>CLASS OF INSULATION</u>
All locations	A

3. Fittings on indoor piping shall be covered with flush, hand-wrapped Class A insulation, to match the adjoining pipe insulation and covered with polyvinyl chloride fitting covers: Zeston 2000 25/50 by Johns Manville, Knauf Insulation Proto PVC Fitting Cover, Speedline Polyco Smoke Safe, or equal.
4. Adhesive: Fibrous Adhesive to bond calcium silicate to itself and non-porous surfaces.

PART 3 – EXECUTION

3.01 INSTALLATION

- A. Except as specified herein, install material in accordance with recommendations of manufacturer. Do not install insulation materials until tests specified in other sections are completed. Remove foreign material such as rust, scale, or dirt. Surfaces shall be clean and dry. Maintain insulation clean and dry at all times.
- B. On cold surfaces where a vapor barrier must be provided and maintained, insulation shall be installed with a continuous, unbroken moisture and vapor seal. Hangers, supports, anchors, or other projections that are fastened to cold surfaces shall be insulated and vapor sealed to prevent condensation.
- C. Surface finishes shall be extended in such a manner as to protect raw edges, ends, and surfaces of insulation.
- D. Pipe insulation shall be continuous through walls, ceiling or floor openings, or sleeves; except where firestop or firesafing materials are required.
- E. Metal shields shall be installed between hangers or supports and the piping insulation. Rigid insulation inserts shall be installed between the pipe and the insulation shields. Inserts shall be of equal thickness to adjacent insulation and shall be vapor sealed accordingly.
- F. Insulation shall not be installed in the following locations unless otherwise noted:
 1. On unions, flanged connections or valve handles.
 2. Over edges of any manhole, clean-out hole, clean-out plug, and to restrict opening or identification of access.
 3. Over any label or stamp indicating make, approval, rating, inspection, or similar data, unless provision is made for identification and access to label or stamp.

3.02 INSTALLATION OF DOMESTIC HOT WATER PIPING SYSTEM INSULATION

- A. General: Domestic hot water, tempered water supply and return piping and condensate return piping, after having been tested, shall be cleaned and insulated.
- B. Application: Insulate domestic hot water supply and return, including tempered supply and return piping in accordance with manufacturer's instructions and as specified herein.



1. Install insulation on valve bodies up to valve bonnet. Fill void in saddles, in accordance with Section 22 0513: Basic Plumbing Materials and Methods, with insulation and seal joints.
 2. Install insulating material to fittings, valves, and strainers and smooth to thickness of adjacent covering. Leave strainer clean-out plugs accessible. Covers fabricated from polyvinyl chloride shall be furnished.
- C. Insulation Jackets in Exposed Indoor Locations:
1. Cover completed insulation with canvas jacket tightly pasted to covering with lagging adhesive. Lap jacket seams 1 1/2-inch minimum. Finish entire jacket with coating of undiluted adhesive.
 2. Equivalent factory applied pre-sized, glass fiber reinforced, or glass fiber jackets may be furnished. Seal jacket seams with adhesive in accordance with manufacturer's instructions.
 3. Johns Manville Zeston 2000, Knauf Insulation Proto PVC Fitting Cover, Speedline Polyco Smoke Safe, or equal, fitting covers may be furnished, with molded or segmented insulation equal to specified insulation applied to fittings. Secure covers in accordance with manufacturer's instructions.
 4. In addition to above requirements, cover exposed insulated piping within a distance of 8 feet above floors with 26 gage galvanized steel jacket. Omit jacket in areas accessible only to maintenance personnel, such as mechanical equipment rooms, utility corridors, accessible pipe tunnels and manholes.
- D. Concealed Indoor Locations: Cover insulation over fittings, valves, and strainers with canvas. Provide pipe insulation with factory or field applied standard jacket of 4 ounce minimum canvas, fiberglass cloth, or glass fiber reinforced jacket. Seal jacket laps with adhesive in accordance with manufacturer's instructions.
- E. Exposed Outdoors: In addition to canvas or fiberglass cloth cover, pipe insulation exposed to weather shall be provided with an additional 0.016 inches thick aluminum jacket with 2-inch lap connected with one inch hem overlap joint located on side of pipe and turned down to shed water. Jacket shall be strapped 12 inches on center with 1/2-inch wide stainless steel strapping and wing seals. Aluminum jacket shall be mitered to fit fittings.
- 3.03 CLEANUP
- A. Remove rubbish, debris, and waste materials and legally dispose of off the Project site.
- 3.04 PROTECTION
- A. Protect the Work of this Section until Substantial Completion.

END OF SECTION



SECTION 22 10 00 PLUMBING PIPING AND FIXTURES

PART 1 - GENERAL

1.01 SUMMARY

- A. Section Includes: Labor, materials, tools, and equipment to install complete plumbing systems.
- B. Related Sections:
 - 1. Division 01 - General Requirements.
 - 2. Section 22 05 00: Common Work Results for Plumbing.
 - 3. Section 22 05 13: Basic Plumbing Materials and Methods.
 - 4. Section 22 05 53: Identification for Plumbing Piping and Equipment.
 - 5. Section 22 07 00: Plumbing Insulation.

1.02 SUBMITTALS

- A. Provide in accordance with Division 01 and Section 22 05 00: Common Work Results for Plumbing. SUBMITTALS
- B. Provide in accordance with Division 01, Section 22 05 00 and specific requirements of each section of Division 22.
- C. Submit all fixtures and equipment shown on Plumbing drawing P-002 Equipment Schedules, providing submittals for all listed items shown. Bottom-line, submit all fixtures and equipment shown are to be from major recognized manufacturers.

1.03 QUALITY ASSURANCE

- A. The California Plumbing Code is hereby made part of this section.
- B. Conform to provisions of Section 22 05 00: Common Work Results for Plumbing.
- C. Manufacturer of plumbing products must be third-party certified to ANSI/NSF Standard 61, Section 9 certification, and ANSI/NSF 372 to demonstrate compliance with the federal requirements for lead contribution to drinking water, the Safe Drinking Water Act SDWA, and the California Health and Safety Code Section 116875.

1.04 PRODUCT HANDLING

- A. Conform to provisions of Section 22 05 13: Basic Plumbing Materials and Methods.

PART 2 - PRODUCTS

2.01 PIPING SYSTEMS



- A. Materials: Refer to Section 22 05 13: Basic Plumbing Materials and Methods.
- B. Insulation for Piping: Refer to Section 23 07 00: Plumbing Insulation.

2.02 FIXTURES AND DRAINS

- A. General: Fixtures specified shall be furnished complete with trim and fittings. Cast iron plumbing fixtures shall be acid resistant enamel, and identified by casting letters "AR" or words "acid-resistant" into metal. Fixtures shall be white unless otherwise specified. Cast iron fixtures shall be white enamel inside and on back, rim and apron, with exposed unfinished surfaces painted white. Fixtures of same general classifications shall be of same make.
- B. Finished Brass:
 - 1. Finished and exposed brass plumbing, except floor, shower and urinal drains shall be chromium-plated and polished. Floor, shower and urinal drains, unless otherwise specified, shall be nickel-bronze metal.
- C. Traps, Trap Arms and Tailpieces:
 - 1. Fixture Traps shall be all cast brass chromium-plated and polished. Exceptions as follows:
 - a. Traps that are an integral part of a fixture.
 - b. Traps concealed in floors, walls and furring.
 - 2. Trap Arms shall be all IPS Threaded Brass Nipples into Female IPS Threaded Drainage Tee.
 - 3. Tailpieces, Extension Tailpieces, 2-part wastes and any other tubular products shall be minimum 17 gage polished chromium-plated brass, except as otherwise specified.
 - 4. Furnish polished chromium-plated brass wall flanges with setscrews and polished chromium-plated brass cover casing on discharge side of each trap.
- D. Faucet Valve Handles: Faucet valve handles shall be solid brass, chromium-plated and polished, and fastened to their stems by Allen type hollow head stainless steel set screws through the side of the handle extending into the stem. Handles with sharp edges or projections shall not be furnished. At accessible fixtures: handles shall be operable with one hand and shall not require tight grasping, pinching, or twisting of the wrist. The force required to activate handles shall be 5 pounds maximum.
- E. Fixture Supplies:
 - 1. Supplies for water heaters shall be unplated rigid copper water tube with threaded adaptors for connections to valves and other threaded connections. All other supplies shall be chromium-plated brass with hospital threads or shall be furnished with fittings and valves, which completely cover threads.
 - 2. Supplies to water closet tanks, lavatories, and drinking fountains shall be furnished with a NSF 372/61 threaded brass nipple. Exposed unfinished piping shall be sleeved with chrome plated brass or copper cover casing and have an appropriate escutcheon for a clean finished appearance. Angle/straight valve stops shall be female 1/2 IPS (inlet) by 3/8 compression (outlet). Fixture



supplies shall be polished chrome-plated, solid supply bulbed end risers with size compatible supply nut connection to fixture and 3/8 O.D. compression nut and ferrule connection to angle stop outlet. Stainless steel flexible braided connectors with re-enforced PVC inner hose are not allowed.

3. Hot and cold water fitting supply outlet piping serving water closets, urinals, lavatories, drinking fountains, sinks, faucets, hose bibs, and sillcocks shall be iron pipe size (IPS) brass nipple, and piped in such a manner that through wall water supply outlet piping be removable, size appropriate, and lead free. The use of copper, copper MIP sweat adapters or similar fittings, in lieu of brass nipples is not allowed. The IPS brass nipple shall be directly connected to the fixture as follows:
 - a. Control stops for water closet and urinal flush valves.
 - b. Angle stop for lavatories, sinks and drinking fountains.
 - c. Shank/arm adapters for wall mounted sink faucets.
 - d. Iron pipe size (IPS) brass nipple connection for hose bibs, sillcocks, and other plumbing related fixture and/or plumbing fitting water supply outlets.
4. Water supply pipe that penetrates a finished surface, wall, countertop or part of a cabinet shall be appropriately sized polished chromium-plated cover casing and wall flange/escutcheon fitting tight to the brass through wall nipple and securely affixed to the finished wall surface.
5. Water supplies of plumbing fixtures shall be protected against back-siphonage in event of a vacuum in piping system. Toilet and urinal flush valves shall be furnished with recognized atmospheric vacuum breakers, installed a minimum of 6 inches above fixture.
6. Discharge outlets of supply faucets for lavatories and sinks shall clear top of overflow rim by at least one inch.

2.03 ACCESS PLATES (To cleanouts, valves, water hammer arrestors and hose faucets)

- A. Round type, stainless steel, vandal-proof, 5/16 inch No. 18 or 1/4 inch No. 20 flat-head machine screw into cleanout plug. Plate shall be prime coated minimum 18 gage steel or polished chrome-plated brass, 18-8 No. 302 stainless steel, or polished nickel bronze.

2.04 BACKFLOW PREVENTION ASSEMBLIES

- A. Pressure vacuum breakers 1/2 inch to 2 inches, City approved.

2.05 CLEANOUT ASSEMBLIES

- A. Cleanout plug shall be line size. Iron body cleanout tee full line size up to 4 inches and round access plate, plugs shall be brass, countersunk with tapped boss for 5/16 inch No. 18 or 1/4 inch No. 20 screws.

2.06 CIRCULATING PUMPS, HOT WATER HEATING SYSTEM



- A. In-line mounted. Close coupled, centrifugal type with an all bronze water chamber, bronze sleeve bearings, bronze impellers, water tight shaft seal suitable for water temperature range from 20-300 degrees F. Forged steel shaft. It must be provided with bracket support to damper vibrations. GPM and TDH capacities as indicated on schedule. Acceptable Manufacturers: Bell & Gossett, Grundfos, Taco or approved equal.

2.07 DIELECTRIC UNIONS

- A. Dielectric style Unions using ferrous and no-ferrous metals are prohibited. Dielectric flanges are admitted for use – see DU-2.

2.08 ELECTRIC WATER COOLERS

- A. Water Coolers shall be provided with brass free waterways and lead mitigating water filtering systems (DFWF). Wall-mounted electric chiller type UL listed for access compliant with minimum capacity of 8.0 GPH certified to comply with Air Conditioning and Refrigeration Institute (ARI) Standard 1010/73. Fountain with brass free waterways shall be furnished with stainless steel apron and cabinet push bar operated bubbler, automatic stream regulator, brass P-trap, and hermetically sealed, air-cooled condensing unit with 115 volt, single phase 1/5 HP motor with thermal overload protection (Hubbell No. 5264 or equal). Provide with approved 3-wire grounding cord and connector. Complete water cooler must have been tested and certified to ANSI/NSF 61 and NSF/ANSI 372 lead free.

2.09 FAUCETS

- A. Access compliant faucets: Force to activate controls shall be no greater than 5 pounds. Self-closing metering, where specified, to remain open 10 seconds minimum when activated. Handles shall be operable with one hand and shall not require tight grasping, pinching, or twisting of the wrist.

2.10 FLOOR DRAINS

- A. See Drawing schedule P-002 for details.

2.11 FLEXIBLE HOSES

- A. Braided stainless steel metal hose (for gas use). Braided bronze metal hose (for non-pressure condensate connection use). US Flex, Metraflex, Nelson Dunn or equal.

2.12 FLUSH VALVE ASSEMBLY

- A. Valves shall be furnished so that flush remains constant and will not require any adjustment.
 - 1. Each flush valve shall be provided with a loose key, square shank, lock shield angle service stop connected to flush valve with a union connection.
 - 2. Provide 17 gage pressed brass escutcheons for wall and fixture. Escutcheons shall be fastened to not turn or rattle.



3. Each flush valve shall be furnished with a vacuum breaker providing one inch opening to atmosphere, which will not leak under any degree of back pressure and will not restrict rate of flow more than 10% at 10 PSI, and will operate noiselessly.
4. Tailpiece shall not be lighter than 17 gage and shall be part of flush valve assembly.
5. Exposed metal parts of flush valve assembly shall be nickel or chromium-plated on a brass or copper base.
6. Controls for water closet flush valves shall be mounted on the wide side of toilet areas.

2.13 LAVATORIES

- A. Access compliant faucets for Lavatories: Force to activate controls shall be no greater than 5 pounds. Self-closing metering, when specified, to remain open 10 seconds minimum when activated.
- B. Cast Iron Lavatories shall be acid resistant enamel and shall conform to Commercial Standards CS 77.63. Unites furnished in conjunction with strainer installation or faucet installation shall be brass. Exposed brass nuts shall be chrome plated.
- C. Exposed trim shall be free from sharp edges or points. Fixture shall be furnished with other listed manufacturer specified trim. Instead of solid supply pipe, polished chrome-plated risers, 3/8 inch outside diameter with ferrule stop end and metal nosepiece may be furnished.
- D. Insulate cold water, hot water and drain lines under all access compliant lavatories with approved type insulation.

2.14 PIPE HANGERS

- A. Refer to Section 22 0513: Basic Plumbing Materials and Methods. Complete with clamps, inserts, etc.

2.15 P-TRAPS

- A. Cast brass complete, chrome-plated.

2.16 PRESSURE REGULATING VALVE ASSEMBLIES

- A. Furnish for sizes ½-inch to 2-inch water service, all bronze body, stainless steel seat, bronze strainer, calibrated springs, and corrosion resistant, adjustable control.

2.17 ROOF DRAINS

- A. See plumbing Drawing schedule P-002 for details. Acceptable Manufacturers: Smith, Zurn, Watts, MiFab, Josam or approved equal.

2.18 SERVICE SINKS AND TRIM



- A. See Drawing schedule P-002 for details.

2.19 SERVICE STOP GAS VALVES

- A. Bronze/Brass gas cock valve with double stake packing nut, ½ inch to 2-inch, with IPS, inclusive, with flat or square head. CSA approved.

2.20 THERMOSTATIC MIXING VALVE ASSEMBLIES (TMVA)

- A. General: Valve bodies shall be cast brass or bronze valve assembly provided with holding bracket and shall be installed on wall bracket. Valve shall be rough brass or bronze satin sprayed finish unless otherwise noted. Assembly shall include a 3 5/8-inch diameter dial thermometer, color-coded with white face and black letters. The temperature range between 100 degrees F. and 150 degrees F. shall be background in red or red line enclosed. Valve complete with fail safe feature, square shank loose key stops, checks and strainers on both hot and cold-water inlets and shutoff valve on outlet. Valves shall be sized on a 45 psig (maximum) pressure drop:

2.21 TRAP PRIMERS

- A. Automatic, multi-trap primer, cast bronze with access panel. Pressure drop of three p.s.i. shall activate trap seal primers. Manufactured by MIFAB, or equal. (Installed in accessible location.)

2.22 URINALS

- A. Wall-hung vitreous china with replaceable trap cartridge or integral liquid seal trap, provided with a biodegradable liquid seal in compliance with the California Building Code and maintains a sanitary and odor-free environment. Furnish complete with hanger brackets, fasteners, gaskets and drain line connections.
 1. Fixtures shall comply with the following requirements:
 - a. Current versions of ASME A112.19.19, standard for Vitreous China Non-Water Urinals and/or IAPMO IGC 161.
 - b. Shall meet performance, testing, and labeling requirements for American National Standards Institute (ANSI).
 - c. Non-water urinals shall hold a current certificate of listing with IAPMO, and shall bear the C/IAPMO triangular certification and shall be manufactured in compliance with current IAPMO IGC 161.
 2. Trap shall permit the uninhibited flow of waste through the Urinal to the sanitary drainage system.
 3. Manufacturers:
 - a. Falcon Waterfree Sealant.
 - b. Waterless Co. Blue Seal Liquid.
 - c. Zurn Aqua Green Sealant.



- d. Kohler Waterless Urinal Sealing Liquid.
- e. Zero Flush Odor Barrier Liquid.
4. Urinals shall at time of school opening be serviced by replacing with an entirely new cartridge and liquid sealant, for units with removable cartridges. All urinals with built in traps shall be rinsed out and liquid sealant replaced.
5. Provide the following replacement quantity based on manufacturer's annual maintenance requirements:
6. Training shall consist of two hours of manufacturer certified training for all site-based operations personnel prior to school occupancy. Certificates shall be issued for all personnel who attend the original training session. The plant manager shall be certified as a trainer by the manufacturer. Provide two video tape copies of the original training session.
7. Provide a manufactured supplied "non-water urinal" descriptive placard at each urinal. Mounting heights shall be 48-inch for standard urinals and 42-inch for access compliant urinals.
8. Provide chrome brass flange and chrome brass I.P.S. cap to each urinal water supply line.
9. Provide accessible clean-out above each urinal.

2.23 WATER CLOSETS

- A. General: Water closets shall be vitreous china with Polyvinyl chloride bolt caps. Fixtures with auto-flush valves shall be provided with manual override button.

2.24 WATER TEMPERATURE CONTROLLERS

- A. Remote bulb type, plain steel case, baked enamel finish, glass fronted cover, mercury to mercury switch. 80 degrees F. to 240 degrees F. range of not more than 10 degrees F. differential.

2.25 GAS-FIRED WATER HEATERS

- A. Gas fired water heaters shall meet the Flammable Vapors Ignition Resistance requirements (FVIR).
- B. Gas water heaters must meet NAECA energy efficiency requirements. In capacity and gas models over 75,000 BTUH.
- C. Water heaters from 75,000 BTU/hr to Boilers 2,000,000 BTU/hr shall comply with rule 1146.2 "Emission of Nitrogen from large water heaters and small boilers". Natural gas fired water heaters with heat input rates less than 75,000 Btu/hr shall comply with rule 1121.
- D. Storage type water heaters shall be provided with a five year unconditional guarantee on tank heater and working parts. Complete guarantee for each heater shall be delivered to the Owner's Authorized Representative (OAR).



- a. Heater shall be furnished complete with baked enamel jacket, double density insulation, heating device, energy saver thermostat, drain valve is to be a ball valve with a plug in one end, and appurtenances necessary for satisfactory operation. Proper label of approval and manufacturer name, model number, size in gallons, and rated capacity shall be permanently secured to jacket.
- b. Heater shall be furnished with a combination pressure temperature relief valve, installed in water heater tank.
- c. Heaters shall be certified by the California Energy Commission.
- d. Floor-mounted heaters shall be on legs that are part of heater. Each heater shall be securely strapped to structure (with 2 straps per code).
- e. Water heaters shall be UL tested, approved and listed. Heaters shall be furnished complete with baked enamel jacket, glass fiber insulation, heating element, double break snap acting thermostat, drain valve and appurtenances required for operation. Electric heaters shall be factory wired ready for connection to electrical source. Install a gate valve on inlet side and union on both inlet and outlet sides of heaters and combination pressure-temperature relief valve on discharge side. Flexible water piping connectors shall not be used.
- f. Water heaters shall be of sizes indicated on Drawings and shall be furnished with equipment necessary to provide a complete and satisfactory piece of equipment.
- g. Pilot lines, gas valves, relays and their wiring shall be located outside boiler jacket to protect them from ambient temperature within. Flame safeguard relay shall be mounted on a control panel attached to wall at location indicated or as directed. All other controls and manual operators shall be so located as to be readily accessible when the boiler is in the installed position.
- h. Wiring of water pump control circuit and line voltage supply to control panel is part of the Work of Division 23. All other wiring in connection with boilers is a part of the Work of this section. Wiring between boiler and wall-mounted control panel shall be installed 7 feet or more above floor level.
- i. Gas-fired, storage type, size indicated on Drawings, with draft diverter and energy cut-off devices. Gas supply connections supplying less than 100,000 BTUs shall be with UL listed corrugated flexible appliance connector, and comply with ANSI Z21.24/CSA 6.10, Connectors for Gas Appliances. Connections supplying 100,000 BTUs and over shall be solid pipe. Heater shall be seismically secured with an approved restraint. HOLDRITE QS-50, QS-120.

2.26 WATER HAMMER ARRESTORS



- A. Lead Free Water Hammer Arrestor provided for Headers for Lavatories, Wash Sinks, Wash Fountains, Kitchen Sinks, Service Sinks, Urinals and Water Closets. For sizing purposes size according to manufacturer’s recommendations.

2.27 FIXTURE CONNECTIONS

- A. Branches to individual fixtures shall be of the following sizes (Inches) unless larger sizes are indicated on Drawings:

Fixture	Copper, Cold (Inches)	Copper, Hot (Inches)	Trap and Connections (Inches)	Soil/ Waste (Inches)	Vent (Inches)
WC Flush Valve	1	N/A	4	4	2
Lavatories	1/2	1/2	1-1/2 by 1-1/4	2	1-1/2
Service Sink	1/2	1/2	2	2	1-1/2
Wash Sink	3/4	1/2	1-1/2 by 1-1/2	2	1-1/2
Single Drinking Fountains	3/8	N/A	1-1/2	2	1-1/2
Standard Urinals, Wall-Hung Flush Valve:		N/A	N/A	2	1-1/2
Access Compliant Urinals, Wall-Hung Flush Valve:		N/A	N/A	2	1-1/2
Sillcocks	3/4 minimum	N/A	N/A	N/A	N/A

- B. Water headers serving water closets shall be copper water tube, with following size throughout length:
1. 1-1/2 inches for 2 flush valves.
 2. 2 inches for 3 to 9 flush valves.
- C. Water headers serving urinals shall be of following size throughout length:
1. 1” for 1 or 2 flush valves.



2. 1-1/4" for 3 flush valves.
 3. 1-1/2" for 4 to 8 flush valves.
- D. Water headers serving lavatories shall be of following size throughout length:
1. 1/2 inch for 2 lavatories.
 2. 3/4 inch for 3 and 4 lavatories.
 3. One inch for 5 and 6 lavatories.

2.28 HEIGHT OF FIXTURES

A. Heights for standard fixtures.

Fixture	
Toilets, height to top of seat	15 to 17
Lavatories, sink top height	32
Wash Sinks	30
Urinals, lip height	24

B. Heights for access compliant fixtures.

Fixture	
Toilets, center line from wall/partition	17-1/2
Toilets Seat Height	18
Lavatories, sink top height	34 maximum
Lavatories, sink knee clearance	27 minimum
Urinals, lip height	16
Urinals, flush handle height	43
Drinking fountains, bubbler height.	36 maximum
Drinking fountains, knee clearance	27 minimum
Wash Sink	Per Drawings



PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine areas and conditions under which Work of this section will be performed. Correct conditions detrimental to proper and timely completion of Work. Do not proceed until unsatisfactory conditions have been corrected.

3.02 INSTALLATION

- A. General:
1. Unless otherwise specified, plumbing fixtures, equipment and appliances that require connections to plumbing line shall be connected. This shall include fixtures specified or indicated as furnished by others, furnished by Owner, or specified in other related sections. Install supplies, stops, valves, traps, wall flanges, or pipe casing for connection of this equipment.
 2. Install equipment as indicated on reviewed and accepted Shop Drawings.
 3. Avoid interference with Work of other trades. Do not deviate from Drawings without review of the Architect.
- B. Examination: Check each piece of equipment in system for defects verifying that parts are properly furnished and installed.
- C. For piping Work, refer to Section 22 0513: Basic Plumbing Materials and Methods.
- D. Plumbing Fixture and Equipment Installation:
1. Unless otherwise indicated, fixtures shall be installed with 5/16 inch brass bolts or screws of sufficient length to securely fasten fixture to backing, wall, or closet ring.
 2. Fixtures installed against concrete or masonry walls shall have their hangers fastened with 5/16 inch brass bolts, Philip Shield type anchors, or 2 unit cinch anchors. Wood or plastic plugs are not permitted.
 3. Fixtures installed against wood or metal stud walls shall have their hangers fastened to metal backing plates with 5/16 inch brass bolts screwed into plate. Fixture hangers for urinals shall be fastened centered vertically on metal backing plate with three 5/16 brass bolts each for small individual hangers and six, for larger one piece hangers. Lavatories shall be hung with not less than four 5/16 inch brass bolts or not less than five 1/4 inch brass bolts. Each sink hanger shall be hung with not less than four 5/16 inch brass bolt or not less than five 1/4 inch brass bolts.
 4. Pan type drinking fountains shall be hung with 5/16 inch cadmium plated bolts with a bolt in each bolt opening in hanger. Hangers for pan type drinking fountains shall provide 2 inches (plus or minus 1/4 inch) between pan and wall. Spaces due to irregularities between fixtures and tile walls shall be neatly filled with white cement or silicone filler.



5. Backing for hanging of plumbing fixtures and equipment shall be installed in supporting wall at time rough piping is installed. Backing for stud walls shall be steel plate 1/4 inch thick, not less than 4 inches wide. Backing for urinals shall be 1/4-inch thick by 6-inch wide steel plate. Steel plate shall be attached to stud at each end of plate and to each stud it crosses. Plate shall be attached to metal studs by bolting with two 1/4 inch U-bolts per stud with bolts through plate and around stud flange or by welding with a 1/8 inch fillet weld full width of stud flange, top and bottom of plate. At wood studs, plate shall be carefully recessed flush with face of stud and attached to each stud with 2 No. 14 flat-head wood screws, 2 inches in length into pre-drilled 1/8 inch holes. Backing for stud walls supporting wall-hung closets shall be as detailed.
 6. Rough-in for fixtures, equipment and appliances shall be as indicated on Drawings and as specified, including those items indicated as furnished by others, furnished by Owner, or future capacity. When connections to equipment from capped or plugged lines are required, caps or plugs shall be removed at time equipment is set and stops or valves installed and connections provided as specified.
 7. Piping shall be stubbed out to exact location of fixtures and stubs shall be installed symmetrical with fixtures. Hot and cold water supplies for center set faucets on lavatories shall be installed on 8-inch centers, unless otherwise specified or required.
- E. Cleanouts in Drain, Waste, Vent and Sewer Lines:
1. Cleanouts shall be installed at locations stated in the California Plumbing Code and accessible at following locations:
 - a. At locations above first floor as stated on construction documents and 5 feet outside of the building.
 - b. Install an accessible main line upper terminal cleanout in all restrooms above water closet overflow. (Install above upper terminal water closet where there are more than one water closets in a restroom).
 - c. Above faucets of each sink with brass plug.
 - d. Above service sink with brass plug.
 - e. At each Drinking Fountain with brass plug.
 - f. At each urinal and locate above urinal with brass plug.
 - g. Above overflow level of pot sinks with brass plug.
 - h. In vertical line at base of each downspout connected to an underground storm drain system extend cleanout to exterior of building.
 - i. At upper end of a horizontal vent line when any part of horizontal line is below overflow level of fixture it serves.



- j. Not to exceed 100-foot intervals in sewer and waste lines exterior of building.
 - k. At property line connection.
 - l. Where indicated on Drawings.
 2. Cleanouts shall be extended to grade as follows:
 - a. Not to exceed 100-foot intervals in straight runs of pipe outside buildings.
 - b. At horizontal changes of direction in aggregate greater than 135 degrees (underground).
 - c. At property lines.
 - d. Where cleanouts occur under concrete.
 - e. Where marked for future connections.
 3. Cleanouts in building shall be extended to floor level or above floor level or above floor level in walls or furring when cleanouts are not accessible or where clearance is less than 18 inches.
 4. Cleanouts in finished areas in building shall be concealed except that cleanouts above service sinks in janitor's rooms or closet, and cleanouts above service sinks or in exposed piping in boiler or heater equipment rooms, may be exposed. Cleanouts for urinals shall be installed above urinal and shall terminate behind an access plate.
 5. Cleanouts in floors of covered areas and those extended to grade in concrete areas shall be floor level type with extensions body brass plugs and detachable nickel-bronze or aluminum alloy scoriated.
 6. Concealed cleanouts in vertical lines shall be service weight soil cleanout tees with brass plugs and round cover plates unless otherwise specified or indicated. A snug fitting sleeve of galvanized sheet metal shall be placed around hub of tee and shall extend to flush with finished soil, or cleanout shall be extended to finished wall.
 7. Cleanouts extended from below floor to a wall or furring or on horizontal lines above floor that terminate at a wall or furring shall be iron body type with brass plugs and round cover plates.
 8. Cover plates over cleanouts in painted walls shall be steel, bonderized and prime coated. Cover plates cover cleanouts in tile walls shall be chromium-plated brass or nickel bronze. Plates shall be attached to cleanout plugs with 5/16 inch No. 18 or 1/4 inch No. 20 stainless steel vandal-proof type screws. Plates shall be one inch larger in diameter than fitting opening.
 9. Cleanouts at bases of downspouts shall be tapped soil tees with brass plugs as hereinafter specified, full size of line.



10. Cleanouts extended to grade in exterior sewer lines other than floors or concrete areas shall be a cleanout assembly with secured top, extra heavy-duty, adjustable sleeve, cut-off ferrule, countersunk threaded brass plug and scoriated tractor type cover.
11. Other cleanouts shall be iron body type.
12. Cleanout extensions shall be no-hub cast iron soil pipe. Exterior cleanouts, those in concrete excepted, shall terminate in a 14-inch by 6-inch thick concrete block with cleanout assembly and top of block flush with finish grade.
13. Fittings in lines utilized as cleanouts shall be approved soil fittings including no-hub pipe. Tees and crosses in vent headers excepted.
14. Pipe joint compound shall not be installed on cleanout plug. After lines are tested and approved, each cleanout plug shall be removed, greased, and replaced.

3.03 EXCAVATION, TRENCHING AND BACKFILLING

- A. Perform trenching, excavation, and backfilling required for Work of this section as specified herein and in Section 31 2323: Excavating, Backfilling, and Compacting for Utilities.

3.04 SERVICE CONNECTIONS

- A. Determine exact location of required water, drain, and sewer connections and provide proper connections.
- B. Potable water lines shall be purged completely before connecting to sources of water for the Project. Determine quality of water supply before connection.

3.05 WATER HAMMER ARRESTORS

- A. Install water hammer arrestors indicated on Drawings and in following locations (only non-ferrous arrestors may be installed in copper water system):
 1. Water lines to lavatory headers, water closet and urinal headers, service sinks, kitchen sinks, wash fountains, drinking fountains, laboratories with medical type faucets and on wash sinks having three or more stations and all other quick closing fixture such as clothes washers, as close to fixture as possible.
 2. Between last two fixtures when three or more fixtures, other than those listed in Number 1 above, are served by a common header.
- B. When possible, arrestor shall be installed in wall or furring. When arrestor is installed in wall or furring, furnish an access plate large enough to permit removal of arrestor. Access plate shall be a minimum of 2 inches larger in each direction than the arrestor.
- C. Fixture water lines shall be provided with mechanical water arrestor hammer dampening devices. Air chambers are not approved.



3.06 GAS SERVICE

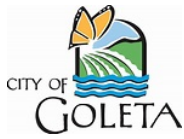
- A. Above Grade Service: Black steel schedule 40 pipe shall be steel, hammered, free of dirt and scale, and blown out with oil-free air or nitrogen to a clean, dry condition. Piping shall not be installed in or through a ventilation duct or plenum.
- B. Underground Service, Gas approved (yellow) Polyethylene Plastic Pipe: Refer to Section 22 0513: “Basic Plumbing Materials and Methods”.
 - 1. Pipes shall be joined with polyethylene fitting and joined together by thermal fusion in accordance with procedures recommended by Polyethylene plastic pipe and fitting manufacturer.
 - 2. Underground Warning Tape shall be installed 12 inches above buried gas piping. Warning tape shall be yellow with caution statement as follows: “CAUTION – BURIED GAS LINE BELOW”.
 - 3. Pipe shall be installed on a 6 inches deep sand bed. After required pressure-leak test, pipe shall be covered with sand not less than 6 inches thick.
 - 4. Piping shall not support weight of valves, metal fittings or other items. Pipe shall be installed strain free.
 - 5. Installer of piping is required to have training and to have attained a certification. Non-trained/Non-certified installer must contact the manufacturer or manufacturer’s representative to provide on-site fusion training and certification, prior to work commencement
 - 6. Where a steel pipe riser passes into a structure or building, a double swing or double-offset joint shall be furnished. Pipe shall pass into structure 6-inches above grade and through a sleeve with a minimum one inch clearance. An isolation valve is required before pipe entering the building.

3.07 CLEANING - PLUMBING PIPING SYSTEMS AND FIXTURES

- A. Plumbing lines and fixtures shall be flushed to remove dirt and foreign material until water runs clear and no foreign substance or odor is present. Strainers and screens on faucets shall be removed during this cleaning operation.
- B. After satisfactory cleaning of strainer and screen replacements has been witnessed by the Project Inspector, post and maintain signs stating: "CAUTION - Water at this construction project has not yet been certified for human consumption." Signs shall be furnished with letters at least 1/2 inch in height and shall be conspicuously posted at entrances to the Project site. Signs shall be paneled, black and yellow, in conformance with OSHA Section 1910.1455.

3.08 DISINFECTING DOMESTIC WATER PIPING SYSTEMS

- A. Newly installed or replaced piping and/or fixtures dispensing potable water, and any additional piping and/or equipment impacting the integrity of this system shall be



disinfected and undergo an approved bacteriological analysis before water system is allowed for public use.

- B. Disinfection shall commence upon complete installation of all related domestic water systems including fixtures, valves, faucets, water heating systems, etc.
- C. Work shall be performed by Technicians Certified by the American Water Works Association (AWWA) and/or the State of California Department Health Services, Grade II Water Treatment Operator Certification or higher issued by the Department of Health Services (DHS) for the State of California. Comply with Title 22, Code of Regulations Division 4, Chapter 13, and Article 2 Operator Certification Grades.
- D. Method:
 - 1. A Physical Separation of minimum 6” or Reduced Pressure Backflow assembly shall be installed to protect from cross contamination of the local water purveyor’s meter service supply when at any time there is any type of water connection with the piping to be disinfected (Chlorinated) and the water meter service supply.
 - 2. Install a Chlorination Port including a T fitting and a shut off valve to the proximity of the point of connection at the new piping system.
 - 3. System is to be flushed to remove any materials that may have entered the system.
 - 4. Using a chemical feed metering pump and a chlorine tank, the chlorine solution is injected into the water system.
- E. Disinfection and De-chlorination procedure (24 or 3 Hour Contact Time):
 - 1. 24-hour Test Method:
 - a. Prior to disinfection, post signs on all water outlets of the system to be disinfected. Sign or tags shall read, “Water System Being Chlorinated-“Danger Do Not Drink Water” or similar warning.
 - b. Piping system shall then be adequately flushed with water to remove any particles and eliminate air pockets.
 - c. Using the continuous feed method, sodium hypochlorite conforming to ANSI/ AWWA B300 will be injected into the water system at a minimum of 50 PPM. A water flow meter provided by the water treatment technician will be used to determine the rate of injection and a chlorine test kit, Hach or equivalent, will be used to monitor the residual.
 - d. Chlorine residual test will be taken at all appropriate points and outlets to verify 50 PPM residual levels.
 - e. The chlorinated system shall be shut down for any use and the chlorinated water shall remain in the water system for retention of 24 hours.



- f. After 24 hours, chlorine residual levels will again be tested at various points throughout the system to insure a minimum of 25 PPM residual. If the system has not met the minimum of a 25 PPM residual, the above disinfection process shall be repeated.
 - g. After satisfactory completion of the residual testing, flush out system until Hach or equivalent test reveal the water outlets have a free chlorine residual concentration less than 0.5 PPM. The procedure shall be in accordance with the AWWA standard C651-05.
 - h. The OAR may allow temporary use of the water system for construction purposes pending results of the bacteriological test analysis. Sign or Tags shall be left on all outlets stating water system is not safe for consumption until laboratory results are complete and meet these specifications.
2. 3 Hour Test Method:
- a. If the water systems must be turned on for use as soon as possible, a 3 hours chlorine contact time to allow for disinfection is permitted with the OAR's approval.
 - b. Prior to disinfection, post signs on all water outlets of the system to be disinfected. Sign or tags shall read, "Water System Being Chlorinated- "Danger Do Not Drink Water" or similar warning.
 - c. Piping system shall be then adequately flushed with water to remove any particles and eliminate air pockets. Using the continuous feed method, sodium hypochlorite conforming to ANSI/ AWWA B300 will be injected into the water system at a minimum of 200 PPM. A water flow meter provided by the water treatment technician will be used to determine the rate of injection and a chlorine test kit, Hach or equivalent, will be used to monitor the residual.
 - d. Chlorine residual test will be taken at all appropriate points and outlets to verify 200 PPM levels. The chlorinated system shall be shut down for any use and the chlorinated water shall remain in the water system for retention of 3 hours.
 - e. After satisfactory completion of a 3 hour disinfection period, flush out system until Hach or equivalent test reveal the water outlets have a free chlorine residual concentration less than 0.5 PPM. The procedure shall be in accordance with the AWWA standard C651-05.
 - f. The OAR may allow temporary use of the water system for construction purposes pending results of the bacteriological test analysis. Sign or Tags shall be left on all outlets stating water system is not safe for consumption until laboratory results are complete and meet these specifications.



F. Bacteriological Test:

1. After final flushing and satisfactory results from the residual free chlorine concentration test, Bacteriological test samples shall be collected. The intent of the following is to provide insurance for an accurate representation to a complete Bacteriological test of the water system. At least two samples shall be taken from each floor of each building.
2. Bacteriological test samples shall be delivered to a State of California Department of Health Services Certified Laboratory to perform qualitative and quantitative bacterial analyses on the water samples for the presence of any Total Coliform bacteria and Plate Count. This count must be less than 500 cfu/mL.
3. The procedure shall be repeated if it shown by bacteriological examination made by an approved agency that the level of Disinfection does not meet these specifications.
4. After satisfactory results for the bacteriological test are provided to the OAR, the physical barrier or temporary reduce pressure back flow device shall be removed, and the new piping shall be connected to the point of connection. All the connecting piping and fittings shall be disinfected prior to installation. Chlorination Port shall be capped water tight. Warning sign or tags shall be removed.

- G. Drinking Fountain and Bottle Filler Lead Test: After installation of Drinking Fountain or Bottle Filler, and successful Bacteriological Test, shut off domestic water supply line feeding the fixture, and inform OAR. OAR will coordinate with the Drinking Water Quality Program (DWQP) Supervisor in local Project Unit and M&O's Plumbing Technical Unit Supervisor to conduct lead detection test and mitigate as necessary. Do not remove related construction warning sign and tags.

3.09 VALVES ON PLUMBING SYSTEM

- A. Furnish and install gates, ball, globes, angles, and check valves on plumbing Work at following locations whether indicated on drawings or not.
- B. Hot and cold valves shall be:
 1. Lead free complying with AB1953.
 2. Above the ground copper water system, 2-inch and larger, may utilize Victaulic butterfly valves and fittings for their connections. A 2-inch or larger Victaulic valve may be in a wall if an adequately sized access panel is provided for maintenance or removal.
- C. Valves shall be accessible and installed within an access panel approximately 3 feet above floor and no more than 7 feet above floor, or in a marked yard box to prevent tampering.



1. Immediately after each water meter, in addition to any valve furnished by utility company, there shall be an accessible valve on the inlet side for a strainer assembly, dual backflow device assembly and/or possibly a dual pressure reducing valve assembly.
2. A gate or ball valve on each water supply before it enters building. Valves shall be accessible from outside building and shall be installed in a marked yard box, unless otherwise indicated on drawings. Ball valves 2 ½-inch size or larger shall omit gate valve handle and furnish 2-inch square operating nut.
3. For restrooms, a gate or ball valve shall be installed in each restroom to isolate the hot and cold water supply into a restroom regardless of the number of fixtures. These valves shall control and be accessible only from within the restroom in which fixtures are installed. Valves shall be installed on the same wall as the group of fixtures it serves. Valves shall control only fixtures in restroom in which they are installed. Back to back restrooms shall be isolated separately and individually.
4. Install a gate or ball valve on each building branch line, which serves two or more fixtures, when these fixtures are not provided with a group isolation valve as specified above. These valves shall be located approximately 3 feet but not more than 7 feet above finish floor.
5. Install a gate, ball valve or partition stop for a drinking fountain or a group of drinking fountains.
6. Install a gate, ball valve or partition stop for hot and cold water supply to plumbing fixtures with no accessible supply stops, such as wall mounted faucets.
7. Install a gate, ball valve or partition stop for stops adjacent to, and controlling water flow to each sill cock and hose bib except as follows:
 - a. A sill cock immediately below an exterior drinking fountain may be controlled by the same gate, ball valve or partition stop as drinking fountain.
 - b. Valves or stops will not be required for individual hose bibs when these hose bibs are on a branch line serving only hose bibs and branch line is furnished with a shut-off valve.
8. Install a lose key angle stop, on each exposed fixture supply, and for each flush valve unless otherwise specified,
9. Install gate or ball valve at each location where a water line is connected to a piece of equipment other than items mentioned above.
10. Install a check valve on each hot water return line where it connects to a hot water storage tank or a water heater.
11. Handles, hand wheels (including dishwasher fill valve handles) and operating nuts shall be furnished of steel, brass, or cast iron and shall be removable.



Unless specified to be loose key type, handles shall be securely fastened to their stems. On exposed outdoor valves, omit operating handles and provide operating nuts.

12. Provide a handle or a key for each five, or fraction thereof, loose key valves, bibs, or stops and deliver them to the project OAR.

3.10 VALVES - GAS SERVICE

- A. A gas readily accessible shut-off stop shall be installed on each gas line entering a building immediately prior to the point it enters the building. Unless otherwise specified or indicated, shut-off valves for lines entering a permanent structure, buildings or portable buildings, shall be installed in a vertical riser above grade.
 1. Gas shut off valve for portable buildings – In addition to the gas readily accessible shut-off stop specified above, a dedicated Gas shut off valve shall be provided in a marked Yard Box, for each portable building to facilitate relocation/removal of building without the need to shut off gas to entire school.
- B. Gas Shut off valve within a building – A gas shut off valve with handles shall be accessible and serviceable within an access panel. Install valve minimum 3 feet above floor but less than 7 feet above floor.
- C. In addition to locations specified, gas shut off valve shall be installed at following locations:
 1. Install a lubricated plug gas shut off valve on any line connected to gas main or header at master assembly.
 2. Install a lubricated plug gas shut off valve before entering any building or structure.
 3. Install a gas valve on each outlet, in addition to any gas stop furnished with equipment.
 4. Service to laboratory gas cocks shall be furnished with a special precision check valve, located downstream from gas stop servicing room outlet at each laboratory cock. Unless otherwise specified, 1/8-inches bore shall be provided for each outlet cock.
 5. Install a gas shut-off valve on each gas line serving 2 or more gas outlets in same room. Service stop shall be installed not more than 7 feet above floor, and shall be in the room it serves.
 6. Install a gas shut-off valve on inlet side of each gas pressure regulating valve.
 7. Gas shut-off valves to be furnished with equipment.
 8. Install gas shut-off valve at not more than 1,000 foot intervals on each gas main.
 9. Gas shut-off valves in classrooms and locations subject to tampering shall be protected while remaining accessible.



- D. When a gas-shut off valve adjacent to gas-fired equipment is indicated in Contract Documents it shall be furnished and installed as part of Work of this section.
- E. When electrical wall switches with emergency push button are specified for controlling gas outlets at Laboratory Classrooms, provide main shut-off gas valve with normally closed electric solenoid valve within an accessible access panel.

3.11 ELECTROLYSIS PREVENTION

- A. Brass nipples, 6 inches, with recognized brass unions; flanges shall be furnished and installed at locations described herein. Flanges shall be installed with complete insulating component consisting of gasket bolt sleeves and bolt washers. Dielectric insulators shall be installed at following locations:
 - 1. Where special applications indicated on Drawings require an insulation flange or brass union, with 6-inch brass nipple to be installed in a condensate line, or steam line, flange insulation shall be of a high temperature type, suitable for continuous operation at temperatures up to 220 degrees F. for condensate and 400 degrees F. for steam.
 - 2. Where steel or cast iron in ground connects to copper or brass piping above ground, transition from steel or cast iron pipe to copper or brass pipe shall be provided in an accessible location.
 - 3. Underground dielectric connections shall be furnished in accessible yard boxes.
 - 4. Above ground dielectric connections shall be exposed; or if in finished rooms shall be located in accessible access boxes.

3.12 UNDERGROUND PIPE MARKERS

- A. Pipe markers shall be furnished according to Section 22 0553: "Plumbing Identification"
- B. Underground Caution Tape shall be placed 12 to 18 inches above the utility line. The Caution Tape shall be a designated color and marked with the appropriate name for the specific type of utility pipe as follows:
 - 1. Yellow – with the words: CAUTION GAS LINE BELOW
 - 2. Blue – with the words: CAUTION WATER LINE BELOW

3.13 HOT WATER CIRCULATING PUMPS

- A. Piping shall be supported from building structure so as to prevent any strain on pump casing.
- B. In-line pumps, unless otherwise specified, shall be centrifugal type with non-overloading characteristics and shall not overload motor above its horsepower rating under operating conditions with ratings based on continuous operation.



- C. Centrifugal water pumps shall be rated according to Hydraulic Institute Test Code for Centrifugal Pumps. Pumps shall be furnished with bronze water chamber, bronze impeller and mechanical seal. Rotating parts shall be statically and dynamically balanced.
- D. Hot water circulating pump shall be arranged so that pump can be automatically turned off when hot water system is not in operation.

3.14 WATER TEMPERATURE CONTROLLERS

- A. Furnish and install a water temperature controller in hot water line adjacent to, and for control of, circulating pumps on hot water return lines when said pump is indicated on Drawings or herein specified. Bulb of temperature controller shall be installed so as to be directly in path of flowing water and so as not to obstruct flow of water.
- B. Furnish and install a water temperature controller in hot water storage tanks for control of circulating pump on hot water circulating line when said pump is indicated on Drawings or specified herein.

3.15 DEPTH OF SEWER LINES

- A. Minimum depth of below grade sewer lines shall be 24 inches to centerline of pipe. Sewer lines shall slope $\frac{1}{4}$ inch per foot minimum, unless otherwise indicated. Minimum depth at Owner property line shall be 6 feet, unless otherwise required.

3.16 BACKFLOW PREVENTION DEVICES

- A. Backflow Devices: Installation of backflow devices shall be tested and certified by County backflow device tester before Substantial Completion. Tests shall be performed in presence of Project Inspector. Test reports shall be turned over to Project Inspector for mailing to proper agency.

3.17 CLEANUP

- A. Remove rubbish, debris, and waste materials and legally dispose off Project site.

3.18 PROTECTION

- A. Protect Work of this section until Substantial Completion.

END OF SECTION



SECTION 23 05 00 COMMON WORK RESULTS FOR HVAC

PART 1 – GENERAL

1.01 SUMMARY

A. Section Includes:

1. This Section provides the basic mechanical requirements that apply to the Work of Division 23.

B. Related Requirements:

1. Division 01: General Requirements.
2. Division 26: Electrical.

1.02 REGULATORY REQUIREMENTS

- A. Materials, fabrication, equipment, and installation shall comply with industry standards and code requirements. Where manufacturer's recommendations exceed industry standards, the manufacturer's recommendation shall establish the minimum standard. As a minimum, standards from the following organizations shall apply:

1. AMCA - Air Movement and Control Association.
2. ANSI - American National Standards Institute.
3. ASME - American Society of Mechanical Engineers.
 - a. ASME B31 - Code for Pressure Piping.
4. AHRI - Air-Conditioning, Heating, and Refrigeration Institute.
5. ASHRAE - American Society of Heating, Refrigerating and Air-Conditioning Engineers.
6. ASTM - American Society for Testing and Materials.
 - a. ASTM A53 - Specification for Welded and Seamless Pipe.
7. CSA - Canadian Standards Association.
8. FM Global - Factory Mutual Global
9. IAPMO - International Association of Plumbing and Mechanical Officials.
10. NFPA - National Fire Protection Association.
11. OSHA - Occupational Safety and Health Administration.
12. SMACNA - Sheet Metal and Air Conditioning Contractors' National Association.
13. UL - Underwriters Laboratories Inc.



14. Intertek (ETL Certification).
- B. Materials, fabrication, equipment, and installation shall comply with federal, state, and local codes including, but not limited to, the following:
 1. CBC, California Building Code, and CMC, California Mechanical Code.
 - a. Latest edition as adopted by the City, the County, and the State of California including amendments effective on the Effective Date of the Contract.
 2. California Code of Regulations, Title 8, Industrial Relations, Division 1, Chapter 4, Division of Industrial Safety.
 3. OSHA - Occupational Safety and Health Administration.
 4. CDPH – California Department of Public Health.
 5. SCAQMD - South Coast Air Quality Management District.
- C. Specifications or Drawings shall not be construed to permit deviation from the requirements of governing codes unless approval has been obtained from legally constituted authorities having jurisdiction, and the Architect. The Contract Documents may contain more stringent requirements than those legally required.
- D. Permits and Fees: Refer to the General and Supplementary Conditions.

1.03 SUBMITTALS

- A. Provide submittals in accordance with Section 01 33 00: Submittal Procedures and with specific requirements of Division 23 sections, as applicable.
- B. After Architect's approval, the above information shall become the basis for inspecting and testing materials and actual installation procedures performed in the Work.
- C. Shop Drawings: Submit sheet metal duct layout and diffuser layouts for review and approval. Drawings prepared in accordance with requirements of Section 01 31 13: Project Coordination and Section 01 33 00 may be provided by the Architect to serve as a background for the Shop Drawings. Shop Drawings shall comply with the requirements of Section 01 31 13 and Section 01 33 00 and shall indicate at a minimum:
 1. Complete system layout of equipment, components, ductwork, and piping, indicating service clearances, duct and pipe sizes, fitting types and sizes, top or bottom of duct and pipe elevations, distances of ducts, pipes and equipment from building reference points and hanger / support locations. All the above items shall be coordinated on the shop drawings according to the requirements of Section 01 31 13.
 2. Schedule and description of equipment, ductwork, piping, fittings, valves, dampers, and controllers.



1.04 PROJECT RECORD DOCUMENTS

- A. Comply with provisions of Section 01 77 00: Contract Closeout.
- B. Project Record Drawings:
 - 1. Provide a complete set of mechanical and control system drawings in AutoCAD and, if available, BIM, complete with external reference drawings, fonts, blocks and plotter pen color/line thickness settings on CD-ROM. Also submit one set of full size reproducible plots on vellum and three sets of prints.
 - 2. Before Contract Completion, deliver corrected and completed prints to the OAR. Delivery of project record documents to the OAR does not relinquish responsibility of furnishing required information omitted from project record documents.
- C. Operation and Maintenance Manuals:
 - 1. Submit operation and maintenance manuals in required form and content. If no revisions are required, furnish one additional copy. If revisions are required, one copy shall be returned with instructions for changes; perform such changes and return manuals. Manuals shall be bound in accordance to Section 01 7700. Deliver manuals to the OAR. Submit an electronic copy of the entire manual in PDF file format.
 - 2. Contents of Manual:
 - a. Title sheet with Project name, including names, addresses and telephone number of CONTRACTOR, installer, and related equipment suppliers.
 - b. Manufacturer's operating instructions including, but not limited to, the following:
 - 1) Identification of components and controls.
 - 2) Pre-start checklist and start-up procedures.
 - 3) Normal operation settings and checklists.
 - 4) Pre-shut down checklist and shut down procedures.
 - 5) Trouble shooting checklist and guidelines.
 - 6) Recommendations for optimum performance.
 - 7) Warnings and safety precautions on improper or hazardous operational procedures or conditions
 - c. Manufacturer's product data and parts and maintenance booklet for each item of equipment furnished under Division 23 that includes the following as a minimum:
 - 1) Manufacturer's model, identification and serial numbers.



- 2) Exploded view of assembly drawings identifying each component or part with the relevant part number.
 - 3) Directory of manufacturer's representatives, service CONTRACTORS and part distributors.
 - 4) Maintenance and trouble-shooting instructions, including schedule for preventive maintenance, periodic inspection and cleaning criteria.
- d. Project Record Drawings: Complete set of mechanical and control system drawings in 50 percent reduced print format shall be furnished with the manual. Submit the above record drawings on CD-ROM in AutoCAD and, if available, BIM, complete with external reference drawings, fonts, blocks, and plotter pen color/line thickness settings.
 - e. Testing, Adjusting, and Balancing reports: Submit as specified in Section 01 4525.
 - f. South Coast Air Quality Management District (SCAQMD) permits to install and operate fuel burning equipment and third-party source test reports as required by SCAQMD to allow start-up and operation of equipment.
 - g. Valve directory complete with location, function, size, and model of each valve with reference to the project record drawings.
 - h. Equipment and component identification chart complete with location, function, size, and model of each equipment or component with reference to the project record drawings.

1.05 COORDINATION

- A. Contract Documents indicate extent and general arrangement of Work under Division 23. CONTRACTOR shall coordinate work in accordance with Section 01 31 13 requirements and make adjustments as required to provide maximum headroom, a neat arrangement to keep passageways and openings clear to provide accessibility and provisions for maintenance, and to meet code requirements.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Delivery and Storage: Deliver materials to Project site in their original unopened containers with labels intact and legible at time of delivery. Store in strict accordance with manufacturer's recommendations.
- B. Do not store plastic pipe or materials in direct sunlight.



1.07 PRELIMINARY OPERATION

- A. OAR may require any portion of mechanical Work to be operated before Substantial Completion. Such operation shall be in addition to regular tests, demonstrations and instructions required under the Contract Documents, and shall be performed as required.
- B. Notify the Project Inspector at least 24 hours in advance of lighting or re-lighting pilots.

1.08 TRAINING OF OWNER PERSONNEL

- A. Training of Owner's personnel shall include:
 - 1. A minimum of 2 hour of on-site overview of the overall Mechanical System.
 - 2. Refer to Division 23 sections for specific training on each of the components of the Mechanical System.
 - 3. A minimum of 2 hours of (in classroom) software training. Training shall be conducted at the site with computer setup for each person attending.
- B. Contract shall include the cost of training Owner operation and maintenance personnel in operating, adjusting, maintenance, trouble-shooting, and Project site repair of each component, equipment, or system provided under this Contract.
- C. Operational and maintenance training shall be conducted on the Project site, unless indicated otherwise.
- D. Upon completion of Owner training, a completion certificate indicating the nature of the training and a description of the systems, complete with equipment and component lists shall be issued to each trainee. The certificate should be issued in duplicate with one copy retained by OAR.
- E. An attendance sheet with the names and signatures of all participants attending the training shall be submitted to the OAR and kept as part of the project documents.

1.09 GUARANTEES AND DAMAGE RESPONSIBILITY

- A. Sound of water flowing in piping shall not be transmitted to building structure. Operation of mechanical system shall not produce operational sounds that can be heard outside of rooms enclosing apparatus or equipment.

PART 2 – PRODUCTS

2.01 MATERIALS AND EQUIPMENT

- A. Unless otherwise specified, materials and equipment shall be new, in good and clean condition. Equipment, materials, and components shall be of the make; type and model number noted on Drawings or specified. Pieces of equipment of the same type shall be by the same manufacturer.
- B. Whenever an item is listed by a single proprietary name, with or without model number and type, it shall be for purpose of design only, to indicate characteristics and quality desired. Proprietary designation listed on Drawings, or listed first in Specifications, is



used as a basis for design to establish a standard for quality and performance and space requirements.

- C. HVAC equipment products from different manufacturers are never identical. Equipment approved as being equal is interpreted as being equivalent in capacity, performance and quality. The dimensions, weight, configuration and utility requirements could be quite different from the equipment used as the basis of design. Due to these differences, additional coordination and adjustments by the CONTRACTOR are required. For the equipment to be deemed truly equal, the additional coordination and adjustments by the CONTRACTOR should not incur any additional cost to the Owner and any additional labor to the design team.
- D. Equipment and materials indicated or required to be installed outdoors shall be of the type that is designed, manufactured, listed or approved by authorities having jurisdiction for outdoor installation by being resistant to the adverse effects of weather. All the additional protective measures against outdoor weather required by the manufacturers' installation instructions and prevalent practice shall be provided.
- E. For substitution of materials or products, refer to the General Conditions.

PART 3 – EXECUTION

3.01 GENERAL INSTALLATION REQUIREMENTS

- A. CONTRACTOR shall arrange for a preconstruction meeting with IOR prior to the installation to discuss installation and testing requirement.

3.02 LOCATION OF PIPING AND EQUIPMENT

- A. Location of piping, apparatus and equipment as indicated on Drawings is approximate and shall be altered to avoid obstructions, preserve headroom, and provide free and clear openings and passageways.
- B. Trenches parallel to footings shall not be closer than 18 inches to the face of footings and shall not be below a plane having a downward slope of 2 horizontal to one vertical, from a line 9 inches above bottom of footing.

3.03 PIPING INSTALLATION

- A. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems; indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, pump sizing, and other design considerations. Install piping as indicated unless deviations to layout are approved on Shop Drawings.
- B. Install piping in concealed locations unless otherwise indicated and except in equipment rooms and service areas.
- C. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.



- D. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal.
- E. Install piping adjacent to machines to allow service and maintenance.
- F. Install piping free of sags and bends.
- G. Install fittings for changes in direction and branch connections.
- H. Select system components with pressure rating equal to or greater than system operating pressure.
- I. Install piping as short and direct as possible, with a minimum number of joints, elbows, and fittings.
- J. Arrange piping to allow inspection and service of refrigeration equipment. Install valves and specialties in accessible locations to allow for service and inspection. Install access doors or panels as specified in Division 08 Section "Access Panels Frames" if valves or equipment requiring maintenance is concealed behind finished surfaces.
- K. Install pipe sleeves at penetrations in exterior walls and floor assemblies.
- L. Seal penetrations through fire and smoke barriers according to Division 07 Section "Penetration Firestopping."
- M. Install piping with adequate clearance between pipe and adjacent walls and hangers or between pipes for insulation installation.
- N. Install sleeves through floors, walls, or ceilings, sized to permit installation of full-thickness insulation.
- O. Seal pipe penetrations through exterior walls according to Division 07 Section "Joint Sealants" for materials and methods.

3.04 TESTS AND TESTING

- A. Tests shall be as required under the applicable sections of Division 23, including this Section.
- B. Tests required by other sections of the Contract Documents include the following:
 - 1. Test and balance of mechanical equipment and systems: Refer to Section 01 4525: Testing, Adjusting, and Balancing for HVAC.2.
- C. Additional tests may be required in the case of products, materials, and equipment if:
 - 1. Submitted items are altered, changed, or cannot be determined as exactly conforming to the Contract Documents.
 - 2. Performance testing and results may also be required on certain items which are as specified, including fan, and pump performance.
- D. Equipment Performance Assurance Tests:
 - 1. Before operating any equipment or systems, a thorough check shall be performed to determine that systems have been flushed and cleaned as required



and that equipment has been properly installed, aligned, lubricated, and serviced. Factory instructions shall be checked to verify installations have been completed and recommended lubricants have been installed in bearings, gearboxes, crankcases, and similar equipment. Particular care shall be furnished in lubricating bearings to avoid damage by over-lubrication and blowing out seals. Equipment shall also be checked for damage that may have occurred during shipment, after delivery, or during installation. Damaged equipment, products, and materials shall be replaced or repaired as required.

2. Upon completion of the above, adjust the system settings to within normal operating conditions to prevent the system from being damaged upon start-up.
3. Run-test the equipment after start-up for five consecutive days. Tests shall include operation of heating, ventilating, and air conditioning equipment and systems for a period of not less than two 8 hour periods at 90 percent of the full specified heating and cooling capacities. If equipment passes, install new filters. If equipment fails, it shall be adjusted and retested until system meets all applicable codes.
4. Equipment Start-up Reports: For each equipment or system on which start-up is performed, submit 8 copies of start-up report for review by the Architect.
 - a. The start-up report shall include the manufacturer's standard start-up form completed and signed by the start-up technician.
5. Provide, maintain, and pay costs for equipment, instruments, and operating personnel as required for specified tests.
6. Provide electric energy and fuel required for tests.
7. Final adjustment to equipment or systems shall meet specified performance requirements.
8. Equipment, systems, or Work deemed defective during testing shall be replaced or corrected as required. Test until satisfactory results are provided.

E. Specific Coordinated Plan for Test and Balance:

1. Provide a narrative of the operational intent that clearly describes the function and sequence of operation of each component, equipment, or system installed. Instruct designated Owner personnel in the operation of the installed systems.
2. Prior to final test and balance, mechanical equipment and systems shall be operated and tested as indicated in Paragraph 3.04.F above to demonstrate satisfactory overall operation of the installed systems.
3. Immediately before starting tests, air filter media shall be cleaned or renewed. Disposable type filters shall be replaced with new filters. Replaceable media shall be replaced with new media.



4. An accurate means of measuring air flow and temperatures shall be furnished to balance air supply, return, and exhaust systems so uniform temperatures occur in every room and design airflow is obtained through registers, diffusers, and grilles.
5. Systems shall be adjusted to provide airflows indicated including maximum fresh air and maximum return air. Dampers shall be checked for proper settings and operation. Air and water inlet and leaving temperatures at coils shall be checked. Complete operational data including airflows, room temperatures, fan speeds, motor currents, plenum, and duct static pressures shall be tabulated.
6. Welding performed as part of this Division may be subject to radiographic inspections at random in accordance with requirements specified in Section 23 0500: Basic HVAC Materials and Methods.

3.05 NOISE AND VIBRATION REDUCTION

- A. Correct noise or vibration caused by mechanical systems. Provide all necessary adjustments to specified and installed equipment and accessories to reduce noise to the lowest possible level
- B. Correct noise or vibration problems caused by failure to install work in accordance with Contract Documents. Include all labor and materials required as a result of such failure. Pay for re-testing of corrected noise or vibration problems by the project acoustical consultant including travel, lodging, test equipment expenses, etc.

3.6 PROTECTION, CARE AND CLEANING

- A. In addition to storage criteria of the General Conditions, and provisions under Section 01 5000: Construction Facilities and Temporary Controls, the following shall be provided:
 1. Provide for the safety and good condition of materials and equipment until Substantial Completion. Protect materials and equipment from damage.
 2. Protect installed Work.
 3. Replacements: In case of damage, immediately provide repairs and/or replacements as required.
 4. Interior of ductwork shall be maintained free of dirt, grit, dust, loose insulation, and other foreign materials.
 5. Air handling equipment shall not be operated until building is cleaned and air filters are installed.
 6. Before initial start-up and again before Substantial Completion, piping shall be drained and flushed to completely remove grease and foreign matter. Pressure regulating assemblies, traps, strainers, boilers, flush valves, and similar items shall be thoroughly cleaned. Tag system with an information tag listing responsible party and date of element, before initial start-up and again before Substantial Completion.



Department of Neighborhood Services and Public Safety
GOLETA TRAIN DEPOT PROJECT

END OF SECTION



SECTION 23 07 00

HVAC INSULATION

PART 1 – GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Supply and return air ducts for heating and cooling systems.
- B. Related Requirements:
 - 1. Division 01: General Requirements.
 - 2. Section 23 05 00: Common Work Results for HVAC.
 - 3. Section 23 05 13: Basic HVAC Materials and Methods.
 - 4. Section 23 30 00: Air Distribution.
 - 5. Section 23 80 00: Heating, Ventilating and Air Conditioning Equipment.

1.02 REFERENCES

- A. American Society for Testing and Materials International (ASTM):
 - 1. ASTM C167 - Standard Test Methods for Thickness and Density of Blanket or Batt Thermal Insulations.
 - 2. ASTM C209 - Standard Test Methods for Cellulosic Fiber Insulating Board.
 - 3. ASTM C302 - Standard Test Method for Density and Dimensions of Preformed Pipe-Covering-Type Thermal Insulation.
 - 4. ASTM C411 - Standard Test Method for Hot-Surface Performance of High-Temperature Thermal Insulation.
 - 5. ASTM C518 - Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus.
 - 6. ASTM C534 - Standard Specification for Preformed Flexible Elastomeric Cellular Thermal Insulation in Sheet and Tubular Form.
 - 7. ASTM C547 - Standard Specification for Mineral Fiber Pipe Insulation.
 - 8. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
 - 9. ASTM E96 - Standard Test Methods for Water Vapor Transmission of Materials.
- B. Underwriters Laboratories Inc.:
 - 1. UL 181 - Standard for Factory-Made Air Ducts and Air Connectors.



2. UL 723 - Standard for Test for Surface Burning Characteristics of Building Materials.

National Fire Protection Association:

1. NFPA 90A - Standard for the Installation of Air-Conditioning and Ventilating Systems .
2. NFPA 90B - Standard for the Installation of Warm Air Heating and Air-Conditioning Systems.
3. NFPA 255 - Standard Method of Test of Surface Burning Characteristics of Building Materials.

1.03 SUBMITTALS

- A. Submit in accordance with Division 01 and Section 23 05 00: Common Work Results for HVAC.
 1. Complete material list of items to be furnished and installed under this Section.
 2. Manufacturer's specifications and other data required demonstrating compliance with the specified requirements.
 3. Shop Drawings, catalog cuts and manufacturer's data indicating insulation, jacketing, adhesives, and coating. Insulating materials shall be certified by manufacturer to comply with the California quality standards for insulating materials.
 4. Manufacturer's recommended method of installation procedures, which will become part of this Section.

1.04 QUALITY ASSURANCE

- A. Qualifications of Manufacturer and Installer, Materials, Fabrication, Execution, and Standard of Quality: Comply with provisions stated under Section 23 05 00: Common Work Results for HVAC and Section 23 05 13: Basic HVAC Materials and Methods.
- B. Test Ratings:
 1. Comply with provisions stated under Section 23 0500 and 23 05 13 with emphasis on ASTM E84, NFPA 255, or UL 723. ASTM C167, ASTM C302, UL label or listing of satisfactory test results from the National Institute of Standards and Technology, or a satisfactory certified test report from an acceptable testing laboratory. Approval by the State Fire Marshal is required.
 2. Furnish labels, legibly printed with the name of the manufacturer or listings indicate that fire hazard ratings do not exceed those specified for materials proposed for installation. Flame spread index of not more than 25 and smoke developed rating not exceeding 50.
 3. Tests shall be performed on each item individually when insulation, vapor barrier covering, wrapping materials, or adhesives are installed separately at the Project site.
 4. Test insulation, vapor barrier covering, wrapping materials and adhesives as an assembly when they are factory composite systems.



- C. Regulatory Requirements: Insulation furnished and installed under this Section shall conform to the requirements of the California Building Code Parts 4, Mechanical Code, Part 5, Plumbing Code and Part 6, Energy Code.
- D. All chemically based products such as sealers, primers, fillers, adhesives, etc. shall meet the California air quality regulations.

1.05 PRODUCT HANDLING

- A. Protection, Replacement, Delivery and Storage: Comply with provisions stated under Sections 23 05 00: Common Work Results for HVAC and 23 05 13: Basic HVAC Materials and Methods.

PART 2 – PRODUCTS

2.01 MATERIALS

- A. General:
 - 1. Piping insulating material shall be fire resistant, non-corrosive, shall not break, settle, sag, pack or disintegrate under vibration, nor absorb more than 1 percent moisture by weight.
 - 2. Piping insulating material shall be furnished with thickness indicated in Table 1, unless otherwise noted on the drawings, and shall furnish thermal resistance in the range of R-4.0 to 4.6 in accordance with inch at 75 degrees F.
 - 3. Provide insulation materials, adhesives, coatings, sealants, fitting covers, and other accessories with a fire hazard rating not to exceed 25 for flame spread, 25 for fuel contributed and 50 for smoke developed, except for materials listed as follows:
 - a. Nylon anchors for installing insulation to ducts or equipment.
 - b. Treated wood blocks.
 - 4. Flame-proofing treatments subject to moisture damage are not permitted.
- B. Lagging Adhesives: Shall be nonflammable and fire-resistant and shall have a maximum flame spread index of 25 and a maximum smoke developed index of 50 when tested in accordance with ASTM E84. Insulation finished with canvas shall be provided with laps adhered in accordance to manufacturer's recommendation. A finish coat of same material shall be applied to entire outer surface of lagging cloth at coverage specified by manufacturer.
- C. Insulation Jackets:
 - 1. Exterior insulation exposed to weather shall be weatherproofed with Childers aluminum jacketing as basis of design, or Pabco, RPR, or equal. Jacketing shall be manufactured from 1100, 3105 or 5010 aluminum alloy with 3/16-inch corrugations. Smooth or embossed jackets may be permitted in special situations to match an existing installation. Jacketing shall be furnished with an integrally bonded moisture barrier over entire surface in contact with



insulation. A minimum thickness of 0.016 aluminum jacketing is to be provided on ducts and piping.

2. Insulated elbows, of 90 degrees and 45 degrees, with a nominal iron pipe size of ½-inch to 8-inch shall be provided with Childers aluminum Ell-Jacs insulation covers as basis of design, or Pabco, RPR, or equal, manufactured from 1100 aluminum alloy of 0.024-inch thickness. Insulated elbows with a nominal pipe size of 10 inches to 18 inches shall be provided with Childers 4-piece aluminum Ell-Jacs as basis of design, or Pabco, RPR, or equal.
- D. Adhesives: Adhesives shall be water based, UL Classified, meet the requirements of NFPA 90A and NFPA 90B, have been tested according to relevant ASTM requirements, and be acceptable to the State Fire Marshal. Name, type and method of installation shall be submitted for review.
- E. Valve and Fitting Cover: When installed in conjunction with PVC jacketing, furnish Zeston 25/50 rated polyvinyl chloride fitting covers as manufactured by Johns Manville, Knauf Insulation, Speedline, or equal.

2.02 DUCTWORK AND PLENUM INSULATION/ACOUSTICAL LINING

- A. General: Insulate ductwork and plenums with not less than the amount of insulation tabulated in Table 2, unless noted otherwise on the drawings.

TABLE 2 - INSULATION OF DUCTS AND PLENUM

<u>Duct Location</u>	<u>Insulation Type</u>
Interior concealed supply air ductwork and plenums (Exposed to inside conditioned environment no insulation required)	F-1
Interior acoustically-lined supply and return ductwork (where shown on plans close to ac units)	L-1 (no F-1 exterior insulation required)
Exterior outside supply and return air ducts and plenums	L-1 (no F-1 exterior insulation required)

Notes:

1. Minimum insulation provided shall be as required by the current California Mechanical Code Title 24 for the most restrictive condition.
2. Refer to the materials indicated in this section for external insulation & internal acoustical lining.
3. For sound attenuation provide internal acoustical duct lining (1-½-inch unless noted otherwise) where indicated on the drawings. Where acoustical lining is shown or required, external duct insulation will not be required.



- 4. All exterior insulated ductwork shall be water proofed at joints, seams and duct penetrations.
- B. External insulation may be omitted under the following conditions:
 - 1. Exposed supply ductwork within inside conditioned environment.
 - 2. Return air ductwork in conditioned space.
 - 3. Interior acoustically lined rectangular supply and return plenums and ductwork
- C. Insulation Types:
 - 1. F-1: 1½-inch blanket fiberglass, factory-laminated with foil skim service jacket (FSK) vapor barrier.
 - 2. L-1: 1½-inch internal acoustical duct lining.
- D. Materials:
 - 1. Fire-Resistive Insulation Materials and Coatings: Submit State Fire Marshal pre-approved materials only.
 - 2. Adhesives: See Paragraph 2.01.D for applicable products.
 - 3. F-1 - External Insulation: Provide glass fiber blankets that are factory-laminated with Foil Reinforced Kraft (FRK) vapor barrier facing; Johns Manville Microlite, Owens-Corning SOFTR Duct Wrap, Knauf Insulation Friendly Feel Duct Wrap, or equal. Provide a minimum installed R value as required by the CEC Building Energy Efficiency Standards; but not less than scheduled on Table 3:

TABLE 3
INSULATION OF DUCTS AND PLENUMS
THERMAL RESISTANCE “R” VALUES

Type	Thickness (in inches)	Installed R Value (hr.ft ² .°F/Btu)
F-1	1 ½	4.2
L1	1 ½	6.0

- 4. L-1 - Internal Acoustical Lining: Internal Lining shall be of the type that inhibits the growth of mold, mildew and fungi and shall not contain harmful VOC’s or contain glass fiber. Approved Material:
 - a. Polyester Acoustical Duct Liner:
 - 1) Polyester duct liner shall be an engineered nonwoven, thermally bonded Polyester with a smooth and durable FSK facing.
 - 2) Polyester duct liner must be able to withstand a constant internal temperature up to 250°F must be compliant with Greenguard Environmental Institute and contain zero VOCs per ASTM D5116. Liner must comply with all applicable standards including ASTM E84, ASTM C411, ASTM C518, ASTM G21, NFPA 90A and 90B, and UL 181.



- 3) Approved Manufacturer: Ductmate Industries “PolyArmor” duct liner or approved equal.
- b. Elastomeric Acoustical Duct Liner:
 - 1) Closed-cell, sponge- or expanded-rubber materials. Elastomeric liner must be able to withstand a constant internal temperature up to 300°F and must comply with all applicable standards including ASTM E84, ASTM E96, ASTM C209, ASTM C534 - Type II sheet materials, ASTM C411, ASTM C518, ASTM G21, ASTM G22, NFPA 90A and 90B, and UL 181.
 - 2) Approved Manufacturer: Armacell LLC “AP Armaflex FS” duct liner or approved equal.
- c. Duct liner must be attached per manufacturer’s requirements using a non-flammable, low VOC water-based adhesive. When applicable, apply a non-flammable, low VOC water-based lagging adhesive to the exposed leading edge of the insulation. Install fasteners per SMACNA HVAC Duct Liner installation instructions.
- d. Duct liner must be installed per SMACNA Manual, “HVAC Duct Construction Standards, Metal and Flexible,” Third Edition unless otherwise specified.

PART 3 – EXECUTION

3.01 INSTALLATION

- A. Except as specified herein, install material in accordance with recommendations of manufacturer. Do not install insulation materials until tests specified in other sections are completed. Remove foreign material such as rust, scale, or dirt. Surfaces shall be clean and dry. Maintain insulation clean and dry at all times.
- B. On cold surfaces where a vapor barrier must be provided and maintained, insulation shall be installed with a continuous, unbroken moisture and vapor seal. Hangers, supports, anchors, or other projections that are fastened to cold surfaces shall be insulated and vapor sealed to prevent condensation.
- C. Surface finishes shall be extended in such a manner as to protect raw edges, ends, and surfaces of insulation.
- D. Pipe or duct insulation shall be continuous through walls, ceiling or floor openings, or sleeves; except where fire-stop or fire-safing materials are required.
- E. Metal shields shall be installed between hangers or supports and the piping insulation. Rigid insulation inserts shall be installed between the pipe and the insulation shields. Inserts shall be of equal thickness to adjacent insulation and shall be vapor sealed accordingly.
- F. Insulation shall not be installed in the following locations unless otherwise noted:
 1. On unions, flanged connections or valve handles.



2. Over edges of any manhole, clean-out hole, clean-out plug, access door or opening to a fire damper, so as to restrict opening or identification of access.
3. Over any label or stamp indicating make, approval, rating, inspection, or similar data, unless provision is made for identification and access to label or stamp.

3.02 INSTALLATION OF DUCTWORK AND PLENUM INSULATION

A. External Covering:

1. Before installing duct insulation, sheet metal ducts shall be clean, dry, and tightly sealed at joints and seams, inspected, and accepted by the site Inspector.
2. Duct exterior insulation shall be firmly wrapped around ductwork with joints lapped a minimum of 2-inch. Insulation shall be securely fastened with 18 gage copper-lined steel wire, or 16 gage soft-annealed galvanized wire spaced approximately 12-inch on centers and at loose ends, presenting a neat and workmanlike appearance. Where duct width is such that wiring will not fasten insulation firmly against duct an adhesive shall be furnished to fasten insulation to duct with wiring being installed at ends of insulation segment.
3. Insulation on ductwork transporting conditioned air, both supply and return, and outside air intake ducts when pre-conditioned, shall be furnished with a factory-applied, fire-resistant vapor barrier.
4. Exposed Ducts or Plenum:
 - a. Install insulation to ducts or plenum furnished with butt joints, without voids and with adhesive over entire surface of duct. Cover insulation with canvas jacket, fastened tightly to insulation with lagging adhesive. Install 2 finish coats of undiluted adhesive.
 - b. When installing jacket, finished covering shall be even and level, without humps, with constant diameters on round ducts maintained.

B. Interior Insulation –Acoustical Lining:

1. Where ducts are internally acoustically lined, external duct insulation will not be required.
2. Dimensions of ducts indicated are net inside dimensions and must include thickness of duct liners to obtain the required duct size.
3. Install insulation in square turns, where required, to cover interior surfaces before duct turns are installed.
4. Install lining material during fabrication of duct with sealed face only exposed to air stream.
5. Interior insulation in ducts or plenums shall not have exposed edges. Edges open to entering or leaving air streams shall be covered, secured in place and sealed with approved duct liner edge sealers.
6. Insulation shall be fastened to sheet metal with an approved fire-retardant adhesive, with minimum 90 percent coverage and edges firmly adhered.
7. Mechanical fasteners shall supplement the adhesive on top sections of ducts more than 12-inch wide and on sides of ducts more than 24-inch high and shall



be spaced on 16-inch centers maximum. Fastener posts shall be cut off approximately ¼-inch from metal disc.

3.03 CLEANUP

- A. Remove rubbish, debris, and waste materials and legally dispose of off the Project site.

3.04 PROTECTION

- A. Protect the Work of this Section until Substantial Completion.

END OF SECTION



SECTION 23 08 00

HVAC SYSTEMS COMMISSIONING

PART 1 – GENERAL

1.01 SUMMARY

A. Section Includes:

1. General requirements for Commissioning of HVAC systems and equipment including installation, start-up, testing, documentation, and training according to the Construction Documents.

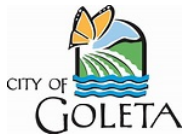
B. Related Requirements:

1. Division 01: General Requirements.
2. Section 01 45 23: Testing and Inspection.
3. Section 01 45 25: Testing, Adjusting, and Balancing for HVAC.
4. Section 01 91 13: General Commissioning Requirements.
5. Section 23 05 00: Common Work Results for HVAC.
6. Section 23 30 00: Air Distribution.
7. Section 23 80 00: Heating, Ventilating and Air Conditioning Equipment.

1.02 REFERENCES

A. Applicable codes, standards, and references: inspections and tests shall be in accordance with the following applicable codes and standards:

1. InterNational Electrical Testing Association – NETA.
2. National Electrical Manufacturers Association – NEMA.
3. American Society for Testing and Materials – ASTM.
4. Institute of Electrical and Electronics Engineers – IEEE.
5. American National Standards Institute – ANSI.
6. National Electrical Safety Code – NESC.
7. California Building Code – CBC.
8. California Electrical Code – CEC.
9. California Mechanical Code – CMC.
10. Occupational Safety and Health Administration – OSHA.
11. National Institute of Standards and Technology – NIST.



12. National Fire Protection Association – NFPA.
13. American Society of Heating and Air-Conditioning Engineers – ASHRAE
(The HVAC Commissioning Process, ASHRAE Guideline).
14. Associated Air Balance Council – AABC (National Standards for Total System Balance).

1.03 SUBMITTALS

- A. Submittals package shall include the following:
 1. Commissioning required submittals in accordance with Division 01 Specification Sections.
 2. Copy of the Architect’s reviewed and accepted submittals to the OAR.
 3. List of team members who will represent the Contractor in the Pre-functional Equipment Checks (PEC) and Functional Performance Tests (FPT), at least six weeks prior to the start of Pre-functional Equipment Checks.
 4. Detailed manufacturer installation and start-up, operating, troubleshooting and maintenance procedures, a copy of full details of Owner-contracted tests, full factory testing reports, if any, and Warranty information, including responsibilities of Owner to keep Warranty in force clearly defined.
 5. Installation and checklist documentation shipped with equipment and field checklist forms to be used by factory or field technicians.
 6. Detailed manufacturer’s recommended procedures and schedules for PECs, supplemented by Contractor’s specific procedures, and FPTs, at least four weeks prior to the start of PEC.

1.04 MEETINGS, SEQUENCING AND SCHEDULING

- A. Meetings: Attend the Commissioning meetings as required.
- B. Sequencing and Scheduling: The work described in this Section shall begin only after work required in related Divisions 23 and 26 Sections has been successfully completed and tests, inspection reports, and Operation and Maintenance manuals required have been submitted and accepted. The start-up and PEC shall be completed and submitted to the Owner at least two weeks prior to beginning FPT.
 1. Coordinate HVAC work with the work of other trades prior to scheduling of any Commissioning procedures.
 2. Coordinate the completion of HVAC testing, inspection, and calibration prior to start of Commissioning activities.

1.05 QUALITY CONTROL

- A. Comply with Division 01 quality control specifications.



- B. Incorporate manufacturer's recommended Commissioning procedures for the systems and equipment to be commissioned under this Section.
- C. Comply with Section 01 45 25: Testing, Adjusting, and Balancing for HVAC.

1.06 EQUIPMENT AND SYSTEMS TO BE COMMISSIONED

- A. Packaged gas heating electric dx air conditioning unit(s) systems.
- B. Exhaust fan(s) systems.

PART 2 – PRODUCTS

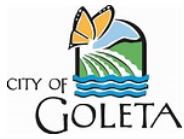
2.01 TEST EQUIPMENT

- A. Equipment to be utilized in the commissioning process shall meet the following requirements:
 - 1. Provide test equipment as necessary for the testing of the equipment and systems to be commissioned.
 - 2. Provide testing equipment and accessories that are free of defects and certified for use.
 - 3. Provide testing equipment with current calibration labels as per NIST Standards.
 - 4. Equipment shall be calibrated on the manufacturer's recommended intervals with calibration tags affixed to the instrument.
 - 5. Testing equipment shall be maintained in good operating condition for the duration of the project.

PART 3 – EXECUTION

3.01 COMMISSIONING PROCESS REQUIREMENTS

- A. Work to be performed prior to commissioning:
 - 1. Complete phases of the work so the system(s) can be started, tested, adjusted, balanced, and otherwise commissioned.
 - 2. If modifications or corrections to the installed system(s) are required to bring the system(s) to acceptance levels due to Contractor's incorrect installation or defective materials, such modifications shall be made at no additional cost to the Owner.
 - 3. Normal start-up services required to bring each system into full operational state:
 - a. Testing, motor rotation check, control sequences of operation, full and part load performance.
 - b. Commissioning shall not start until each system is complete and start-up has been performed.
- B. Pre-Commissioning responsibilities:



1. Inspection, calibration and testing of the equipment required to commission the following systems:

- a. HVAC System(s).

3.02 PREPARATION

- A. Provide certified HVAC technicians as required, with tools and equipment necessary to perform Commissioning activities specified.
- B. Provide certified testing agency personnel and equipment factory representatives as require in the Commissioning plan and other related Sections.
- C. Verify that work required in this Section is complete prior to starting of FPT.
- D. Verify that complete operational manuals have been reviewed and accepted by the Commissioning service provider as specified before starting FPT.

3.03 TESTING

- A. Testing procedures shall include the following minimum information:
 1. Test number.
 2. Equipment used for the test, with manufacturer and model number and date of last calibration.
 3. Date and time of the test.
 4. Indication of whether the record is for a first test or retest following correction of a problem or issue.
 5. Identification of the system, subsystem, assembly, or equipment.
 6. Conditions under which the test was conducted, including (as applicable); ambient conditions, set points, override conditions, status, and operating conditions that impact the results of the test.
 7. Systems and assemblies test results and performance and compliance with contract requirements.
 8. Issue number, if any, generated as the result of the test.
 9. Name(s) and signature(s) of witnesses and the person(s) performing the test.
- B. Contractor shall participate and perform Commissioning related testing requirements as specified.
- C. General Requirements for Mechanical, Controls, and Testing and Balance:
 1. Construction and Acceptance Phases:
 - a. Provide assistance to Commissioning service provider in preparing FPT procedures specified. Sample test forms are included in the project Commissioning Plan.
 - b. Develop full startup and initial checkout plan using manufacturer's start-up procedures and Commissioning checklists for commissioned



- equipment. Submit to Commissioning service provider for review and approval prior to startup.
- c. During startup and initial checkout process, execute mechanical-related portions of PEC for the equipment and systems to be commissioned.
 - d. Perform and clearly document completed startup and system operational checkout procedure. Providing four copies of the results to the Owner.
 - e. Resolve any open punch list items before FPT. Air testing and balance shall be completed with discrepancies and problems remedied before FPT of respective air -related systems.
 - f. Provide skilled technicians to execute starting of equipment and to execute PFT. Ensure that technicians are available and present during agreed upon schedules and for sufficient duration to complete necessary tests, adjustments, and solutions to identified problems.
 - g. Maintain a log of events and issues of tests and related Commissioning activities. Submit handwritten reports of discrepancies, deficient or uncompleted work by others, contract interpretation requests, and lists of completed tests as specified.
 - h. Correct open issues and re-test as needed to prove compliance with system operational standards.
 - i. Prepare Operation and Maintenance Manuals and provide training for the Owner maintenance personnel and end-users per Section 01 7900.
 - j. Coordinate with equipment manufacturers to determine specific requirements to maintain validity of Warranty and notify the Owner.
 - k. Execute simulated seasonal FPT, witnessed by the Owner and the Commissioning service provider, as specified. Document results and perform corrections as needed for system acceptance and make necessary adjustments to Maintenance and Operations Manuals and Record Drawings.

3.04 SENSOR CALIBRATION

- A. Field-installed temperature, relative humidity, CO₂, pressure sensors, pressure gages, and actuators (dampers and valves) shall be calibrated using the methods described below. Calibration procedures shall be documented during execution of the Start-up and the PEC. Alternate methods may be used, if approved by the Commissioning service provider.
- B. Test instruments shall have had a NIST certified calibration within the last 12 months. Sensors installed in the unit at the factory with provided calibration certification need not be field calibrated.
- C. Sensors:
 1. Verify that sensor locations are appropriate and away from causes of erratic operation.
 2. Verify that sensors with shielded cable are grounded only at one end.



3. For sensor pairs that determine a temperature difference, make sure they are reading within 0.2 degrees F of each other.
4. For sensor pairs that determine a pressure difference, make sure they are reading within 2 percent of each other.
5. Calibration: Put the equipment in operation. Make a reading with a calibrated test instrument within six inches of the site sensor. Verify that the sensor reading (via the permanent thermostat or gage) is within the tolerance listed in the table below of the instrument-measured value. If not, calibrate or replace sensor.

6. Tolerances:

<u>Sensor</u>	<u>Required Tolerance (+/-)</u>
AHU wet bulb or dew point	2.0 degrees F
Outside air, space air, duct air temps	0.4 degrees F
Flow rates, air	10 percent of sensor range (inc. design value)
Relative humidity	4 percent
CO ₂ monitor	100 ppm
Sound level	5 db - Type 1 meter (Per Calibrator Mfg.)
Flow Rates	5 percent of sensor range (inc. design value)

3.05 ADJUSTING

- A. Perform work required to rectify installations not meeting contract requirements at no additional cost to the Owner.
- B. Corrective work shall be completed in a timely manner to permit completion of the Commissioning process.
- C. If systems' Commissioning deadline, as defined in the Project Schedule, goes beyond the scheduled completion without resolution of the problem(s), the Owner reserves the right to obtain supplementary services or equipment to resolve the problem.

3.06 TRAINING

- A. Provide training plan for systems to be commissioned as required in applicable Division 23 specification sections and Section 01 7900.

END OF SECTION



SECTION 23 09 00 HVAC CONTROLS

PART 1 – GENERAL

1.01 SUMMARY

- A. Section Includes: HVAC system environmental controls, including equipment, materials, installation, start-up, testing, documentation and training according to construction documents. The project drawings establish the scope of HVAC system(s) controls work with local and remote status/alarm monitoring by the Owner and their HVAC system equipment service contractors.
- B. The DDC system shall have the capable of remote Web browser interface for HVAC system adjustments of system operational times, temperatures, and remote alarm/ failure indication for remote service notification thru an Ethernet IP address. No laptop or on-site desktop workstation/printer access is required, as no on-site building engineer is foreseen. Capability shall be provided for a remote service person upon alarm or maintenance notification receiving alarm/notice, remotely via the Etherne, to plug their service tablet or laptop (provided by the Contractor) into the main DDC HVAC system control panel to be located in the Electrical room and then access the project HVAC system network. The DDC system shall have the capability to generate email and/or text messages to be sent to the service co., notifying there is an alarm malfunction or an unexpected change of events. It is anticipated servicing of the system will be performed by local mechanical contractors, who will require the provisions for remote web IP access.
- C. Related Requirements:
 - 1. Division 01: General Requirements.
 - 2. Section 01 45 23: Testing and Inspection.
 - 3. Section 23 05 00: Common Work Results for HVAC.
 - 4. Section 23 05 13: Basic HVAC Materials and Methods.
 - 5. Section 23 08 00: HVAC Systems Commissioning.
 - 6. Section 23 30 00: Air Distribution.
 - 7. Section 23 80 00: Heating, Ventilating and Air Conditioning Equipment.
 - 8. Section 26 05 00: Common Work Results for Electrical.
 - 9. Section 26 05 13: Basic Electrical Materials and Methods.

1.02 REFERENCES

- A. The latest version of applicable codes, standards, and references. Inspections and tests shall be in accordance with the following applicable codes and standards, except as provided otherwise herein.



1. International Electrical Testing Association – NETA.
2. National Electrical Manufacturers Association – NEMA.
3. American Society for Testing and Materials – ASTM.
4. Institute of Electrical and Electronics Engineers – IEEE.
5. American National Standards Institute – ANSI.
6. National Electrical Safety Code – NESC.
7. California Building Code – CBC.
8. California Electrical Code – CEC.
9. California Mechanical Code – CMC.
10. Insulated Cables Engineers Association – ICEA.
11. Occupational Safety and Health Administration – OSHA.
12. National Institute of Standards and Technology – NIST.
13. National Fire Protection Association – NFPA.
14. American Society of Heating, Refrigerating, and Air-Conditioning Engineers – ASHRAE
(The HVAC Commissioning Process, ASHRAE Guideline).
15. International Electrical Testing Association (NETA) Acceptance Testing.

1.03 SUBMITTALS

- A. Provide in accordance with Division 01 and Section 23 05 00: Common Work Results for HVAC.
- B. Shop Drawings shall include but not limited to:
 1. Cover page with legend, common notes, symbol schedule, and drawing index.
 2. Complete point to point environmental controls and energy management network communication diagram(s) for Direct Digital Controls (DDC) of each system:
 - a. Identify all components.
 - b. Indicate conduit and wire characteristics, sizes and quantities.
 - c. Provide bill of materials.
 3. Floor plans showing control panels and intercommunication wiring.
 - a. Show system(s) interface connections.
 4. Operations and Maintenance Manuals.
 5. As-built submittal drawings.
 6. Installation Instructions of each control device.
 7. Supplemental local or factory training schedule for post warranty support.
 8. A complete list of recommended spare parts with pricing for the OWNER's use in keeping the environmental control system downtime to a minimum.



9. Composite DVD with AutoCAD or electronic pdf drawings in a “.dwg” format.

1.04 QUALITY CONTROL

- A. CONTRACTOR shall have adequate experience installing systems of similar size and complexity with the control product line proposed for this project.
 1. Qualifications of Installer: Minimum five years experience installing products and systems of similar scope and complexity.
 2. Installer shall submit certification from the equipment manufacturer indicating that installer is an authorized representative of the equipment manufacturer and is trained on network applications.
 3. Installer shall maintain a fully equipped service organization capable of furnishing repair service to the equipment and shall maintain a spare set of major parts for the system at all times.
 4. Installer shall furnish a letter from manufacturer of equipment certifying equipment has been installed according to factory standards and that system is operating properly.
 5. CONTRACTOR shall have participated in the commissioning of a minimum of 10 projects of similar magnitude to those needed for this project.
 6. System startup and testing shall be performed under the direct observation of the Project Inspector and OAR.
- B. Materials and equipment installed shall be new.
- C. System installation shall not begin until Shop Drawings are submitted and reviewed by the Architect or Engineer of Record.
- D. Components for Direct Digital Control (DDC) shall comply with ASHRAE standards.
- E. The installer shall provide the system components required by code and for the life safety of the service personnel.
- F. System shall be able to interface with open protocol BACnet systems.
- G. Provide all ancillary components for the system to perform the required sequence of operations. Install, test and adjust the system accordingly.
- H. System components shall operate per industry standards. The standards shall be as defined by ASHRAE, SMACNA, AABC, NEBB, TABB, and the literature of the manufacturers listed in this Section.
- I. Provide field engineering tools including software and hardware needed for programing and/or modifying system controller and devices.

1.05 WARRANTY

- A. Components, system hardware and software, and parts and labor shall be guaranteed against defects in materials, fabrication, and execution for three years from date of system acceptance. Provide labor and materials to repair, reprogram, or replace defective components at no charge to the OWNER during the warranty period.



- B. Provide a list of applicable warranties for equipment and components, this list shall include warranty information, names, addresses, telephone numbers, and procedures for filing a claim and obtaining warranty services.
- C. CONTRACTOR shall respond to OWNER's request for warranty service within four hours of initial call to schedule a mutually agreeable time for service. Submit records of the nature of the call, the work performed, and the parts replaced or service rendered.

1.06 TRAINING

- A. Provide a competent instructor who is factory trained and has comprehensive knowledge of system components and operations to provide full instructions to designated personnel in the system operation, maintenance, and programming. Training shall be specifically oriented to installed equipment and systems.
 - 1. Provide 2 hours of onsite OWNER familiarization and training for the installed system. Training shall include system overview, time schedules, override commands, emergency operation, and programming and report generation. OWNER employees attending this training session shall be provided with the following documentation:
 - a. As-built drawings of System layouts and point to point connection diagrams.
 - b. System components cut sheets.
 - c. Operations and maintenance data.
 - 2. Programmer and maintenance training shall include database entry; trend logs application programs, diagnostic routines, reporting, failure recovery and calibration.
 - a. Provide 4 hours of training as follows:
 - 1) Training session shall accommodate a minimum of 2 persons and be facilitated at CONTRACTOR's training facility, which should be no more than 50 miles from the Project Site.
 - a) Training shall be delivered in 1 session increments.
 - b) Obtain OWNER's approval for training locations exceeding 50 miles. In such cases, the CONTRACTOR shall be responsible for transportation expenses.
 - c) CONTRACTOR shall provide training computers for all attendees. Computers shall be ready for live training sessions.
 - 2) Training shall cover instruction, theory, and expose the trainees to system's features, components, architecture, operations, programming, report generation, communications, and any other pertinent information required for the operations and maintenance of the system.
 - 3) Each training session shall have an itemized agenda covering all aspects of the training to be covered in the sessions.



CONTRACTOR shall obtain agendas approval from OWNER and Commissioning Agent.

- 3) Instructor(s) shall give the trainees the opportunity to practice on simulated and actual (installed) systems.
- 4) The training session shall cover, but not be limited to the following instruction modules or sessions:
 - a) System Architecture:
 - (1) System layout and components interrelations and hierarchical structure.
 - b) User Operations:
 - (1) Familiarization and navigation with the EMS operating System.
 - (2) Window panes, menus, navigation buttons, alarm response windows, system passwords and accessibility features and options, monitoring and managing data points (inputs, outputs, numeric values, time and date, strings).
 - (3) Views: Provide sufficient information as to train staff on how and where to access programs, functions, adjust or alter diagnostic points and related data, override messages, reports and actions taken.
 - c) Trending: Setting trend(s) intervals, accessing data trends and history logs for diagnosis points or groups, and reporting. Working with trended data graphical displays, including but not limited to hiding points, setting display types and colors, viewing and setting scales.
 - d) Graphics: Standard symbols and color codes, graphics customization, how and where to access and manage the system with the graphic displays, including changing points and values, using HOA switches and viewing results, mapping to or with other graphic sources and functions, including groups, navigation, sequence of operations, and displays and reports.
 - e) Alarms: Reading and interpreting alarms, acknowledging and silencing alarms, routing and setting priorities, viewing and responding e-mailed and paged alarms.



PART 2 – PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

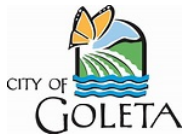
- A. Alerton, Automated Logic, Schneider Electric, Trane, Carrier, or approved equal.

2.02 SYSTEM ARCHITECTURE

- A. The system shall be capable of providing a peer-to-peer network of distributed stand-alone DDC controllers that meet ANSI/ASHRAE Standard 135 for open protocol communications.
- B. A maximum of 32 controllers shall be connected to any one MS/TP bus. Minimum Speed of 38kb and can support 127 devices per COM port. Provide a minimum of 2 ports.
1. Provide a Building Automation System (BAS) that consists of Network Server/Controllers (NSCs), a family of Standalone Digital Control Units (SDCUs), Administration. The BAS shall provide control, **remote** alarm detection, scheduling, reporting and information management for the entire facility, WEB enable capabilities, and Wide Area Network (WAN).
 2. The system shall be a top-level 100/1000bT Ethernet network that utilizes BACnet/IP, LonWorks IP, and/or Modbus TCP protocol.
 - a. A sub-network of SDCUs using the BACnet MS/TP protocol shall connect the local, and stand-alone controllers with Ethernet-level Network Server Controllers/IP Routers.
- C. Only systems that use HTML 5 structured language are allowed.
- D. The supplied computer software shall employ object-oriented technology (OOT) for representation of data and control devices within the system. For each global, system or unitary controller, provide a PICS document showing the installed device's compliance level. Minimum compliance is Level 3 with the ability to support data read and write functionality.
- E. Maximum acceptable response time from any alarm occurrence (at the point of origin) to the point of annunciation shall not exceed three seconds for network connected controllers or user interfaces.
1. For each system point, alarms can be created based on high/low limits or in comparison to other point values.
 2. There is no limit to the number of alarms that can be created or stored in system hardware for any point, up to the system capacity.
 3. System shall generate configured alarms from single or multiple system conditions.
 4. Alarms will be generated from an evaluation of the alarm condition, and presented to the user in a fully configurable order, by priority, time, and category,
 - a. Alarm views shall be presented to the user upon logging into the system WorkStation and/or Webstation.



5. Program the alarm management system to create and report alarm events history; the alarm events history data base shall provide the option to select alarm cause and action notes associated with an alarm event. The alarm management system shall also generate checklists for operators' use when utilizing a suggested mode of troubleshooting.
 6. Provide alarm event history for a feature use to permit assigning of events for resolution to OWNER staff. The system shall notify the user and assigned resolution personnel.
 7. Alarms shall be capable of being routed to any BACnet workstation that conforms to the B-OWS device profile and uses the BACnet/IP protocol.
- F. The system shall be able to interface with subsystems that utilize ANSI/CEA-709.1: Control Network Protocol Specification.
- G. EMS SERVER Provide a Web Server to automatically convert system displays on the workstation to an Internet page. Internet page shall be readable from standard PC browsers. Acceptable browsers shall be latest version of Chrome or Firefox. No additional plug-ins, programs, software, hardware, etc. shall be needed to access the Internet page. The server shall be a separate device to provide security protection for the building system from outside hackers.
- a. Coordinate individual system components IP addresses, switch port assignments, security settings such as but not limited to SNMP alarm delivery, HTTPS/SSL settings, VLAN assignment and authorized IP address ranges with the OWNER's Information Technology Division. Coordination activities with ITD shall be executed through the OAR.
 - b. Provide IP address label on the interior of each cabinet door or equipment.
 - c. The system shall support the ability to notify the Train Depot or OWNER designated personnel by SMS or Email messages, utilizing the OWNER's mail server when problems or situations that require immediate attention arise.
2. Operator Workstation shall display data associated with the project as called out on drawings or object type list supplied. Graphic files shall be created using digital, full color photographs of system installation, AutoCAD or Visio drawing files of field installation drawings and wiring diagrams from as-built drawings. Operator's workstation shall display data using three-dimensional graphic representations of mechanical equipment. System shall be capable of displaying graphic files, text, trend data and dynamic object data together on each display screen with animation of equipment operation.
 3. Controllers shall be programmed using graphical software tools that allow connection of function blocks for visual sequencing of control logic. Function blocks shall display real time data and be animated to show status of data inputs and outputs when in real time operation. Animation shall also show change of status on logic devices and countdown of timer devices in a graphical format.



4. Operator Tracking Log shall record operator changes to the system for future review. This shall include, but not be limited to setpoint changes, time schedule overrides, alarm limits, etc.
5. The system shall be equipped with a battery back-up source capable of providing 30 minutes of operation (computer and monitor) in the absence of normal power, to allow for an orderly shutdown and data back-up.

2.03 GLOBAL CONTROLLER

- A. Building controllers shall incorporate the functions of a 3-way BACnet router. Controller shall route BACnet messages between the high-speed LAN (Ethernet 100MHz), master slave token passing (MS/TP) LANs, a point-to-point (PTP/RS-232) connection and telephone modem.
- B. Provide global control strategies for the system based on information from any point objects in the system. Programming shall be object-oriented using graphical control function blocks. Global strategies shall include, but not limited to unit scheduling, electrical demand limiting, optimized start-stop of equipment, central plan reset control, etc.
- C. Battery shall retain static RAM memory and real-time clock functions for a minimum of 1.5 years (cumulative). Battery shall provide up to five minutes of powerless operation for orderly shutdown and data backup.
- D. Alarms may be generated within the system for any object change of value or state either real or calculated. This includes events such as analog object value changes, binary object state changes and various controller communication failures. Each alarm may be automatically dialed out to a telephone pager or emailed to any Internet PC computer.
- E. Provide a UPS with battery back-up capability to provide a minimum of 30 minutes of operation (computer and monitor) for orderly shutdown and data backup. Make connections and test the system for proper operation in the presence of the Project Inspector.
- F. The global controller shall be equipped with ADR demand limiting capacity interface.
 1. The system shall include 5 DI for interfacing to local utility ADR program. The 5 DI shall be located in a 24 X 24 X 6 NEMA 12 cabinet mounted in the MDF or IDF room. Upon closer of each DI the control system shall raise or lower (depend on system mode) global room temperature set point 1 degree (user adjustable).
 2. The system shall also include a demand-limiting program that utilizes data from site utility meter. Features indicated below shall be available via a switchable graphical user interface in all operating stations:
 - a. Shed/Restore equipment in digital format shall include 5 data input points for interface to future ADR web appliance located in an MDF/IDF room. System server shall accept ADR command from utility service via web interface, and shall include at least 5 priority



levels of equipment shedding. Load shedding on a given priority level shall include two methods. In one the loads shall be shed and restored in a “first-off/first-on” mode and in the other; the loads shall be shed/restored in a linear fashion.

- b. Adjust operator selected control setpoints in analog format based on energy usage when compared to shed and restore settings.
- c. Shedding may be implemented independently on each and every zone or piece of equipment connected to the system.
- d. Status of every load shed shall be capable of being displayed on every operator terminal connected to the system. Statuses shall be displayed along with the English description of each load.

2.04 APPLICATION (system and unitary) DDC CONTROLLERS.

- A. Application controllers shall include universal inputs with 10-bit resolution that accept 3K and 10K thermistors, 0 to 10VDC, 0 to 5 VDC, 4 to 20 mA and dry contact signals. Any input on a controller may be either analog or digital with a minimum of three inputs that accept pulses. Controller shall include support and modifiable programming for interface to intelligent room sensor with digital display, and set point adjustment and override button. Controller shall include binary and analog outputs on board. Analog outputs shall be switch selectable as either 0–10VDC or 0–20mA. Software shall include scaling features for analog outputs. Application controller shall include a supply voltage to power external sensors.
- B. Program sequences shall be stored in EEPROM or flash memory. No batteries shall be needed to retain logic program. Controller shall execute program sequences 10 times per second and be capable of multiple PID loops for control of multiple devices. Calculations shall be completed using floating-point math. Programming of application controller shall be completely modifiable in the field over the installed BACnet LANs or remotely via modem interface.
- C. CONTRACTOR shall provide a laminated wiring diagram for each control panel. Locate diagrams on interior side of control panel’s doors.

2.05 TEMPERATURE SENSORS

- A. Temperature sensors shall be 10K ohm thermistor factory-calibrated to within 0.5 degrees F, totally interchangeable with housings appropriate for the application.
- B. Wall sensors shall be installed 48 inches above finished floor. Duct sensors to be installed such that the sensing element is in the main air stream. Immersion sensors to be installed in wells filled with thermal compound. Outside air sensors shall be installed away from exhaust or relief vents, not in an outside air intake and in a location that is in the shade most of the day.
- C. Intelligent room sensors shall be equipped with digital display, set point adjustment and override button. Smart room temperature sensor/thermostat shall incorporate PIR motion sensor, temperature display, set point adjustment and override button.



Acceptable Manufacturers: Schneider Electric SE8600 series, Viconics VT8600 series, Sigler 8600 series or equal.

- D. Room thermostat shall be BACnet capable, Acceptable manufacturers: Schneider Electric SE8600 series, Viconics VT8600 series, Sigler VT8600 series or equal.

2.06 PRESSURE SENSORS

- A. Differential and pressure sensors shall have a tensioned stainless steel diaphragm to form a variable capacitor that produces a linear output with an accuracy of 1.0 percent of full scale. The unit shall be able to withstand 10 PSIG over pressurization.
- B. Differential pressure switches shall utilize a diaphragm operated snap-acting switch with a setpoint range of 0.05 to 2.0 inches WC.

2.07 DEMAND CONTROL VENTILATION (DCV) CARBON DIOXIDE (CO₂) SENSORS

- A. Sensors shall be wall mounted at a height of approximately 4 feet. Locate sensors adjacent to room thermostat.
- B. Sensors shall be furnished with a display window that provides continuous monitoring and sensor status readings, and with tamperproof cover.
- C. Sensors shall be gold plated for long-calibration stability, be factory calibrated and certified for a minimum of five years.
- D. Carbon dioxide concentration levels shall be sensed by non-dispersive infrared technology. A corrosion-free sensing chamber shall be used for accurate, stable CO₂ sensing. An LCD shall display sensed CO₂ concentration.
- E. Sensor shall be gold plated and have a range of 0-2000 PPM at +/- 5 percent accuracy for long-term calibration stability. Both analog and binary relay output circuits shall be available on the sensor. An automatic background calibration algorithm shall reduce required maintenance.
- F. Acceptable Manufacturers: Telaire, Honeywell, Johnson Controls, or equal.

2.08 DAMPER ACTUATORS

- A. Electric damper actuators shall be direct shaft mounted and use a V-bolt and toothed V-clamp. The actuator mounting arrangement and spring return feature shall permit normally open or normally closed positions of the damper as required.
- B. Actuators shall be sized for 200 percent of the design torque requirements.
- C. Damper actuators shall incorporate a release mechanism to manually position the damper for maintenance or emergency override.
- D. Damper actuators located outdoors shall have a clear plastic weather shield specifically designed for the application.
- E. Damper motor control shall be with 2-10 VDC
- F. Acceptable Manufacturers: Belimo, Honeywell, Johnson Controls, Schneider Electric, or equal.



2.09 CURRENT SWITCH

- A. Current sensing switch shall be self-powered with solid-state circuitry and a dry contact output. A multi-turn setpoint adjustment shall set the trip point status. An LED shall indicate the on or off status.

2.10 CONTROL RELAY

- A. The relay shall be contained in a plenum rated NEMA 12 enclosure with a ¾” NPT conduit fitting. Coil voltage shall be 24 or 120 VAC with a contact rating of 10A. An LED on the enclosure cover shall indicate the relay is energized.

2.11 POWER SUPPLIES

- A. Power supplies and panel assemblies shall be UL or NRTL listed.
- B. Control subcontractor shall be responsible for providing an operational powered system. This means from the control system power supply providing the control power wiring and conduit and connecting to the electrical panelboard.

2.12 ENCLOSURES

- C. Controllers, power supplies and relays shall be mounted in Hoffman A-LP NEMA 12 enclosures or equal when located in an indoor environment.
- D. Enclosures for outdoor applications shall be metal NEMA 4, Hoffman A-ALP, A-BLP or equal, and be mounted on the north exposure of the controlled unit.
- E. Enclosures shall have hinged, locking doors with common keying (CAT-60) for control panel on the Project Site.
- F. Enclosures shall have permanently affixed to the door an engraved nametag identifying the equipment served. The nametag shall be a minimum 1 inch by 3-inch with ½ inch lettering.

PART 3 – EXECUTION

3.01 CONTROLS INSTALLATION

- A. Wiring methods for control system shall be as defined in the Division 26 specifications. Wire types shall conform to manufacturers’ recommendations.
- B. Mount control panels adjacent to associated equipment on vibration-free walls or freestanding angle iron supports. One cabinet may accommodate more than one system in same equipment room. Control panel assemblies must be UL listed.
- C. Provide software and hardware required to provide controls and monitoring of diagnostic points indicated in specification Section 23 8000.
- D. Coordinate with Division 26 electrical installer so that "Hand/Off/Auto" selector switches are installed to override automatic interlock controls when switch is in the "Hand" position. Safety shutdown interlock wiring shall disable the equipment regardless of the position of the H-O-A switch.



3.02 ROOM SENSORS INSTALLATION

- A. Room sensors shall be wall mounted at a 48-inch height above finished floor. Room sensors are not permitted on outside walls, between shelving, in recesses or above heat producing equipment. Coordinate with Division 26 for sensor or thermostat mounting adjacent to light switches.

3.03 COORDINATION

- A. Coordinate the work with other aspects of mechanical, electrical, fire-life safety and security systems, controls, and photo voltaic systems to obtain a complete and operating system in accordance with the contract documents.
- B. Meet with the OAR and school principal and other school staff to determine when each zone or building will be occupied, and to determine programming and scheduling of the heating, ventilating and air conditioning equipment.
- C. CONTRACTOR shall contact Goleta Train Depot facility personnel to coordinate for timely availability of VPN access point(s) from OWNER's Information Technology Division.

3.04 CONTROL SYSTEM ADJUSTMENTS

- A. Make adjustments under operating conditions to provide sequence of operation for each control system per design intent. If required operating conditions cannot be obtained prior to completion date of the contract due to outdoor seasonal temperatures, return to the job site when requested by the OWNER and re-adjust control system when outdoor temperatures will permit proper operating conditions. Start re-adjustment within seven calendar days after notification.

3.05 PERFORMANCE AND ACCEPTANCE:

- A. Test and calibrate each device including but not limited to the following for proper operation, connection, signal value or response.
 - 1. Building Controllers.
 - 2. Custom Application Controllers.
 - 3. Application Specific Controllers.
 - 4. Input / Output Devices. (Sensors, actuators and monitoring devices)
 - 5. Operator Interfaces.
- B. Verify that systems are standalone and operable upon network failure.
- C. Verify that systems return to normal operation automatically upon resumption of network operation or return of power.
- D. Test each system for functions of the required control sequence of operation either by normal control operation or forced operation as required. Log and submit results.
- E. Test the network for connectivity, data transmission rates, input/output responses, and other appropriate parameters Failure modes, including network failure, individual control system failure, and power outages, shall be simulated and responses logged, with any effects on network operation noted and corrected.



- F. Test each preprogrammed time and holiday schedule.
- G. Commissioning requirements of Divisions 01, 23, and 26 apply to this Section.

3.06 WIRING AND INFRASTRUCTURE

- A. Provide necessary wiring, terminations, connections and conduit infrastructure for the complete system as indicated in the construction documents.
- B. Exterior cables whether above or below ground level shall be rated for exterior applications. When entering a building provide a code sized pull box with necessary hardware to transition exterior rated cables to interior applications.
- C. Provide both labeling and record documentation for all EMS system cabling. A cable management schedule and diagram shall be provided at each system panel or cabinet, in addition to a complete cabling diagram to be provided at the head end equipment location.
 - 1. The cable management spread file shall include the following:
 - a. Cable Schedule.
 - b. Cable Test Forms.
 - c. Cable Label sequence and nomenclature.
 - d. Network chart.
 - 2. Cable numbering shall be based on a defined format which readily identifies cable type, and allows maintenance technicians to determine originating and terminating locations.
 - 3. Present the data in an Excel spreadsheet that will operate on the latest Windows platform. Information shall be presented in paper and electronic formats.
 - 4. A copy of the cable schedule in a transparent plastic sleeve shall be affixed in the interior side of the front door of each network cabinet or cables convergence hub points.

3.07 DATA LOGGING REQUIREMENTS

- A. The system must be capable of storing the system's collected and diagnosis data for a minimum of seven days.
- B. Program the system for a standard seven day schedule including holidays.

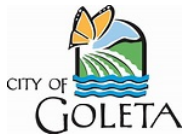
3.08 CLEANUP

- A. Remove rubbish, debris and waste materials and legally dispose of off Project Site.

3.09 PROTECTION

- A. Protect Work of this Section until Substantial Completion.

END OF SECTION



SECTION 23 05 93

TESTING, ADJUSTING, AND BALANCING FOR HVAC

PART 1 – GENERAL

1.01 SUMMARY

A. SECTION INCLUDES

1. This Section specifies the requirements for test and balance of HVAC systems.

B. RELATED REQUIREMENTS

1. Section 01 11 00: Summary of Work.
2. Section 01 31 13: Project Coordination.
3. Section 01 32 13: Construction Schedule.
4. Section 01 33 00: Submittal Procedures.
5. Section 01 77 00: Contract Closeout.
6. Section 23 05 00: Common Work Results for HVAC.
7. Section 23 05 13: Basic HVAC Materials and Methods.
8. Section 23 05 48: HVAC Sound, Vibration and Seismic Control.
9. Section 23 09 00: HVAC Instrumentation and Controls.
10. Section 23 3 000: Air Distribution.
11. Section 23 80 00: Heating, Ventilating and Air Conditioning Equipment.

PART 2 – PRODUCTS (Not used)

PART 3 – EXECUTION

3.01 DEFINITIONS AND APPLICABLE PUBLICATIONS

- ###### A. For the purposes of this Section definitions are as indicated in applicable publications of AABC, NEBB, TABB, ASHRAE, ANSI and SMACNA.

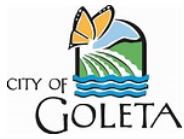
1. TAB: Testing, Adjusting and Balancing.
2. TABB: Testing, Adjusting and Balancing Bureau.
3. AABC: Associated Air Balance Council.
4. NEBB: National Environmental Balancing Bureau.
5. ASHRAE: American Society of Heating, Refrigerating and Air-Conditioning Engineers.
6. ANSI: American National Standards Institute.



7. SMACNA: Sheet Metal and Air Conditioning Contractors' National Association.
8. OAR: OWNER'S Authorized Representative

3.02 QUALITY ASSURANCE

- A. The General Contractor shall contract directly with the test and balance agency. Tests performed by testing agencies contracted with the system's subcontractor will not be accepted. The qualifications of the agency shall comply with Article 3.02, Quality Assurance. The agency shall be responsible for furnishing labor, instruments, and tools required to test, adjust, and balance the heating, ventilating, and air conditioning (HVAC) systems and related plumbing systems, as described and/or as indicated in the Contract Documents.
- B. CONTRACTOR shall obtain services of an independent, qualified testing agency acceptable to Architect to perform testing and balancing Work as specified and as follows:
 1. Agency shall be currently certified by either the Associated Air Balance Council (AABC), the National Environmental Balancing Bureau (NEBB), or the Testing, Adjusting and Balancing Bureau (TABB). NEBB or TABB certification shall be for Air and Hydronic Testing, Adjusting and Balancing and Sound and Vibration Measurement.
 2. Work shall be in accordance with the latest edition of the AABC, NEBB, or TABB National Standards. Where the requirements of the two standards are different, the more stringent requirements shall prevail. Also, if the Contract Documents impose a more stringent standard, then the Contract Documents shall prevail.
- C. Performance Criteria: Work of this Section shall be performed in accordance with approved Testing, Adjusting, and Balancing agenda.
- D. Test Equipment Criteria: Basic instrumentation requirements and accuracy/calibration required by Section Two of the AABC, Section II of the NEBB, or TABB Procedural Standards for Testing, Adjusting and Balancing of Environmental Systems.
- E. Verification: The Test and Balance Agency shall recheck 10 percent (minimum 10) of the measurements listed in the report. The locations shall be selected by PROJECT INSPECTOR or OAR. The recheck will be witnessed by PROJECT INSPECTOR or OAR. If 20 percent of the measurements that are retested differ from the report and are also out of the specified range, an additional 10 percent will be tested. If 20 percent fall outside the specified range, the report will be considered invalid and all test and balance work shall be repeated.
- F. Due to more stringent acoustical requirements in the educational environment, the Test and Balance Agency shall recheck the air systems where the sound level is higher than the specified requirements and demonstrate compliance with the methodology specified in this document with emphasis on fan speed adjustment and balancing for optimum acoustical performance. The recheck will be witnessed by PROJECT



INSPECTOR or OAR. When there are multiple air systems, a system selected by PROJECT INSPECTOR or OAR shall be rechecked. If this system is found to be not in compliance, a second system shall be checked. If the second system if also found to be not in compliance, the report will be considered invalid, and all test and balance work shall be repeated.

3.03 SUBMITTALS

- A. Submit name of agency to perform the Work. Include in the submittal the certified qualifications of all persons responsible for supervising and performing actual Work of this Section. Agency shall submit a minimum of five commercial or industrial HVAC system TAB projects of similar type, size, and degree of difficulty completed within the last two years. Agency shall provide name and telephone number of contact person for each listed project.
- B. Submit, for approval, 6 copies of the Agenda as indicated in Article 3.06 to test and balance all mechanical and relevant plumbing systems.
- C. Preliminary Report: Review the Contract Documents, examine Work installations and submit a written report to ARCHITECT, PROJECT INSPECTOR and OAR indicating deficiencies in Work precluding proper testing and balancing of the Work.
- D. Final TAB Report: Submit the final TAB report for review by ARCHITECT, PROJECT INSPECTOR, and OAR outlining the conditions and Work completed on each HVAC system. All outlets, devices, HVAC equipment, etc. shall be identified, along with a numbering system corresponding to report unit identification.
- E. Submit an AABC “National Project Performance Guaranty” or “NEBB Quality Assurance Certification”, assuring the Project systems were tested, adjusted, and balanced in accordance with the Specifications and AABC, NEBB, or TABB National Standards.
- F. CAD PDF drawings: Submit single line, multi-color CAD drawings indicating outside return and supply air, volume control boxes, each outlet and inlet, room numbers, duct sizes at traverse locations, temperatures and pressures, systems balanced, components changed, and CONTRACTOR installed access points. In addition, drawings shall identify controls, equipment settings, including manual damper quadrant positions, manual valve indicators, fan speed control levers, and similar controls, and devices shall be marked on the drawings to show final settings. CAD files shall be submitted on CD-ROM upon final submittal of TAB report. Reports shall identify discrepancies between completed Work and the Contract Documents affecting the performance and longevity of the system.

3.04 GENERAL SCOPE OF WORK

- A. The general scope of Work shall include but not be limited to the following:
 - 1. Measure airflow rates of HVAC systems and make adjustments to achieve design airflow rates, tabulate results, and submit reports.



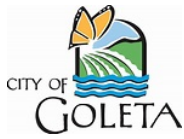
2. Measure flow velocities, temperatures, static pressures or head, rotational speed, and electrical power demand of fans, pumps, and other related HVAC system components, tabulate results, and submit reports.
3. Measure sound levels in each conditioned space, tabulate results, and submit reports.
4. Measure ambient sound levels of outdoor HVAC units and system components such as chillers and cooling towers, tabulate results, and submit reports.
5. Reports shall contain sufficient data for the system designer to evaluate system performance and solve installation problems such as system pressure profiles and pressure drops across system components

3.05 SPECIFIC SCOPE OF WORK

- A. The specific scope of Work shall include the following HVAC system components as indicated on the Drawings:
 1. Air conditioning units and their supply, return, relief and exhaust fans.
 3. Outside Air and Return Air Plenums.
 4. Outside Air Intakes.
 5. All Supply, Return and Exhaust Ductwork.
 6. All associated Air Terminal Devices, i.e. Supply Diffusers, Return Registers, etc.

3.06 TESTING, ADJUSTING, AND BALANCING AGENDA

- A. Provide proposed materials, methods, procedures, forms, diagrams, and reports for test and balance Work.
- B. Agenda to be completed by the test and balance agency and submitted to ARCHITECT, PROJECT INSPECTOR, and OAR for review and approval.
- C. Agenda shall include one complete set of AABC, NEBB, or TABB publications listed in Sub-paragraph 3.02.B.2, applicable publications, or, in case of other test and balance agencies and or organizations, comparable publications to establish an approved, systematic, and uniform set of procedures.
- D. Agenda shall also include the following detailed narrative procedures, system diagrams, and forms for test results:
 1. Specific standard procedures required and proposed for each system of the Work.
 2. Specified test forms for recording each procedure and for recording sound and vibration measurements.
 3. Systems diagrams for each air, water, and steam system. Diagrams may be single line.
- E. In addition to information recorded for standard AABC, NEBB, or TABB procedures, the following information is required:



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1. Fan data.
 2. System number, location, manufacturer, model, and serial number.
 3. Fan wheel type and size.
 4. Motor horse power, type, and rpm.
 5. Sheave size, type, number of grooves, and open turns on Variable Pitch Sheave.
 6. Number and size of belts, motor and fan shaft sizes, center-to-center of shafts in inches, and adjustment available motor data, including nameplate data, actual amps, rated, and actual motor rpm, volts, phase, hp, kW, starter heater size, and capacity.
 7. Fan design airflow and service (supply, return, outdoor air or exhaust).
 8. Fan static pressure, suction/discharge, static profile, and static control point.
- F. The following traverse data is required:
1. Traverse location, size of duct (inside dimensions), and area of duct in square feet.
 2. Column for each hole traversed/lines for each reading.
 3. Barometric pressure.
 4. Temperature/Static pressure in the duct.
 5. Actual CFM corrected to SCFM.
 6. Notes.
- G. The following air distribution data is required:
1. Room identification.
 2. Outlet or intake balance sequence number.
 3. Size of outlet or inlet.
 4. AK Factor.
 5. Design and Actual FPM and CFM.
 6. Notes.

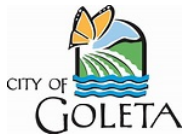


3.07 PROCEDURES

- A. Schedule the Work of this Section in order for test and balance activities to be completed prior to the date of Substantial Completion. CONTRACTOR shall place all heating, ventilating, and air conditioning equipment into operation during each day and until all HVAC adjusting, balancing, testing, demonstrations, and instructions on systems are completed. Agency shall prepare and submit reports within ten (10) days from completion of the Work of this Section to allow sufficient time for corrective measures to be completed before Substantial Completion of the Work. When an individual building or portion thereof is ready for occupancy, all equipment relative to such portion of Work shall be put into service, tested, and balanced.
- B. Prior to the date of Substantial Completion, and upon completion of test and balance Work, place all exhaust fans in operation, force all air handling units, and air conditioning units into a 100 percent outdoor air economizer mode with heating and cooling locked out and flush the building continuously for a period of fourteen (14) days.
- C. Coordinate test and balance procedures with any phased Project requirements so test and balance procedures on each phased portion of the Work will be completed prior to completion of said designated phase.

3.08 FIELD EXAMINATION

- A. Before the commencement of test and balance Work, CONTRACTOR shall ascertain that following conditions are fulfilled:
 - 1. Refrigerant systems are fully charged with specified refrigerant.
 - 2. Over-voltage and current protection have been provided for motors.
 - 3. Equipment has been labeled as required.
 - 4. Curves and descriptive data on each piece of equipment to be tested and adjusted are available as required.
 - 5. Operations and maintenance manuals have been supplied.
 - 6. Controls manufacturer and boiler-burner representatives shall be available for consultation and supervision of adjustments during tests.
 - 7. Verify that heating and cooling coil fins are cleaned, combed and air filters clean, and installed.
 - 8. Verify that duct systems are clean of debris and leakage is minimized, access doors are closed and duct end caps are in place, and fire and volume dampers are in place and open.
 - 9. Automatic control systems are completed and operating.
 - 10. Start up and initial commissioning of all HVAC equipment except fans shall be by the manufacturer.
- B. In addition to the above, CONTRACTOR shall establish a specific, coordinated plan which details how each area of existing building will be balanced during the various



phases of the Work. The evaluation shall address, at a minimum, the following concerns:

1. OWNER operations.
2. Building safety and security policies. Prior to any fire safety or security systems shutdown at any time during the Work, CONTRACTOR shall first advise and coordinate with OWNER to ensure all concerned parties are notified.
3. Protecting fixtures and equipment.
4. Concerns specific and unique to building related issues.
5. Downtime required for each Air Handling Unit including projected time to return each portion of the building back to its normal occupancy temperature and humidity.
6. Shutdown and reactivation of the fire alarm system to avoid accidental alarms during test and balance and related Work.

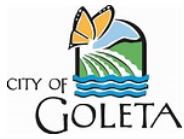
3.09 TEST AND BALANCE

A. For each heating, ventilating, or air conditioning system the following shall be performed, recorded, and submitted in an approved format for review. Make, type, and model of unit, and location of each piece of equipment shall be included in the report. Readings shall include but not be limited to following:

1. Air Systems:
 - a. General
 - 1) Verify all ductwork, dampers, grilles, registers, and diffusers have been installed per design and set in the full open position. Agency shall perform the following TAB procedures in accordance with AABC or NEBB National Standards. Where the requirements of the two standards are different, the more stringent requirements shall prevail. Also, if the Contract Documents impose a more stringent standard then the Contract Documents shall prevail.
 - b. Zone, Branch, and Main Ducts:
 - 1) Adjust ducts to within design CFM requirements by means of Pitot-tube duct traverse.
 - c. Supply Fans:
 - 1) Fan Speeds: Test and adjust fan RPM to achieve maximum or design CFM. CONTRACTOR shall provide new belt pulleys when required.
 - 2) Current and Voltage: Test and record motor voltage and amperage, and compare data with the nameplate limits. Ensure



- fan motor is not in or above the service factor as published by the motor manufacturer.
- 3) Pitot-Tube Traverse: Perform a Pitot-tube traverse of main supply and return ducts, record total CFM.
 - 4) Outside Air: Test and adjust the outside air using Pitot-tube traverse.
 - 5) Static Pressure: Test and record system static profile of each supply fan.
 - 6) Current and Voltage: Test and record motor voltage and amperage, and compare data with the nameplate limits. Ensure fan motor is not in or above the service factor as published by the motor manufacturer.
- d. Return, Relief, and Exhaust Fans:
- 1) Fan Speeds: Test and adjust fan RPM to achieve maximum or design CFM. CONTRACTOR shall provide new belt pulleys where required.
 - 2) Pitot-Tube Traverse: Perform a Pitot-tube traverse of the main return ducts to obtain total CFM.
 3. Static Pressure: Test and record system static profile of each fan.
- e. Diffusers, Registers and Grilles:
- 1) Tolerances: Test and balance each diffuser, grille, and register to within 5 percent of design requirements.
 - 2) Identification: Identify the type, location, and size of each grille, diffuser, and register. This information shall be recorded on air outlet data sheets.
- g. Coils: Air Temperature: Once airflow is set to acceptable limits, agency shall take wet bulb and dry bulb air temperatures on the entering and leaving side of each cooling coil. Dry-bulb temperature shall be taken on the entering and leaving side of each heating coil.
- h. Duct Leakage Testing:
- 1) Every section of the entire air distribution system (all supply, return, exhaust, and relief ductwork) shall be tested at 1.5 times design static pressure, unless the duct sealant is complete per SMACNA Seal Class A completely airtight, and then no duct pressure test is required. All ducts shall demonstrate 1 percent leakage maximum (per CBC).
- i. Air Conditioning Units:



- 1) Prepare pressure profile and show design and actual CFM (outside air, return air, and supply air).
 - 2) Measure and record each mode (minimum OA and 100 percent OA) where economizer cycle is specified.
 - 3) Record pressure drops of all components (coils, filters, sound attenuators, louvers, dampers, and fans) and compare with design values.
 - 4) Pressure profile and component pressure drops are performance indicators and are not to be used for flow measurements.
- j. System Pressure Profiles:
- 1) Prepare pressure profiles from fan (supply, return, and exhaust) or air handling unit to extremities of system.
 - 2) As a minimum, show pressure at each floor, main branch, and airflow measuring device.
 - 3) Make pitot-tube traverses of all trunk lines and major branch lines where required for analysis of distribution system. Airflow measuring devices installed in ductwork, if available, may be utilized.
 - 4) Record residual pressures at inlets of volume controlled terminals at ends of system.
 - 5) Show actual pressures at all static pressure control points utilized for constant or variable flow systems.
- k. Fan speed adjustments and balancing for optimum acoustical performance:
- 1) As the very first step, the speed of all fans (supply, return, and exhaust inside packaged equipment or air handling units) shall be adjusted to deliver the required fan total air quantity with all volume dampers and other flow rate control devices fully open. Adjustments shall be made with the outdoor air intake dampers, return air dampers, and relief air dampers in the minimum outdoor air position. The adjustments shall be made again in the 100 percent outdoor air position in systems with 100 percent outdoor air economizers.
 - 2) The above adjustment shall be done with wet cooling coils, where cooling coils are provided.
 - 3) The airflow rates at each branch duct shall be adjusted as the second step with air with all volume dampers and other flow rate control devices fully open.
 - 4) The airflow rates at each air inlet and outlet shall be adjusted as the final step. The volume damper in the branch duct shall be



used for balancing. Opposed blade dampers at air inlets and outlets where provided shall only be used for fine adjustments and shall not be closed beyond 60 percent open or when the dampers start to generate audible noise.

- 5) CONTRACTOR shall provide the labor and materials for all dampers, pulleys, and belt changes required for balancing. The design documents indicate the worst-case scenario with safety factors in fan static pressures for contingency. Properly coordinated and installed air systems may require a lower static pressure and a reduction in fan speed.

3.10 VERIFICATION OF HVAC CONTROLS

- A. Agency shall verify in conjunction with CONTRACTOR all control components are installed in accordance with the intent of the Contract Documents and are functioning according to the design intent, including all electrical interlocks, damper sequences, air and water resets, fire stats, and other safety devices.
- B. CONTRACTOR shall verify all control components are calibrated and set for design operating conditions and intent.

3.11 TEMPERATURE TESTING

- A. To verify system control and operation, agency shall perform a series of three temperature tests taken at approximately two hour intervals in each separately controlled zone. The resulting temperatures shall not vary more than two degrees Fahrenheit from the thermostat or control set point during the tests. Outside temperature and humidity shall also be recorded during the testing periods.

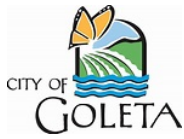
3.12 BUILDING/ZONE PRESSURIZATION

- A. Agency shall test and adjust building/zone pressurization by setting the design flows to meet the required flow direction and pressure differentials. Positive/Negative area(s) supply air shall be set to design flow and exhaust air rates adjusted to obtain the required pressure differential(s).

3.13 FINAL TABULATION

- A. After heating, ventilating, and air conditioning components are satisfactorily tested and balanced, entire system shall be put into operation and all pressures, temperatures, gpm, cfm, velocities, etc., shall be recorded and checked against design schedules. Design requirements shall be listed on reports and final tabulation shall be within a tolerance of plus or minus five percent of design requirements.
- B. Readings at various locations as described herein will be made every hour for four (4) hours, during normal working hours for three (3) days. Boilers, forced air furnaces, and chillers shall be started up far enough in advance to meet design conditions during period of testing.

3.14 VIBRATION TESTING



- A. Furnish instruments and perform vibration measurements if specified in Division 23. Provide measurements for all rotating HVAC equipment half horsepower and larger, including reciprocating/centrifugal/screw/scroll compressors, pumps, fans, and motors.
- B. Record initial and final measurements for each unit of equipment on test forms. Where vibration readings exceed allowable tolerance and efforts to make corrections have proved unsuccessful, forward a separate report to ARCHITECT.

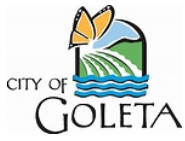
3.15 SOUND TESTING

- A. Perform and record sound measurements as specified in this Section and in Section 23 0548: HVAC Sound, Vibration and Seismic Control. Take additional readings if required by ARCHITECT.
- B. Measuring equipment and methods shall comply with the current requirements of the AABC, NEBB, TABB and ANSI S12.60. Take measurements with a calibrated Type 1 sound level meter and octave band analyzer.
- C. Sound reference levels, formulae, and coefficients shall be according to ASHRAE Handbook: HVAC Applications, Chapter on Sound and Vibration Control.
- D. Where sound pressure levels are specified as noise criteria or room criteria in Section 23 0548: HVAC Sound, Vibration and Seismic Control determine compliance with the Contract Documents as follows:

- 1. Reduce background noise as much as possible by shutting off unrelated audible equipment.
- 2. Measure octave band sound pressure levels with specified equipment "off".
- 3. Measure octave band sound pressure levels with specified equipment "on".
- 4. Use difference in corresponding readings to determine sound pressure due to equipment. Sound pressure level, due to equipment equals sound pressure level with equipment "on" minus factor.

DIFF.:	0	1	2	3	4	5	9-10 or More
FACTOR:	10	7	4	3	2	1	0

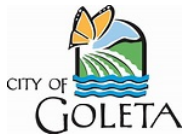
- 5. Plot octave bands of sound pressure level due to equipment for typical rooms, on a graph, which also shows, noise criteria (NC) curves.
- E. Where sound levels are required in dbA, measure sound levels using the A-frequency-weighting of meter. Single value readings will be used instead of octave band analysis.
- F. Measure sound levels at each octave band as NC or RC (room criteria) if indicated in the Drawings or other Spec Sections. Where measured sound levels exceed specified level, CONTRACTOR shall take all remedial action and necessary sound tests shall be repeated. Sound tests after remedial action shall be in octave band in NC or RC for the room and also at each diffuser, grille, or register in occupied areas. Sound levels shall be measured approximately five feet above floor on a line approximately 45 degrees to center of opening, on the A- and C-frequency-weighting of the measuring instrument.
- G. Measure and record sound levels in decibels for each room per current ANSI S12.60.



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- H. Report shall include ambient sound levels, taken without air-handling equipment operating, of rooms in which above openings are located. A report shall also be made of any noise caused by mechanical vibration.

END OF SECTION



SECTION 23 30 00

HVAC AIR DISTRIBUTION

PART 1 – GENERAL

1.01 SUMMARY

- A. Section Includes: Ductwork and appurtenances required for a complete air distribution system for the heating, ventilating, and air conditioning systems indicated on Drawings and as specified.
- B. Related Requirements:
 - 1. Division 01: General Requirements.
 - 2. Section 23 05 00: Common Work Results for HVAC.
 - 3. Section 23 08 00: HVAC Systems Commissioning.
 - 4. Section 23 05 13: Basic HVAC Materials and Methods.
 - 5. Section 23 07 00: HVAC Insulation.
 - 6. Section 23 09 00: HVAC Controls.
 - 7. Section 23 80 00: Heating, Ventilating and Air Conditioning Equipment.

1.02 SUBMITTALS

- A. Provide in accordance with Division 01 and Section 23 05 00: Common Work Results for HVAC.
- B. Manufacturer's Data:
 - 1. Complete list of items to be furnished and installed under this Section. Material lists that do not require performance data shall include manufacturer names, types and model numbers.
 - 2. Manufacturer's specifications and other data required to demonstrate compliance with specified requirements.
 - 3. Literature shall include descriptions of equipment, types, models, sizes, capacity tables or curves marked to indicate performance characteristics, electrical requirements, options selected, space requirements, including allowances for servicing, and other data. Data shall include name and address of nearest service and maintenance organization that regularly stocks repair parts. Listings of items that function as parts of an integrated system shall be furnished at one time.
 - 4. Submit complete acoustical test reports showing that proposed products have been tested in accordance with latest editions of relevant ASHRAE and AHRI Standards (ANSI/ASHRAE Standard 70 for air inlets and outlets; ANSI/ASHRAE Standard 130 and AHRI 880 for terminal units) and will be suitable for operation in Project spaces with specified maximum noise criteria



(NC) requirements. The results of all testing shall be certified by an independent testing agency and submitted to the ARCHITECT for approval. The submittal shall include a complete description of the test conditions, methods and procedures.

5. Submittals shall include a tabulation of proposed products, identification of Project spaces where proposed products are to be installed, maximum allowable NC for all Project spaces, and product NC (at specific design air volume) for all Project spaces.
6. Shop Drawings: Shop Drawings indicating methods of installation of equipment and materials, sizes and gages of ducts, and details of supports. Items to be covered shall include but not be limited to following:
 - a. Layout of ductwork and equipment drawn to scale to establish that equipment will fit into allotted spaces with clearance for installation and maintenance. Indicate proposed details for attachment, anchoring to, and hanging from structural framing of building. Indicate vibration isolation units, foundations, supports, and openings for passage of pipes and ducts.
 - b. Drawings indicating locations and sizes of sleeves and prepared openings for pipes and ducts.
 - c. Typical details of supports for equipment and ductwork.

1.03 QUALITY ASSURANCE

- A. Installer's and Manufacturer's Qualifications: Comply with provisions stated under Section 23 05 00: Common Work Results for HVAC.
- B. Sound power level measurements and Manufacturers' NC value calculations shall be conducted in complete accordance with the latest version of ANSI/ASHRAE Standards 70 and 130 and AHRI 880.

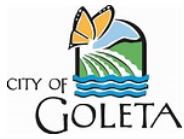
1.04 DELIVERY, STORAGE AND HANDLING

- A. Comply with provisions stated in Section 23 05 00: Common Work Results for HVAC.
- B. Ensure ducts are clean and free of dirt, dust, moisture, oils and other contaminants that can lead to poor air quality. During construction, cover openings of ductwork with a self-adhering protective film. Film shall not leave a residue on metal after removal, and shall be highly resistant to tears and punctures.

PART 2 – PRODUCTS

2.01 GENERAL

- A. Unless otherwise noted, provisions, including amendments thereto, of the latest edition of the HVAC Duct Construction Standards of Sheet Metal and Air Conditioning Contractor's National Association (SMACNA) and the California Mechanical Code (CMC), are hereby made part of this Section.



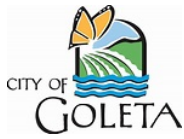
- B. Rectangular, round and flat oval ducts shall be manufactured and installed in accordance with requirements of the latest edition of the HVAC Duct Construction Standards – Metal and Flexible of SMACNA.
- C. Sheet metal ducts shall be fabricated from galvanized steel, aluminum or stainless steel.
- D. Galvanized steel ducts shall be fabricated of galvanized steel sheet, lock forming grade, conforming to ASTM A653 and A924.
- E. Galvanized steel ducts gage thickness and permissible joints and seams of ductwork shall conform to requirements of the latest edition of the HVAC Duct Construction Standards – Metal and Flexible of SMACNA and the CMC unless noted otherwise on the drawings. The more stringent requirements shall prevail.
- F. Button punch snap-lock seams, using Lockformer or equal, shall be permitted only in concealed areas using 20 and 22 gage galvanized steel ducts with screws added at the ends. Button punch snap-lock is not permitted for aluminum or duct lighter than 22 gage.
- G. Ducts shall be reinforced in accordance with the latest edition of the SMACNA HVAC Duct Construction Standards: Cross-broken Duct: Duct sizes 19 inches wide and larger which have more than 10 square feet of unbraced panel shall be beaded or cross-broken. This requirement is applicable to 20 gage or less thickness and 3 inches w.g. or less pressure. For details, refer to SMACNA manual.
- H. Round and Oval Galvanized Steel Ducts:
 - 1. Round Spiral Ducts and Fittings: Fabricated from galvanized sheet steel shall be machine-formed spiral pipe with sealed spiral locking joints. Fittings shall be furnished with continuous corrosion-resistant welds. Provide gages of ducts and fittings recommended by manufacturer.
 - 2. Details of seams and transverse joints for round duct and fittings shall conform to SMACNA standards.
 - 3. Flat oval ducts shall be provided as indicated on the Drawings. Reference standard details in SMACNA manual.
 - 4. Minimum duct wall thickness, and permissible joints and seams of ductwork for flat oval duct construction shall conform to requirements in the latest edition of the HVAC Duct Construction Standards – Metal and Flexible of SMACNA and the CMC. The more stringent requirements shall prevail.
- I. Flexible Ducts
 - 1. Flexible duct shall be non-metallic, insulated for conditioned air supply and return. The flexible ducts shall be factory fabricated with exterior reinforced laminated vapor barrier, 1 ½-inch thick fiber glass insulation (K = 0.25 at 75 degrees F), encapsulated zinc-coated spring steel wire helix and impervious, smooth, non-perforated interior vinyl liner and factory fabricated steel connection collars. For the composite assembly, including insulation and vapor barrier, comply with NFPA Standard 90A or 90B and tested in accordance with



- UL Standard, UL 181. Non-insulated metallic ducts shall be provided for exhaust only.
2. Maximum flexible duct length shall be 5 feet in length.
 3. Methods of installations, standards for joining and attaching, and supporting flexible duct shall conform to applicable provisions of SMACNA manual.
 4. Specifications herein shall not supersede installation requirements by flexible duct manufacturer if those are more stringent.
- J. Fittings and Other Construction Details: Details of fittings such as elbows, turning vanes, branch take-off and connections, duct access doors, connections for grilles, registers and ceiling diffusers, flexible connector at fan, etcetera, shall conform to applicable provisions of this Section or SMACNA manual.
1. Duct Seam and Joint Sealant: Provide SMACNA Seal Class A sealant (sealing with duct sealant all joints and seams) for all metal ducts to be completely airtight. Spiral lock seams in factory fabricated round or oval ducts are excluded. Note that with the incorporation of SMACNA Class A sealant application, the requirement for on-site duct pressure testing will be waived, as the ducts are sealed virtually airtight.
 2. Sealant shall be: Design Polymeric DP1010 or DP1020, Childers CP-145A/CP-146 Chil-Flex, Foster's 32-19 Duct-Fas, Miracle-Kingco Glenkote Seal-Flex, Ductmate Industries PROseal or FIBERseal, or equal.
 3. Sealant materials shall comply with the flame spread and smoke developed rating of current CMC when tested in accordance with ASTM E84.
 4. Sealant for exposed to weather ducts shall pass the Weather Resistance Test per ASTM G154 at 2000 hours QUV.
- K. Restrictions:
1. Zinc-coated steel duct shall not be installed for ductwork transporting moisture-laden air. Flexible duct may only be furnished where specifically indicated on Drawings. Aluminum ducts shall not be installed for internal pressures above 2 inches of water.
 2. Fiberglass duct is not permitted as a substitute for sheet metal duct.

2.02 DAMPERS

- A. Manual Volume Control Dampers:
1. Rectangular: Multi-blade type, opposed blade operation, 16 gage galvanized steel blades; center pivoted on 3/8 inch diameter steel trunnions; interlocking edges; dampers shall be in own angle frame, full duct size as indicated on Drawings; frame of minimum 16 gage steel channel construction. Provide with damper operator and axles positively locked to blade. Ruskin MD35, Pottorff MD-42, Greenheck MBD-15 or equal.
 2. Round: Frame shall be constructed of not less than 20 gage galvanized steel, blades of not less than 20 gage galvanized steel channel construction with



factory neoprene seals, ½ inch diameter axle shafts and locking hand quadrant. Ruskin MDRS25, Greenheck MBDR-50, or equal.

3. Oval: Frame shall be constructed of not less than 14 gage galvanized steel channels with factory blade seals of not less than 12 gage galvanized steel with not less than ½ inch diameter axle shafts. Provide Ruskin standard construction for frame, blade and axle size, thickness and material variation. Provide adjustable locking hand quadrant. Ruskin CDO25, or equal.

B. Manual Fire Dampers:

1. FD, Fire Dampers: Shall conform to requirements of and be listed by State of California Fire Marshal and NFPA 90A. Dampers shall provide airflow resistance not to exceed 0.05 inch water gage static pressure at 900 fpm or 0.25 inch water gage at 2,000 fpm. Dampers shall be installed in required steel sleeve at each penetration of a rated partition.
 - a. Vertical-mounted fire dampers: Fire damper shall be curtain type with blades completely removed from the air stream to allow for maximum free area. Dampers will be provided in factory sleeves as tested and listed by manufacturer. Dampers shall be rated for 1 ½ hours for installation in one or 2-hour partitions. Provide UL listed fusible links of adequate size and temperature rating. Dampers will be installed according to the manufacturer's recommended installation instructions provided with units. Provide suitable access for inspection and servicing of each damper. Pottorff VFD-10/VFD-10D Series, Ruskin IBD/DIBD Series, Greenheck FD/DFD Series, or equal.

- C. Duct Access Panels: Provide factory fabricated access panels in ducts where required for servicing fire or smoke dampers, and at other locations as specified in this Section. Units shall consist of removable panel, gasketed and pressure sealed by controlled spring tension locks. Construct unit, including interior parts, of same material as duct. Units shall be constructed to be suitable for installation in systems of up to 5 inches water gage static pressure.

2.03 AIR DISTRIBUTION DEVICES

A. General:

1. Grilles, registers, diffusers and appurtenances shall conform to requirements specified herein and shall be of type and sizes as specified and indicated on Drawings. Performance shall be in accordance with ANSI/ASHRAE Standard 70 including airflow velocity, pressure, temperature, and sound measurements.
2. Sponge neoprene, rubber, vinyl or felt border gaskets shall be provided for surface-mounted registers, grilles or diffusers.
3. The noise generating characteristics of all specified grilles, registers, and diffusers shall be tested to, and comply with, all requirements of this specification. Representative samples shall be subjected to tests in accordance with applicable standards and procedures in order to demonstrate such



compliance. A special test for this project is not required if the manufacturer has previous certified test results that can be made applicable to this project. Maximum Sound Levels of diffusers, grilles and registers shall be as follows:

General: NC 35

4. Provide suitable frame types to match the ceiling types as specified or indicated on the Architectural Drawings.
 5. Ceiling diffusers shall be provided with equalizing grids.
 6. Ceiling mounted grilles, registers and diffusers shall be provided with a factory applied, baked enamel, dull finish, bone white to match acoustical ceiling tile.
 7. Grilles or registers mounted on painted walls or other surfaces shall be furnished with a baked prime coat and finish painted in accordance with Section 09 9000: Painting and Coating.
 8. Do not provide opposed blade dampers inside supply connection necks at diffusers and registers to balance the airflow, as they tend to create noise. Provide a manual volume damper at each branch take-off and also at branch duct to each diffuser and register upstream of the flexible duct connections. Air throw patterns shall be as indicated on the drawings.
 9. Diffusers, registers and grilles indicated or scheduled on the drawings to comply with special requirements shall take precedence over the standard items specified.
- B. Diffusers, Grilles And Registers
1. Acceptable Manufacturers: Anemostat, Krueger, Price, Titus, or equal.
 2. See plan schedule for diffuser types.

PART 3 – EXECUTION

3.01 EXAMINATION

- A. Examine areas and conditions under which Work of this Section will be performed. Correct conditions detrimental to proper and timely completion of Work. Do not proceed until unsatisfactory conditions have been corrected.

3.02 DUCTWORK

- A. Construct ductwork according to details of fabrication and methods of support, as indicated in the SMACNA manuals and CMC, unless specified or indicated otherwise in this Section or on Drawings. In event of conflict, the most stringent requirement shall be provided.
- B. Unless otherwise required, construct ducts to conform accurately to dimensions indicated and to be straight and smooth on inside, with joints neatly finished.
- C. Duct dimensions indicated are net inside dimensions.



- D. Anchor ducts to building structural slab, framing and roof decking and detail method of anchoring and fastening if not indicated on Drawings. Supports shall be seismically constructed as required by the latest edition of the SMACNA guidelines.
- E. Construct and install ducts to be completely free from vibration under operating conditions.
- F. Indicate on layout drawing, required for suspended ductwork, location of supports, loads imposed on each fastening or anchor, typical details for anchorage, and details for special anchorage for supports attached to metal roof decking.
- G. Attach supports only to building structural framing members and concrete slabs.
- H. Where supports are required between structural framing members, detail and install suitable intermediate metal framing.
- I. Ducts transporting air-conditioned or heated supply air shall be insulated in accordance with requirements of Section 23 0700: HVAC Insulation.
 - 1. All outside ducts exposed to weather shall be acoustically-lined from HVAC equipment through building envelope.
- J. Ferrous angles and structural members and joining collars specified for construction and support of ductwork and plenums shall be primed with one heavy coat of required asphaltic aluminum paint before installation or fabrication. Metal surfaces shall be thoroughly cleaned before installation of paint. Galvanizing may be provided instead of painting. Installed duct hanger rods concealed in furred ceilings and walls are not required to be primed or painted.
- K. Broken places in galvanized coating shall be acid washed and then completely soldered over or painted with galvanizing paint.

3.03 DUCT CONSTRUCTION

- A. Minimum ductwork gages, joints, reinforcing, and bracing of ductwork shall conform to SMACNA and CMC. The most stringent standards shall prevail. Additional bracing shall be provided to prevent objectionable panel vibration.
- B. Button punch snap-lock seams, using Lock-former or equal, shall be permitted only in non-accessible areas using 20 and 22 gage galvanized steel ducts with screws added at the ends. Button punch snap-lock is not permitted for aluminum or duct lighter than 22 gage.
- C. Provide longitudinal seams of the grooved snap lock, or Pittsburg and standing, sealed spiral or continuously welded.
- D. Ferrous angles and structural members and joining collars specified for the construction and support of ductwork and plenums shall be primed with one heavy coat of asphalt aluminum paint before installation or fabrication. The metal surface shall be thoroughly cleaned before application of the paint. Galvanizing may be provided instead of painting. Installed duct hanger rods concealed in furred ceilings and walls is not required to be primed or painted.



- E. Broken places in galvanized coating shall be acid washed and then completely soldered over or painted with galvanizing paint.
- F. S-type or drive-slip type girths or longitudinal seams shall not be furnished for ductwork installed outdoors or mounted on roofs.
- G. Broken places in galvanized coating shall be acid washed and then completely soldered over or painted with galvanizing paint.

3.04 DUCT ELBOWS AND TURNING VANES

- A. Duct elbows, including supply, exhaust, and return, shall be provided with a centerline radius of 1.5 times duct width parallel to radius whenever possible; centerline radius shall not be less than width of duct parallel to radius.
- B. Where space does not permit above radius, or where square elbows are indicated on Drawings, turning vanes shall be installed whether indicated on Drawings or not.
- C. Turning vanes shall conform to SMACNA and CMC.

3.05 DUCT JOINTS AND SEAMS

- A. Conditioned air supply and return ducts shall be furnished with completely joints and seams sealed, welded for air tightness, except spiral seam factory machine formed duct components. Spiral seam is exempted. Joints between slip-fit components may be assembled with all seams and joint connections fastened with screws.
- B. Other ducts shall be furnished with joints and seams sealed by using sealant, taping, soldering, or welding.
- C. S-slip or drive-slip type girths or longitudinal seams are not permitted on exterior or exposed rooftop mounted ductwork.
- D. Caulking, taping, or other joint or seam treatment shall be provided per SMACNA Seal Class A in accordance with recognized standards.
- E. Seams around fan, coil housing and plenums shall be sealed with gaskets or sealing compound to provide an airtight assembly.
- F. Alternative duct connectors such as Ductmate Industries, Mez Industries, or equal may be used if the following conditions are met:
 - 1. One of the specifically listed connectors is submitted and approved by the ARCHITECT and OAR.
 - 2. The correct size connector, application, and gage of material conform to SMACNA Standards.
 - 3. The connector is installed per manufacturer's specifications.

3.06 DUCT TRANSITION

- A. Slopes in sides of transition pieces shall be no greater than 1 to 5. Abrupt changes or offsets in duct system are not permitted, except when reviewed by the ARCHITECT.



3.07 FLEXIBLE CONNECTIONS (At AC Unit Duct Connections)

- A. At points where sheet metal connections are installed to fans or air handling units, or where ducts of dissimilar metals are connected, a flexible connection of commercial grade, Duro Dyne Durolon, Ventfabrics Ventglas, Ductmate Industries Proflex, or equal, non-combustible material shall be installed and securely fastened by zinc-coated steel clinch-type bands or a flange type connection. Inlet and outlet openings shall be axially in-line, maximum deviation of centerline shall be less than 5 percent of diameter or shortest dimension of a rectangular inlet of fan or air handling unit, with system at rest. Duct end of connection shall be seismically restrained if more than 4 feet from last support.

3.08 AIR DIFFUSERS AND GRILLES

- A. General: Install supply devices after ducts, plenums, and casings have been cleaned and blown free of small particles, as specified. Devices shall be aligned to be parallel to ceiling construction or walls and ceiling surfaces, and shall be pulled tightly to compress gaskets and to fit neatly against surfaces.
- B. Diffusers: Support surface mounted ceiling diffusers from angles or channels resting on and fastened to ceiling construction. Do not support from ducts. Install lay-in diffusers on T-bar ceilings with hanger wires from each corner and not supported by ceiling structure. Provide sheet metal adaptor box above each diffuser to allow space for volume controller with round collars for connection to round ducts where indicated on Drawings. Fasten duct-mounted diffusers to duct collars.
- C. Registers and Grilles:
1. Fasten wall mounted and duct mounted registers and grilles to flanges of duct collars.

3.09 VOLUME DAMPERS

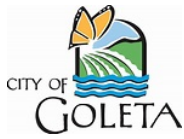
- A. Manually operated dampers, gravity dampers, fire dampers, and motor operated dampers shall be furnished and installed as specified and indicated. Upon completion of installation, dampers shall be checked, lubricated, and adjusted so that they operate freely, without binding. Dampers shall be of standard commercial manufacture, complete with damper frame. Where painting is required, they shall be shop finished unless otherwise noted.
1. Provide and install manual volume dampers per SMACNA standards to allow balancing per AABC, NEBB or TABB Procedures and Standards whether indicated on the drawings or not.
 2. Balancing dampers shall be installed in main supply ducts from fan discharge plenums, where two or more ducts are connected to each plenum, although such balancing dampers may not be indicated. Each zone shall be provided with a manual volume damper. Sheet metal screws shall be installed through handles and into ducts to lock damper in place after test and balance.



3. Each supply, return, and exhaust branch shall be provided with manual volume dampers.
4. Do not provide opposed blade dampers at air inlets and outlets, except where indicated.
5. Each supply, return, and exhaust inlet or outlet shall be provided with a manual volume damper. This damper shall be a minimum of 5 feet upstream of the air outlet and inlets. An acoustic flexible duct should be provided between the outlet and inlet and the damper for concealed ducts.
6. Dampers installed in accessible locations shall be provided with locking and indicating quadrants. Ventfabrics Ventlok, Duro Dyne, Young Regulator Co., or equal.
7. Dampers installed in ductwork in furred ceiling spaces or in roof spaces with less than 30 inches of clearance below beams, joists, or other construction, and where access panels are not provided shall be furnished with damper rods extended below ceiling and terminated with a concealed damper regulation. Ventfabrics Ventlok, Young Regulator Co., Duro Dyne, or equal.
8. Dampers not identified as splitter, extractor, or butterfly dampers shall be of multi-louver type arranged for opposed blade operation. Damper shall be same dimension as adjoining duct and be tight closing. Blades shall not be greater than 9 inches. Dampers shall be not less than 18 gage steel.
9. Motor operated dampers shall be furnished by temperature control manufacturer as part of temperature control equipment and shall conform to requirements of Section 23 0900: HVAC Instrumentation and Controls.
10. Dampers shall be provided with accessible operating mechanisms. Where operators are exposed in finished portions of building, operators shall be chromium-plated with exposed edges rounded. Splitter dampers are not permitted unless specified and reviewed by the ARCHITECT.
11. Access panels shall be installed for access at each damper's operating mechanism.

3.10 DUCT SLEEVES AND PREPARED OPENINGS

- A. Furnish duct sleeves for 15-inch diameter ducts or less passing through floors, walls, ceilings, or roof and install during construction of the floor, wall, ceiling, or roof. Install round ducts larger than 15 inches diameter and square and rectangular ducts passing through floors, walls, ceilings or roof through prepared openings. Provide duct sleeves and prepared openings for duct mains and duct branches.
- B. Provide one inch clearance between duct and sleeve or between insulation and sleeves for insulated ducts, except at grilles, registers and diffusers.
- C. Provide prepared openings for round ducts larger than 15 inches in diameter and for square and rectangular ducts with one inch clearance between duct and openings or



between insulation and opening for insulated ducts, except at grilles, registers and diffusers.

- D. Provide closure collar of galvanized sheet metal not less than 4 inches wide unless otherwise indicated on Drawings on each side of walls or floors where sleeves or prepared openings are provided except where grilles or diffusers are installed. Install collar tight against surface. Fit sharp edges of collar installed around insulated duct to preclude tearing or puncturing insulation covering vapor barrier. Fabricate collars from round ducts in steel. Provide not less than 4 nails to attach collar where openings are 12 inches in diameter or less and not less than 8 nails where openings are 20 inches in diameter or less.
- E. Pack space between sleeve or opening and duct or duct insulation with commercial grade packing yarn.

3.11 FLEXIBLE DUCT RUNOUTS

- A. Runouts from branches, risers or mains to air terminal units and outlets may be pre-insulated, factory fabricated flexible ducts complying with NFPA 90A. Flexible ductwork shall not exceed 5 feet in length. When required to suspend flexible ducts, furnish hangers of type recommended by manufacturers of pre-insulated flexible duct and install at intervals recommended. Method of attachment to other components of air distribution system for a vapor-tight joint shall be in accordance with printed instructions of flexible duct manufacturer. Bend radius shall be 1-1/2 times diameter of duct, measured from centerline. Bends greater than 90-degree angle are not permitted. Non-metallic flexible duct shall be permitted only in T-bar suspended ceilings.

3.12 DUCT HANGERS AND SUPPORTS

- A. Exposed or easily accessible ductwork: All exposed ducts shall be supported by all-thread Rod as a single hanger and or a trapeze support for rectangular duct work in accordance with requirements of the latest edition of the HVAC Duct Construction Standards – Metal and Flexible of SMACNA.
- B. Non-accessible ductwork: Non-exposed and hidden from sight during regular school operations ductwork, rigid round, rectangular, and flat oval metal ducts, shall be installed with support systems conforming to SMACNA Standards.
- C. Where ducts are installed one above the other, they shall be individually supported on a trapeze of steel angles with 3/8 inch supporting steel rods securely fastened to overhead construction. A minimum distance of 3 inches shall be maintained between ducts wherever possible, but in no event shall distance be less than 2 inches. Minimum sizes of steel angles shall be 1 1/2-inch by 1 1/2-inch by 1/8 inch for duct sizes through 60 inches in greatest dimension, 2-inch by 2-inch by 1/8 inch for duct sizes 61 inches through 84 inches, 2-inch by 2-inch by 3/16 inch for duct sizes 85 inches through 96 inches, and 2-inch by 2-inch by 1/4 inch for duct sizes over 97 inches.



- D. Ducts six square feet area and greater and or minimum 28” round or greater shall be seismically restrained. Refer to Section 23 0548: HVAC Sound, Vibration and Seismic Control.
- E. Hangers shall not be supported by, or fastened to, non-structural members including blocking. Toggle or Molly type bolts are not permitted.
- F. Roof-mounted ductwork shall be installed a minimum 12 inches above roof and shall be supported by galvanized welded pipe, one on each side, fastened to roof structure, flashed and sealed to roof membrane. Install supports at each turn, unit connections, and each penetration, and space at maximum 6 feet off-center in general. Pitch pockets are not allowed.

3.13 ACCESS PLATES AND DOORS

- A. Access plates and doors shall be furnished and installed where stops, valves, fire dampers, fusible links, coils, damper operating mechanism, control equipment, lubrication fittings, air filters, air handling equipment and similar items normally requiring adjustment or servicing are installed in concealed spaces.
- B. Access plates and doors shall be located to permit convenient access to equipment sized to permit removal of equipment for servicing. Access plates shall be no less than 12-inch by 12-inch in clear opening. Proper servicing of equipment requires adequate access for maintenance personnel. Access doors shall not be less than 24-inches by 24-inch, unless otherwise detailed. Two or more valves shall not be located in same access area unless sufficient clearance is provided for operation, servicing and removal of each valve.
- C. Openings in ducts or plenums whose longer dimension does not exceed 12 inches may be covered by a plate of same material as duct, gasketed and fastened to duct or plenum with sheet metal screws.
- D. Access plates and doors in walls and ceilings of finished rooms and in locations normally accessible to the public shall be furnished with continuous piano hinges, unless otherwise specified, and a special flush type spring-loaded latch requiring an Allen wrench to operate. Access devices shall be installed after plastering in plaster ground openings.
- E. Access panels or doors penetrating one-hour fire resistive ceilings shall meet code requirements for such openings.
- F. Access panels shall be fire-rated; Milcor, or equal. Access doors shall be as required for installation in openings penetrating one-hour fire resistive ceilings. Access doors shall be furnished with a flush, key-operated cylinder lock, furnished with two keys each, instead of Allen headlock for non-rated ceilings.
- G. Other access panels, except those specified above, shall be furnished with suitable hinges and one or more sash fasteners.



- H. Panels located in ducts and plenums shall be installed with gaskets made of synthetic rubber, felt, or similar material to provide an airtight installation. Panels shall be constructed and reinforced to prevent vibration.
- I. Label the words "FIRE DAMPERS" on panels over fire dampers and words "DO NOT OPEN - HEATER IS OPERATING" on panels located in heater or equipment rooms. Letters shall be approximately 3 inches high, if space is available.
- J. Furnish a key to operate latch access plates, one for each access plate, but not to exceed five keys for any one Project.
- K. Access plates and panels shall be furnished with manufacturer's name or trademark and model number cast or stamped thereon, or upon a label permanently affixed thereon.
- L. Provide duct through roof flashing as detailed in the SMACNA standards or as indicated on Drawings.
- M. Refer to SMACNA for access plate and door construction.

3.14 PAINTING OF EXTERIOR SUPPLY AND RETURN DUCTWORK

- A. Exterior exposed supply and return ductwork connected to the ac units are to be painted by the Div. 23 contractor, if work is not provided by the General Contractor. Bottomline, the exterior ductwork is to be painted to prevent rust.

3.15 CLEANUP

- A. Remove rubbish, debris and waste materials and legally dispose off the Project site.

3.16 PROTECTION

- A. Protect the Work of this Section until Substantial Completion.

END OF SECTION



SECTION 23 80 00

HVAC EQUIPMENT

PART 1 – GENERAL

1.01 SUMMARY

- A. Section Includes: Air conditioning and air handling equipment including but not limited to:
 - 1. Rooftop Packaged Air Conditioning Units.
 - 2. Exhaust Fans.
- B. Related Requirements:
 - 1. Division 01: General Requirements.
 - 2. Section 07 60 00: Flashing and Sheet Metal.
 - 3. Section 23 05 00: Common Work Results for HVAC.
 - 4. Section 23 05 13: Basic HVAC Materials and Methods.
 - 5. Section 23 09 00: HVAC Instrumentation and Controls.
 - 6. Section 23 30 00: Air Distribution.

1.02 DESIGN REQUIREMENTS

- A. Work of this Section is based on HVAC equipment units indicated as Basis of Design in Part 2 of this Section. Products from different HVAC equipment manufacturers listed are never identical, although equivalent in similar capacity, performance and quality. In the cases where dimensions, weight, configuration and utility requirements differ from the products used as a basis of design, the Contractor, at no additional cost to the Owner, shall coordinate and submit, for Architect review, revisions to the design. Service clearances shall be verified following manufacturer recommendations prior to selection and submittal.

1.03 SUBMITTALS

- A. Provide in accordance with Division 01 and Section 23 05 00: Common Work Results for HVAC.

1.04 QUALITY ASSURANCE

- A. Provide submittals in accordance with Section 23 05 00: Common Work Results for HVAC.

1.05 PROJECT RECORD DOCUMENTS

- A. Provide Owner instructions on equipment operation and maintenance procedures, as indicated in Section 23 05 00: Common Work Results for HVAC.

1.06 WARRANTY



- A. Compressors shall be provided with manufacturer's five year warranty, replacement only.
- B. Manufacturer shall warrant parts, except heat exchangers, for a period of five years.
- C. Heat exchangers shall be provided with manufacturer's ten year warranty, replacement only.

PART 2 – PRODUCTS

2.01 EQUIPMENT

- A. Capacities of air conditioning equipment indicated on Drawings are minimum net capacities actually required. Standard catalog ratings shall be adjusted to actual Project site environmental conditions.

2.02 ROOFTOP GAS-FIRED HEATING AIR CONDITIONING UNITS

- A. Manufacturers: Carrier, Trane, York, or McQuay,
- B. Furnish packaged air conditioning unit with gas heating for roof top installation. Unit shall be self-contained, completely factory assembled, with complete internal wiring and controls. Unit shall also be provided with a fully piped refrigerant circuit, fully charged with an environmentally friendly refrigerant that is not scheduled for phase out. Unit shall be field configurable for horizontal discharge. Cooling and heating capacities, electrical characteristics, and operating conditions shall be as indicated on Drawings.
- C. Quality Assurance:
 - 1. Units shall be CSA certified for outdoor installation.
 - 2. Cooling capacity shall be rated in accordance with current ANSI/AHRI Standard 210/240.
 - 3. Unit shall be UL or ETL listed and designed to conform to ANSI/ASHRAE Standard 15 Safety Code for Mechanical Refrigeration and ANSI Z21.47-2016/CSA 2.3-2016 Gas
 - 4. ANSI/NFPA 70: National Electrical Code.
 - 5. Unit cooling efficiency EER/SEER ratings shall comply with CCR, Title 24, Building Energy Efficiency Standards for Residential and Nonresidential Buildings, and shall not be less than ratings indicated on drawings.
 - 6. Unit heating efficiencies AFUE ratings shall comply with current CCR, Title 24, Building Energy Efficiency Standards for Residential and Nonresidential Buildings, and shall not be less than ratings indicated on drawings.
 - 7. Unit shall comply with California Maximum Oxides of Nitrogen (NOX) Emission Regulations and current SCAQMD regulations.
 - 8. The unit roof curbs shall conform to NRCA standards. Provide shimming to maintain level bottom of rail installation.
 - 9. Insulation and adhesive shall meet NFPA 90A and 90B requirements for flame spread and smoke generation.



10. Unit casing shall be capable of withstanding ASTM B117 500-hour salt spray test.
11. Each unit shall be run tested at factory per ANSI/ASHRAE 37 and provided with a certificate indicating tested pressures, amperages, dates, and inspector.

D. Unit Cabinet:

1. Galvanized steel with baked enamel finish on external surfaces that are exposed to weather.
2. Interior surfaces exposed to conditioned and return air streams shall be insulated with a minimum ½-inch thick, 1 pound density foil-faced cleanable insulation.
3. Cabinet top cover shall be of one piece construction or where seams exist, shall be double hemmed and gasket sealed.
4. Cabinet panels shall be hinged access panels for filter, compressors, evaporator fan, control box and heat section areas. Each panel shall use multiple quarter-turn latches. Each major external hinged access panel shall be permanently attached to rooftop unit. Panels shall also include tiebacks.
5. Return air filters shall be accessible through a hinged access panel and be on a slide-out track using standard size filters.
6. Holes shall be provided in base rails (minimum 16 gage) for rigging shackles and level travel and movement during overhead rigging operations.
7. Unit shall have a factory-installed internally sloped condensate drain pan, providing a minimum ¾-inch-14 NPT connection to prevent standing water from accumulating. Pan shall be fabricated of high impact polycarbonate material, epoxy powder coated steel or stainless steel and shall slide out for cleaning or maintenance. An alternate vertical drain (¾-inch NPT) connection shall also be available. Drain pans shall conform to ASHRAE 62 self-draining provisions.

E. Compressors:

1. Unit shall be furnished with single (If single compressor is used, then it shall be two stage type) or multiple fully hermetic scroll compressors with internal vibration isolators.
2. Dual electrically and mechanically independent refrigerant circuits for 7.5 tons and above.
3. Compressors shall be provided with service access valves.
4. Compressor motors shall be cooled by refrigerant passing through motor windings.
5. Compressors shall be provided with line break thermal and current overload protection.
6. Compressors shall be provided with crankcase heaters, internal high-pressure and temperature protection.
7. Compressors on unit rated 90,000 BTU and below shall be of two stage types.

F. Refrigerant circuit components:

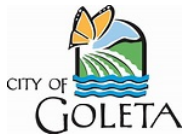
1. Thermostatic expansion valve (TXV) with removable power element.



2. Refrigerant strainer.
 3. Service gage connections on suction, discharge, and liquid lines.
 4. Solid core refrigerant filter driers.
- G. Coastal Evaporator and Condenser Coils Protection: Evaporator and condenser coils shall be furnished suitable for the Goleta corrosion-rich coastal environment with:
1. A flexible epoxy polymer coating uniformly applied to all coil surface areas without material bridging between fins.
 2. Coating process shall ensure complete coil encapsulation of tubes, fins and headers.
 3. Color shall be high gloss black with gloss per ASTM D523-89.
 4. Uniform dry film thickness from 0.8 to 1.2 mil on all surface areas including fin edges.
 5. Superior hardness characteristics of 2H per ASTM D3363-92A and cross-hatch adhesion of 4B-5B per ASTM D3359-93.
 6. Impact resistance shall be up to 160 in.-lb (ASTM D2794-93).
 7. Humidity and water immersion resistance shall be up to minimum 1000 and 250 hours respectively (ASTM D224-92 and ASTM D870-92).
 8. Corrosion durability shall be confirmed through testing to be no less than 6000 hours salt spray per ASTM B117-90.
- H. Fans and Motors:
1. Direct -drive indoor fans shall be provided for the AC Units with the cooling capacity of less than or equal to 60,000 BTU/H.
 2. Belt drive indoor fan shall be provided on AC Units with the cooling capacity of greater than 72,000 BTU/H include an adjustable-pitch motor pulley. Fans shall accommodate from 0.6 inch to 1.6-inch external static pressure without changing drives or motors.
 3. Condenser fan shall be a dynamically balanced, propeller type, fabricated of aluminum blades riveted to corrosion resistant steel spiders and direct-driven by a totally enclosed motor. Condenser air shall be discharged vertically. Condenser fan motor shall be ECM type motor and provide cooling operation down to 25 degrees F outdoor temperature with automatic-reset thermal overload protection.
- I. Heating Section:
1. Induced draft combustion type with energy saving direct spark ignition system, redundant main gas valve, and 2-stage heat.
 2. The heat exchanger shall be of tubular section type fabricated of a minimum of 20 gage steel coated with a nominal 1.2 mil aluminum-silicone alloy or 20 gage type 409 stainless steel, including stainless steel tubes, vestibule plate.
 3. Burners shall be of in-shot type fabricated of aluminum coated steel or stainless steel.
 4. Gas piping shall enter unit cabinet at a single location.
 5. Integrated Controls shall provide following:



- a. Timed control of evaporator fan functioning and burner ignition,
 - b. Anti-cycle protection for gas heat operation (after one cycle on high temperature limit switch and one cycle on flame rollout switch).
 - c. Diagnostic information.
6. Induced draft motor shall be provided with permanently lubricated, sealed bearings and inherent automatic reset thermal overload protection.
- J. Controls, Safeties and Diagnostic Points:
1. Unit Controls: Unit shall be furnished with self-contained, BACnet MS/TP Direct Digital Controls.
 - a. Controls shall be factory-installed.
 - b. Controls shall operate with zone control systems.
 - c. Controls shall furnish built-in diagnostics for thermostat/sensor commands for staged heating and cooling, evaporator-fan operation, and economizer operation.
 - d. Controls shall be furnished with a 5-minute time delay between modes of operation.
 - e. Control circuit shall be protected by a fuse on 24-V transformer side.
 - f. Control shall incorporate passive infrared detection for sensing occupancy in space serve.
 2. Compressor high temperature, high current, internal overloads, internal thermostat.
 - a. Compressor reverse rotation protection.
 - b. Loss-of-charge/low-pressure switch.
 - c. Freeze-protection thermostat, evaporator coil.
 - d. High-pressure switch.
 - e. Internal relief valve.
 - f. Anti-recycle relay, or time cycle device to prevent rapid cycling of compressor after any off cycle.
 3. Heating section shall be provided with following minimum protections:
 - a. High-temperature limit switches.
 - b. Induced draft motor speed sensor.
 - c. Flame rollout switch.
 - d. Flame proving controls.
 - e. Redundant main gas valve.
 - f. Heating controls shall consist of:
 - 1) 2-stage automatic combination gas valve.
 - 2) Pressure regulator.
 - 3) Electric spark intermittent ignition system or hot surface ignition system.
 - 4) Time delay fan control.
 4. Operating Characteristics:



- a. Unit shall be capable of starting and operating at 125 degrees F ambient outdoor temperature, meeting maximum load criteria of AHRI Standard 210/240 or 360 at plus or minus 10 percent voltage.
 - b. Compressor with standard controls shall be capable of operation down to 25 degrees F ambient outdoor temperature.
5. EMS Diagnostic Points: Provide diagnostic points for units, including those at projects with no EMS.
- a. Supply air temperature.
 - b. Return air temperature.
 - c. Space temperature.
 - d. Outdoor air temperature.
 - e. CO2 levels.
 - f. Filter status, via pressure transducer on analog point.
 - g. Fan status (air flow switch or proof of flow for supply fan for LEED credits).
 - h. Compressor status.
 - i. Economizer damper current position.
 - j. Other diagnostic point required by current Title 24, automated fault detection and diagnostics (FDD).
- K. Filter Section:
1. Provide filter section with factory-installed low-velocity, throwaway, 4-inch or 2-inch thick high capacity, MERV 13 (LEED requirement) Class 2, filters of commercially available sizes. Provide 2 sets of filters, the 2nd set for change out at project acceptance.
 2. Filter face velocity shall not exceed 300 fpm at nominal airflows.
 3. Filter section shall allow installation of standard size air filter.
- L. 100% Outdoor Air Economizer with Modulating Power Exhaust:
1. Provide 100 percent outdoor air economizers. Electrical power to the power exhaust module to be provided by Div. 23 if exhaust module is separate from the AC unit module (rather than integrated).
 2. Gear-driven integrated economizers.
 3. Integrated integral-modulating type capable of simultaneous economizer and compressor operation.
 4. Furnish hardware and controls to provide cooling with outdoor air.
 5. Low-leakage dampers not to exceed 3 percent leakage, at one inch wg pressure differential (variable sliding economizer).
 6. Relief damper. Damper shall close upon unit shutoff.
 7. Differential temperature and enthalpy controller unless indicated otherwise on drawings.
 8. Building Pressure Control: Provide units with power exhaust controlled by a pressure sensor in space or outdoor air measurement and tracking as indicated on drawings. The controller shall modulate VFD in power exhaust to maintain



a positive pressure differential of 0.03 inch of water between indoor and atmospheric pressure. Furnish field wiring to power exhaust and install tubing in space. Provide other accessories as required to comply with UL or ETL requirements.

9. Base Rail: Factory installed on AC units.
10. Dampers Using Electronic Actuators:
 - a. Manufacturer: Belimo, Honeywell, Invensys, Johnson Controls, or equal.
 - b. Size for torque required for damper seal at load conditions.
 - c. Coupling: V-bolt dual nut clamp with a V-shaped, toothed cradle.
 - d. Overload Protection: Electronic overload or digital rotation-sensing circuitry without the use of end switches to prevent damage to the actuator during a stall condition.
 - e. Fail-Safe Operation: Mechanical, spring-return mechanism.
 - f. Actuators shall be listed by ISO 9001, ULC, and CSA C22.2.

M. Unit Accessory Options To Be Provided for each AC Unit:

1. Unit-mounted integral non-fused disconnect with single point power connection,
2. Horizontal duct connections,
3. 100% Modulating Economiser power exhaust (or remote mounted in return horizontal ductwork with all assoc. Elec. Work to be provided by Div. 23 contractor).
4. Low gas heat option.
5. Corrosion-resistant epoxy-phenolic coated condenser and dx cooling coils for ocean coastal environment.
6. Integral powered convenience electrical outlet for servicing,
7. 2-inch min. Merv 13 air filters (LEED requirement) with remote dirty filter maintenance indicator thru Ethernet connection.
8. Remote DDC system Comfortlink (or equivalent) interface card for remote ethernet status and monitoring by Amtrak/city of Goleta and building service personnel.
9. Demand control ventilation (DCV) CO2 interface control provisions regulating OA introduction during occupancy and wall-mounted CO2 sensors.
10. Foil faced internal insulation, hinged access panels.
11. Thru the base connections for electrical, gas, & control wiring.
12. 14-inch high roof curb. Provide sloped pre-manufactured roof curb, or shim standard roof curb to accommodate roof slope.

N. Furnish programmable digital thermostat and CO sensor functionality (separate CO2 sensor if required) with following features for single zone:

1. 7-day time clock.
2. Heat, cool, automatic changeover.
3. Occupied/unoccupied modes.



2.04 INLINE CABINET EXHAUST FANS

- A. Acceptable Manufacturers: Greenheck, PennBarry, Twin City or approved equal.
- B. Provide inline type fans of sizes, capacities and configurations indicated on drawings, complete with accessories for installation of fans. Also, provide accessories for proper operation and balancing of fans in accordance with design intent and sequence of operation.
- C. Certification: Fan shall be listed by Underwriters Laboratories (UL 705). Fan shall bear AMCA certified ratings seal for sound and air performance.
- D. Housing: The fan shall be of bolted and welded construction utilizing corrosion resistant fasteners. The housing shall be of minimum 12 gage steel. Bearing supports shall be minimum 10 gage welded steel. Lifting eyes shall be provided for ease of installation. Unit shall bear an engraved aluminum nameplate.
- E. Finish: Steel fan components shall be coated with polyester powder coating to exceed 1,000 hour salt spray test under ASTM B117 test method.
- F. Wheel: Wheel shall be of mixed flow type with a wheel cone, spherical back plate and single thickness cambered blades, or formed hollow airfoil blades continuously welded to back plate. Hub shall be keyed and securely attached to fan shaft. Wheel shall overlap an aerodynamic aluminum inlet cone to provide maximum performance and efficiency. Wheel shall be balanced in accordance with AMCA Standard 204, Balance Quality and Vibration Levels for Fans.
- G. Motor: Motor shall be ECM type, voltage and phase, as indicated on drawings. Provide permanently lubricated sealed ball bearings. Option: Energy efficient motor meets EPAct and NEMA Table 12-10.
- H. Shaft: Blower shaft shall be AISI C1045/SAE 1045, or 1040 hot rolled and accurately turned, ground, and polished. Shafting shall be sized for a critical speed of at least 143 percent of maximum RPM.
- I. Bearings: Bearings shall be designed and tested specifically for use in air handling applications. Construction shall be heavy-duty regreasable ball or roller type in a cast iron pillow block housing and selected for a minimum L50 life in excess of 200,000 hours at maximum cataloged operating speed.
- J. Drive: Fans shall be direct drive or belt driven as indicated on drawings.
- K. Belts and Drives: Belts shall be oil and heat resistant, non-static type. Drives shall be precision machined cast iron type, keyed and securely attached to wheel and motor shafts. Drives shall be sized for 150 percent of installed motor horsepower. The variable pitch motor drive must be factory set to specified fan RPM.

PART 3 – EXECUTION

3.01 GENERAL



- A. Uniformity: Unless otherwise specified, equipment of same type or classification shall be product of same manufacturer.
- B. Equipment Installation: Equipment installation shall be in strict accordance with these Specifications, and installation instructions of manufacturers. Equipment installed on concrete foundations shall be grouted before piping is installed. Piping shall be installed in such a manner as not to place a strain on equipment.
 - 1. Install equipment in a neat and skillful manner, properly aligned, leveled, and adjusted for satisfactory operation.
 - 2. Install so connecting and disconnecting of piping and accessories can be readily accomplished, parts are readily accessible for inspection, service and repair. Space shall be provided to readily remove filters, coils, compressors and fan wheels. Access doors shall be hinged with cam lock door handles.
 - 3. Provide flexible connections for duct, pipe and conduit connections at moving equipment.

3.02 ROOF-TOP EQUIPMENT MOUNTING

- A. Horizontal Flow Packaged Units: Install unit on prefabricated mounting curb secured directly to roof designed to suit roof conditions and requirements of provided unit. Submit Shop Drawings for review.

3.03 NOISE AND VIBRATION

- A. Operation of Equipment: Mechanical equipment and piping systems shall operate without exceeding specified noise and/or vibration levels.
- B. Corrective Measures: If specified noise and/or vibration levels are exceeded, provide necessary changes to reduce noise and/or vibration levels to within specified levels.

3.04 FIELD TESTS AND INSPECTION

- A. General: Perform field inspections, field tests, and trial operations as specified in Section 23 0500: Common Work Results for HVAC. Provide labor, equipment and incidentals required for testing. The Project Inspector will witness field tests and trial operations as specified in Section 23 0500: Common Work Results for HVAC.
- B. Equipment and Material: Equipment and material certified as being successfully tested by manufacturer, in accordance with referenced Specifications and standards, will not require re-testing before installation. Equipment and materials not tested at place of manufacture will be tested before or after installation, as applicable or necessary, to determine compliance with reference Specifications and standards.
- C. Start-Up and Operational Test: System shall be started up and initially operated with components operating. During this test, various strainers or filters shall be periodically cleaned until no further accumulation of foreign material occurs. Adjust safety and automatic control instruments as required to provide proper operation and control sequence. Refer to Section 23 0500: Common Work Results for HVAC.



- D. Operation and Maintenance Data: Provide required operation and maintenance data as specified in Section 23 0500: Common Work Results for HVAC.
- 3.05 CLEANUP
- A. Remove rubbish, debris and waste materials and legally dispose of off Project site.
- 3.06 PROTECTION
- A. Protect Work of this Section until Substantial Completion.

END OF SECTION



SECTION 26 05 00
COMMON WORK RESULTS FOR ELECTRICAL

PART 1 - GENERAL

1.01 SUMMARY

- A. This Section specifies the basic requirements for electrical installations and includes requirements common to more than one section of Division 26. It expands and supplements the requirements specified in sections of Division 01.
- B. Related Requirements:
 - 1. Division 01 – General Requirements.
 - 2. Section 03 30 00 – Cast-in-Place Concrete.
 - 3. Section 09 90 00 – Painting and Coating.
 - 4. Division 14 – Conveying Equipment.
 - 5. Division 23 – HVAC.
 - 6. Division 26 – Electrical.
 - 7. Division 27 – Communications.
 - 8. Division 28 – Electronic Safety and Security.
 - 9. Division 31 – Earthwork.
 - 10. Division 32 – Exterior Improvements.
 - 11. Division 33 – Site Improvements.
- C. Related Industry Standards: The most current version of the following industry standards.
 - 1. ASTM D 709 – Laminated Thermosetting materials.
 - 2. ANSI/NEMA FB-1 – Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit, Electrical Metallic Tubing, and Cable.
 - 3. ANSI/NEMA 250 – Enclosures for Electrical Equipment (1000 Volts Maximum).
 - 4. California Electrical Code (CEC).



5. IEEE C57.12.28 – Standard for Pad-Mounted equipment Enclosure Integrity.
6. IEEE 1584 – Performing Arc-Flash Hazard Calculations.
7. UL/ANSI 1 – Standard for Flexible Metal Conduit.
8. UL/ANSI 1242 – Standard for Electrical Intermediate Metal Conduit.
9. UL/ANSI 506 – Standard for Specialty Transformers.
10. UL/ANSI 6 – Electrical Rigid Metal Conduit-Steel.
11. UL/ANSI 6A – Electrical Rigid Metal Conduit-Aluminum, Red Brass, and Stainless Steel.
12. UL 797 – Electrical Metallic Tubing-Steel.
13. UL/ANSI 870 – Standard for Wireways, Auxiliary Gutters, and Associated Fittings.
14. UL/ANSI 891 – Standard for Safety Switchboards.

1.02 BASIC ELECTRICAL REQUIREMENTS

A. Quality Assurance:

1. Work shall be performed by CONTRACTOR'S personnel possessing the skills and experience obtained in performing work of similar scope and complexity.
2. Refer to related division(s) specifications for other requirements.

B. Drawings and Specifications Coordination:

1. For purposes of clearness and legibility, Drawings are essentially diagrammatic, and the size and location of equipment is indicated to scale whenever possible. Verify conditions, dimensions, indicated equipment sizes, and manufacturer's data and information as necessary to install the Work of this Division. Coordinate location and layout with other Work.
2. Verify final locations for rough ins with field measurements and with the requirements of the equipment to be connected.
3. Drawings indicate required size and points of termination of conduits, number and size of conductors, and diagrammatic routing of conduits. Install conduits with minimum number of bends to conform to structure, avoid obstructions, preserve headroom, keep openings and passageways clear, and comply with applicable code requirements.



4. Routing of conduits may be changed provided that the length of any conduit run is not increased more than 10 percent of length indicated on the Drawings.
5. Outlet locations shall be coordinated with architectural elements prior to start of construction. Locations indicated on the Drawings may be distorted for clarity; CONTRACTOR shall coordinate in the field prior to rough-in work.
6. Coordinate electrical equipment and materials installation with building components and the Work of other trades.
7. Equipment disconnects shall be readily accessible and free of obstructions.
8. When extending or intercepting existing electrical facilities, CONTRACTOR shall Coordinate and verify existing conditions.

C. Terminology:

1. Signal Systems: Applies to clock, bell, fire alarm, annunciator, sound, public address, buzzer, telephone, television, inter-communication, elevator access controls, lighting control systems and security systems.
2. Low Voltage: Applies to signal systems operating at 120 volts and less, and power systems operating at less than 600 volts. Medium voltage: Applies to power systems operating at more than 600 volts.
3. UL: Underwriter's Laboratories Inc, Nationally Recognized Testing Laboratory (NRTL), or equal.

D. Regulations: Work shall comply with the requirements of authorities having jurisdiction and the California Electrical and Building Codes. Material shall conform to regulations of the National Board of Fire Underwriters for electrical wiring and apparatus. Materials shall be new and listed by UL, or another NRTL.

E. Structural Considerations for Conduit Routing:

1. CONTRACTOR shall provide calculations and drawings as necessary for any construction and/or alterations requiring conduits to pass through or interfere with any structural members, or where notching, boring or cutting of the structure is necessary, or where special openings through walls, floors, footings, or other buildings elements, or where notches and bored holes in wood or steel are required. All work shall conform to CBC, Part 2, Title 24 requirements.
2. Concrete encasement for underground conduits that abuts a foundation wall or underground structure shall rest on a haunch integral with wall or structure, or shall extend down to footing projection, or shall be doweled into structure unless



otherwise indicated. Underground structures shall include maintenance holes; pull boxes, vaults, and buildings.

F. Electrically Operated Equipment and Appliances:

1. Furnished Equipment and Appliances:

- a. Work shall include furnishing and installing wiring enclosures and complete connections of electrically operated equipment, appliances and electrical control devices, which are specified to be furnished and installed in this or other sections of the Specifications. Wiring enclosures shall be concealed except where exposed work is indicated on the drawings.
- b. Provide all connections necessary for installation of equipment.
 - 1) Equipment shall be tested for proper operation, including proper rotation of motorized equipment.
 - 2) If outlets are of incorrect electrical characteristics, or any specified equipment fails to operate properly, CONTRACTOR shall repair and/or replace the outlet and/or equipment.
 - 3) Utility connections (electrical, controls, gas, etc.) to roof mounted mechanical equipment shall be made through the side of the equipment and not from beneath the unit to facilitate future replacement.

2. Equipment and Appliances Furnished by Others:

- a. Equipment and appliances indicated on Drawings as "not in contract" (NIC), "furnished by others," or "furnished by the OWNER," will be delivered to the Project site. Required electrical connections shall be performed for such equipment and appliances. Motorized equipment will be furnished factory-wired to a control panel or junction box unless otherwise indicated. Appliances will be furnished equipped with portable cord and cap. Provide disconnect switches where required.
- b. Connections to equipment furnished under this Division shall be part of the Work of this section. Work shall include internal wiring, installation, connection and adjustment of bolted drive motors in which the motor is supplied as a separate unit, and connections only for equipment furnished with factory installed internal wiring, except as further limited by Drawings and this Specification. Work shall include furnishing and installing suitable outlets, disconnecting devices, starters, push-button stations, selector switches, conduit, junction boxes, and wiring necessary for a complete electrical installation. Work shall also include furnishing



- and installing conduit and boxes for HVAC control systems, furnished under Division 23. Devices and equipment furnished shall be of same type used elsewhere on the Work or as specified.
- c. Electrical equipment furnished under other sections, for installation and connection under Work of this section, will be delivered to the Project site ready for installation.
 - d. Mechanical equipment furnished under other sections, and requiring electrical connection under this section, will be set in place as part of the Work of the section furnishing such equipment unless noted otherwise.
 - e. Suitability and condition of equipment furnished under other sections shall be determined in advance of installation. Immediate notice of damage, unsuitability, or lack of parts shall be given to the entity providing such equipment.
- G. Power Distribution System Reports: For fault current, coordinatization and Arc-Flash system report requirements refer to applicable electrical distribution equipment sections. for specific requirements.
- H. Protection of Materials:
- 1. Protect materials and equipment from damage and provide adequate and proper storage facilities during progress of the Work. Damaged materials and/or equipment shall be replaced.
- I. Cleaning:
- 1. Exposed parts of Work shall be left in a neat, clean, usable condition. Finished painted surfaces shall be unblemished and metal surfaces shall be polished.
 - 2. Thoroughly clean parts of apparatus and equipment. Exposed parts to be painted shall be thoroughly cleaned of cement, plaster, and other materials. Remove grease and oil spots with solvent. Such surfaces shall be wiped, and corners and cracks scraped out. Exposed rough metal shall be smooth, free of sharp edges, carefully steel brushed to remove rust and other spots, and left in proper condition to receive finish painting.
 - 3. Remove rubbish, debris, and waste materials and legally dispose of off the Project site.
- J. WARRANTIES
- 1. Provide one-year warranty on all material and labor performed, unless noted otherwise in specific sections.



PART 2 - PRODUCTS - NOT USED

PART 3 - EXECUTION

3.01 GENERAL REQUIREMENTS

- A. Advise the Inspector before starting the Work of this Division.
- B. Exposed conduits shall be painted to match the surfaces adjacent to installation.
- C. Salvaged materials removed from buildings shall be removed from the Project site as required by the OAR.
- D. Trenches outside of barricade limits shall be backfilled and paved within 24 hours after being inspected by the Inspector. Provide traffic plates during the time that trenches are open in traffic areas and in areas accessible to the public.
- E. Where existing structural walls are cored for new conduit runs, separation between cored holes shall be three inches edge to edge from new or existing holes, unless otherwise required by the Architect. All coring to be laid out and reviewed by Architect prior to drilling. CONTRACTOR to verify location of structural steel, rebar, stress cabling or similar prior to lay out.
- F. Electrical equipment shall be braced and anchored for CBC Seismic Design requirements, or as otherwise indicated on the Drawings.

3.02 DELIVERY STORAGE AND HANDLING

- A. Deliver products to project site with proper identification, which shall include names, model numbers, types, grades, compliance labels, and similar information needed for District identification; all products and materials shall be adequately packaged and protected to prevent damage during shipment, storage, and handling.
- B. Coordinate deliveries of electrical materials and equipment to minimize construction site congestion.

3.03 CUTTING AND PATCHING

- A. Cutting and patching of electrical equipment, components, and materials shall include the removal and legal disposal of selected materials, components, and equipment.
- B. Do not endanger or damage installed Work through procedures and processes of cutting and patching.
- C. Repair or restore other work or surfaces damaged as a result of the work performed under this contract.



3.04 CLEANUP

- A. Remove rubbish, debris and waste materials and legally dispose off the Project site.
- B. Remove equipment and implements of service, and leave entire work area neat and clean, to the satisfaction of the OWNER Authorized Representative.

3.05 PROTECTION

- A. Protect the Work of this section until Substantial Completion.

END OF SECTION



SECTION 26 05 13

BASIC ELECTRICAL MATERIALS AND METHODS

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

1. Boxes, enclosures, keys and locks.
2. Receptacles and switches.
3. Identifications and signs.

B. Related Requirements:

1. Division 01 - General Requirements.
2. Division 26 – Electrical.
3. Division 27 – Communications.
4. Division 28 - Electronic Safety and Security.

PART 2 - PRODUCTS

2.01 BOXES, ENCLOSURES, KEYS AND LOCKS

A. Outlet Boxes and Fittings:

1. Outlet boxes installed in concealed Work shall be galvanized steel, pressed, or welded type, with knockouts.
2. In exposed Work, where conduit runs change direction or size, outlet boxes and conduit fittings shall be cast metal with threaded hubs cast integral with box or fitting.
3. Fittings shall be cast metal and non-corrosive. Ferrous metal fittings shall be cadmium-plated, or zinc galvanized. Castings shall be true to pattern, smooth, straight, with even edges and corners, of uniform thickness of metal, and shall be free of cracks, gas holes, flaws, excessive shrinkage, and burnt-out sand.
4. Covers for fittings shall be galvanized steel or non-corrosive aluminum and shall be designed for particular fitting installed.



5. Light fixture outlets shall be 4-inch octagon, 4-inch square, 2 1/8-inch deep or larger, depending upon number of conductors or conduits therein. Plaster rings shall be furnished with round opening with two ears drilled 2 23/32 inches center to center.
 6. For local device outlets provide 4-inch square 2 1/8-inch deep, boxes for single gang, 5-inch square boxes for two-gang, and special solid gang boxes with gang plaster ring for more than two switches.
- B. Junction and Pull boxes:
1. Junction and pull boxes, in addition to those indicated, shall only be used in compliance with codes, recognized standards, and Contract Documents.
 2. Interior and non-weatherproof boxes shall be constructed of blue or galvanized steel with ample laps, spot welded, and shall be rigid under torsion and deflecting forces. Boxes shall be furnished with auxiliary angle iron framing where necessary to ensure rigidity.
 3. Covers shall be fastened to box with enough machine screws to ensure continuous contact all around. Flush type boxes shall be drilled and tapped for cover screws if boxes are not installed plumb. Surfaces of pull and junction boxes and covers shall be labeled in black marker ink designating system, panelboard and circuit designation contained in box. In exposed Work, designation shall be installed on inside of pullbox or junction box cover.
 4. Weatherproof NEMA 3R pull and junction boxes shall conform to foregoing for interior boxes with following modifications:
 - a. Cover of flush mounting boxes shall be furnished with a weather-tight gasket cemented to, and trimmed even with, cover all around.
 - b. Surface or semi-flush mounting pull and junction boxes shall be UL, or another Nationally Recognized Testing Laboratory (NRTL) listed as rain-tight and shall be furnished complete with threaded conduit hubs.
 - c. Exposed portions of boxes shall be galvanized and finished with one prime coat and one coat of baked-on gray enamel, unless already furnished with factory baked-on finish.
 5. Junction and pull boxes shall be rigidly fastened to structure and shall not depend on conduits for support.
 6. Underground Concrete Pull Boxes:
 - a. Pre-cast concrete pull boxes. Concrete pull boxes shall be traffic type, reinforced for H-20 wheel loading, pre-cast concrete. Pull boxes with inside dimensions of 2 feet by 3 feet by 3 feet deep shall consist of a base section, top ring, and cover. Base section shall be furnished with 2



knockouts measuring 10 inches by 10 inches in each 3 feet side, and one 20 inches by 20 inches knockout in each 2-foot side. Pull boxes with inside dimension 4 feet by 4 feet by 4 feet deep shall consist of a base section, midsection, topping, and cover. Base section shall be furnished with 2 knockouts measuring 8-inch by 16-inch on each of two opposite sides, and one 20-inch by 20-inch knockout on each of other two opposite sides. Pull boxes shall be furnished with a minimum of 6-inch diameter sump knockout and one-inch diameter ground rod knockout. In pull boxes, furnish and install cable racks on walls. Racks shall be furnished with 3 porcelain cable holders on vertical steel mounting bars. Pull boxes shall be furnished with 3/4-inch diameter pull irons. Covers shall be traffic-type consisting of steel safety plate bolted to frame. Covers shall be marked as electrical, power, or signal as required.

- b. Provide end bells in duct entrances. Terminate each metal conduit with insulated bushing provided with a grounding terminal.
 - c. Provide 6-inch deep sand base under pull boxes.
 - d. Identify power and signal cables by tagging in manholes and pull boxes. Tie securely to cables with nylon cord.
 - e. Top of steel plate shall provide a minimum coefficient of static friction of 0.5 for either wet or dry locations, when tested for any shoe sole material. Test shall comply with ASTM D 1047 or F 489 or F 609 standards. Submit manufacturer's test results for Architect's review as part of materials and equipment submittals.
 - f. The use of underground extension boxes shall be limited to not more than 1 times the original depth of pull box.
 - g. Approved Products: Oldcastle Precast, Jensen Precast, Kistner, Western Precast, or OWNER approved equal.
7. Underground utility boxes shall be reinforced concrete with non-setting shoulders to prevent settlement following installation. Boxes shall be furnished with cast iron cover with finger hole, size as indicated on Drawings. Utility boxes shall be as manufactured by Oldcastle, Jensen, Kistner, Western Precast, or equal.
 8. Manholes, vaults, and pull boxes required by a utility company, and installed as part of this Contract, shall meet requirements of servicing utility company.

C. Floor Outlets:

1. Floor Outlets (except for extension outlets) shall be cast iron, watertight floor boxes with flush brass floor plates, and shall be set to finish flush with finish floor covering, whether it be carpeted, wood, resilient floor covering, or other finish materials.



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- a. Floor boxes shall be used in offices, classrooms, and in library areas only.
 - b. Approved Products: Harvey Hubbell Inc. B-2503, Thomas & Betts 640 series, Legrand Omnibox, or OWNER approved equal.
2. Telephones above floor outlets, where not subject to water, shall be provided with Harvey Hubbell Inc. SC-3098 pedestals with SC309T plates. Refer to other Division 26 sections. Floor boxes shall be used in offices, classrooms and in Library areas only.
 - a. Approved Products: Legrand 525 series, Thomas & Betts FPT-400 Series, or OWNER approved equal
 3. Plugs above floor outlets where not subject to water shall be provided with pedestal s and device plates. Refer to other Division 26 sections. Floor boxes shall be used in offices, classrooms, and library areas only.
 - a. Approved products: Pedestals shall be Legrand 525 series, Thomas & Betts FPT-400 Series, Harvey Hubbell Inc. SC-3098; Device plates shall be Hubbell SS309D, or District approved equal.
 4. Two gang and single box pedestal boxes shall be listed for wet locations where subject to water. Provide required cover plates.
 - a. Floor outlets shall be used in Cafeteria, Cafeteria serving areas, or any areas where floors are subjected to water.
 - b. Approved products: Single gang boxes - Hubbell SA-6687. Two gang boxes shall be Hubbell SA-6885, or OWNER approved equal.
 5. Extension floor outlets shall be cast iron with cast iron covers, and 1/2-inch offset entries for above-floor conduit extensions; Boxes shall be designed to permit access to wiring without disturbing above-floor extensions and shall be set flush with finish floor.
 6. Above floor service fittings for data outlets and surge suppression receptacles shall be faceplate interchangeable, die cast aluminum.
 - a. Approved products: Hubbell SC3098 with cover plates SS309DS, Legrand 525 series, Thomas & Betts FPT-400 Series, or OWNER approved equal.
- D. Floor Pockets – Plugging Boxes:
1. Three-Gang floor lighting pockets shall be flush floor type recess floor mounted enclosure, with cast iron floor plate and hinged cast iron door notched for cables.



- a. Each floor pocket shall be provided with three 20-amp, 3 wire, 125-volt receptacles with matching caps.
- b. Approved products: Legrand or Hubbell Recessed Floor Boxes, C.W. Cole TLS 353-6, or equal, for wood floors and C.W. Cole TLS-353-6-C, or OWNER approved equal for concrete slabs.

2. Single Gang:

- a. Receptacle floor pockets shall be single gang, flush floor type, with cast iron floor plate, hinged cast iron door notched for cable and cast-iron box. Provide each pocket with a standard, single grounding type receptacle unless otherwise indicated.
 - 1) Approved Products: C.W. Cole TLA-362-1-FE, or OWNER approved Legrand or Hubbell recessed floor box, or OWNER approved equal. For wood floors provide C.W. Cole TLS-362-1, or OWNER approved equal.
- b. Microphone or projector floor pockets shall be single gang flush floor type with cast iron floor plate, hinged cast iron door, notched for cable and cast-iron box.
 - 1) Approved Products: Legrand or Hubbell recessed floor box, C.W. Cole TLA-362-3-FE, C.W. Cole TLS-362-3, in wood floors, or OWNER approved equal.

E. Keys and Locks:

1. Provide two keys with furnished door locks, including cabinet door locks and switchboard locks, two keys for lock switches on switchboards or control panels, and two keys with interlocks or other furnished lock switches. Deliver keys to OAR.
2. Special keys and locks shall only be provided where specified. Locks shall be keyed to Corbin No. 60 or 70 as follows:
 - a. Access to operate equipment shall be keyed to Corbin 60.
 - b. Access to service areas shall be keyed to Corbin 70.

2.02 RECEPTACLES AND SWITCHES

A. Receptacles:

1. Duplex receptacles shall be heavy-duty specification grade, grounding type. Terminal screws shall be wired on the side and back with internal screw pressure plates. Mounting strap shall feature heavy-duty brass construction. Receptacle



back body shall be PVC. Receptacle face shall be ivory, impact resistant nylon. Receptacles shall have triple wipe brass power contacts.

a. Approved products:

<u>NEMA #</u>	<u>Pass & Seymour</u>	<u>Hubbell</u>	<u>Leviton</u>
(20 amps) NEMA 5-20	PS5362-I	HBL5362-I	5362-I
(15 amps) NEMA 5-15	PS5262-I	HBL5262-I	5262-I

Equal products approved by OWNER may be acceptable.

2. Duplex receptacles on circuits supplied by panel boards with integral surge suppression shall be Pass & Seymour model number PS5262BL (blue), Hubbell DRUBTVSS15, Leviton 5262-SBU, 15-amps, 120-volts, or OWNER approved equal.

3. Single receptacles shall be heavy-duty specification grade, grounding type. Terminal screws shall be back and side wire with internal screw pressure plates. Mounting strap shall feature heavy-duty brass construction. Receptacle back body shall be thermoplastic. Receptacle face shall be ivory, impact resistant nylon. Receptacles shall have triple wipe brass power contacts. For circuits consisting of one single receptacle only, ampere rating of receptacle shall be same as circuit breaker or fuse.

a. Approved products:

<u>NEMA #</u>	<u>Pass & Seymour</u>	<u>Hubbell</u>	<u>Leviton</u>
(20 amps) NEMA 5-20R	5361-I	HBL5361-I	5361-I
(15 amps) NEMA 5-15R	5261-I	HBL5261-I	5261-I

Equal products approved by OWNER may be acceptable.

4. Single 15 and 20-amps receptacles on circuits supplied by panel boards with integral surge suppression shall be blue in color.

a. Approved products: Pass & Seymour NEMA 5-20R model number 5361-BL (blue), NEMA 5-15R model number 5261-BL (blue), or OWNER approved equal.

5. Provide specification grade ground-fault circuit interrupter (GFCI) type receptacles in accordance with 2010 UL standards. GFCI receptacles shall have a trip indication light. Receptacle terminal screws shall be back and side wire with internal screw pressure plates. Test and reset buttons shall match device body and shall be ivory. GFCI receptacles shall be manufactured in standard configuration for installation with stainless steel smooth plates. Exterior mounted receptacles shall be mounted inside weatherproof enclosure.

6. Provide weatherproof receptacles, except where otherwise indicated or specified, consisting of GFCI receptacles, as specified herein, and metal plates with die-cast lockable hinged lids and weatherproof mats;



Tamper-resistant receptacles with thermoplastic dual mechanism shutter system to help prevent insertion of foreign objects. Receptacles shall have extra heavy-duty brass, one-piece mounting strap with integral ground. Receptacles shall be ivory color, impact resistant nylon face and back body.

B. Switches

1. Local Switches:

- a. Local switches shall be high strength thermoplastic toggle, industrial grade, rated 20 amps at 120-277 volts AC only, with plaster ears, external screw pressure plate back and side wired, and standard size composition cups which fully enclose mechanism. Switches shall be approved for installation at currents up to full rating on resistive, inductive, tungsten filament lamp and fluorescent lamp loads, and for up to 80 percent of rating for motor loads. Switches shall have oversized silver alloy contacts for long life and better heat dissipation. Provide switches as single pole, double pole, 3-way, 4-way, non-lock type. Provide non-lock type switches with ivory handles;

	<u>Pass & Seymour</u>	<u>Hubbell</u>	<u>Leviton</u>
Single pole	PS20AC1I	HBL1221I	1221-2I
Double pole	PS20AC2I	HBL1222I	1222-2I
Three-way	PS20AC3I	HBL1223I	1223-2I
Four-way	PS20AC4I	HBL1224I	1224-2I

Equal products approved by OWNER may be acceptable.

2. Emergency Lighting Control Unit

- a. The Emergency Lighting Control Unit shall provide all required functionality to allow a standard lighting control device to control emergency lighting in conjunction with normal lighting in any area within a building.
- b. The emergency lighting control unit shall allow control of emergency lighting fixture in tandem with normal lighting in an area while ensuring that emergency lighting will turn on immediately to full brightness upon loss of normal power supplying the control device. Emergency lighting operation shall be independent for each controlled area and shall not require a generalized power failure for proper operation.
- c. The device shall have normally closed dry contacts capable of switching 10-amp emergency ballast loads at 120-277 VAC, 60 Hz., 2-amp tungsten loads at 120 VAC, 60Hz., LED loads at 120-277V VAC, 60 Hz
- d. The device shall have universal rated voltage inputs provided for normal power sense and normal switched power at 120-277 VAC, 60 Hz.



- e. The device shall provide separate LEDs to indicate the presence of normal and emergency power sources. The LEDs shall indicate the unit's current operational mode (normal or emergency)
- f. The device's normal power input terminal shall be connected to the line side of the control device such that any upstream fault causing a loss of power, including the tripping of the branch circuit breaker, will force the unit into the emergency mode and turn on the emergency lighting.
- g. The unit shall automatically switch emergency lighting on and off as normal lighting is switched. When normal power is not available, the unit shall force and hold emergency lighting on regardless of the state of any external control device until normal power is restored.
- h. Approved products: WattStopper ELCU-100 Emergency Lighting Control Unit, LVS #EPC-PM Series, Lighting Control Design #GR 2001 series, or OWNER approved equal.

3. School Main Entrance Intercom Station: Refer to specification section 28 1000 – Access Control System.

2.03 IDENTIFICATION AND SIGNS

A. Identification Plates:

1. Provide identification plates for the following unless otherwise specified, for switchboards, unit substations, motor control centers, control panels, push-button stations, time switches, contactors, motor starters, motor switches, panelboards, and terminal cabinets.
2. Identification plates shall be of plastic stock and shall adequately describe function, voltage and phase of identified equipment. Where identification plates are detailed or described on Drawings, inscription and size of letters shall be as indicated. For lighting and power panels, identification plates shall indicate panel designation, voltage, and phase of panel. For terminal cabinets, identification plates shall indicate system contained in terminal cabinet.
3. Identification plates shall be black-and-white nameplate stock of bakelite with characters cut through black exposing white. Plates shall be furnished with beveled edges and shall be securely fastened in place with No. 4 Phillips-head, cadmium-plated steel, self-tapping screws. Characters shall be 3/16 inch high, unless otherwise indicated.

B. Markings:

1. Install identification markings to surface-mounted starters, switches, disconnect switches, contactors, and other devices controlling motors and appliances. Provide abbreviations required along with an identifying number. Markings to be provided with locking type stencils using paint of a contrasting color. Figures



shall be 3/8 inch high unless otherwise indicated. Dymo Industries Inc., self-sticking plastic labels, with embossed characters made with a typewriter may be installed instead of stencils and paint; p-touch self adhesive plastic, or Brother P-Touch self sticking laminated plastic labels may be installed.

2. High Voltage: High voltage switchboards, cabinets, boxes, and conduits exposed in accessible locations, including under buildings and in attics, are required to be marked "WARNING-HIGH VOLTAGE – ABOVE 600 VOLTS". Markings for switchboards shall consist of 18 gage steel, porcelain enamel sign of standard manufacture. Markings for boxes, cabinets, and conduits shall be by means of stenciling or printed self-adhesive markers, Westline Tel-A-Pipe, or equal. Provide letters of black on orange background and not less than 1-7/8 inches high. On conduit runs, install markings at intervals not exceeding 10 feet in any individual area. Markings shall be installed after other painting Work is complete.

C. Warning Signs:

1. Provide a warning sign on outside of each door or gate to rooms or enclosures containing high voltage equipment. Signs required reading, "WARNING - HIGH VOLTAGE - KEEP OUT". Provide 2-inch high lettering.
2. Provide a warning sign on each high-voltage non-load break disconnect and fused cutout (not oil filled). Signs required reading, "DO NOT OPEN UNDER LOAD". Provide 2-inch-high lettering.
3. Provide signs of standard manufacture, 18 gage steel, with porcelain enamel finish. Provide red lettering on a white background.

PART 3 - EXECUTION

3.01 INSTALLATION AND SUPPORT OF BOXES

- A. Install outlet boxes flush with finished surface of wall or ceiling. Install plumb and securely fastened to structure, independent of conduit. Except where otherwise indicated, provide factory-fabricated adjustable attachment bar hangers between studs to support outlet boxes. When installation is performed in fire rated walls, maintain the wall's rating integrity by means of approved fire stop methods.
- B. Outlet boxes installed in suspended or furred ceilings with steel runner or furring channels shall be supported, except where otherwise indicated, by a Unistrut P-4000 Tessco A1200HS-10, Cooper B-Line B22s-HG, or OWNER approved equal channel spanning main ceiling runner channels. Each box shall be supported from its channel by a 3/8-inch 16 threaded steel rod with a Unistrut P-4008, Fastenal #48604, Copper B-Line 78101140346 or OWNER approved equal; nut and a Tomic No. 711-B Adapta-Stud, or OWNER approved equal. Rod shall be tightened to a jamb fit with channel and its nut. Box shall be locked to rod by means of a 1/2-inch locknut on stud and a 3/8-inch 16 hex nut locking stud to rod.



- C. Heights of outlets and equipment indicated on Drawings shall govern. In absence of such indications, following heights shall be maintained with heights measured to centerline unless otherwise noted:
1. Install wall-mounted switches at 48 inches above finished floor.
 2. Outlet boxes for fire alarm pull stations shall be mounted at a mounting height above finished floor that ensures that the operating handle of the initiating device is no higher than 48 inches from finished floor.
 3. Wall mounted fire alarm strobe or horn/strobe devices shall be mounted such that the entire lens is not less than 80 inches above finished floor. If ceiling heights allow, wall mounted appliances shall have bottom of lens a minimum of 80 inches but not more than 96 inches to the top of lens.
 4. Install outdoor fire alarm audible devices or fire alarm sprinkler flow bells at least 10 feet but not more than 12 feet above finished floor to center. Provide STI or other OWNER approved protective covers as required in plans.

3.02 COVER PLATES

- A. Provide a plate on each switch, plug, pilot light, data, interphone, public telephone, and television outlet, and on existing and reset outlets where so indicated or required. Plates shall be of stainless steel unless otherwise specified.
- B. Flush wiring device and signal system outlets indicated to be blank covered, shall be covered with blank stainless-steel plates. Flush lighting outlets to be blanked shall be covered with Wiremold 5736 steel covers, or equal, painted to match surrounding finish. Provide stainless steel covers to blank indicated or required surface-mounted outlets.
- C. In the following cases, and at required locations. Switch and receptacle plates shall be engraved with the device(s), or fixtures being controlled, or as indicated:
1. Three-gang and larger gang switches in locations other than classrooms.
 2. Lock switches.
 3. Pilot switches.
 4. Switches so located that operator cannot see fixtures, or items of equipment controlled while his hand is on the switch.
 5. Switches not in same room with fixtures or items of unit heaters, air curtains, fly fans, etcetera.
 6. Receptacles operating at other than 120 V shall be identified with the operating voltage.
 7. Switches operating on 277 V shall be identified with the operating voltage.



8. Where indicated on Drawings.

- D. Designations shall be as indicated on Drawings or as specified by Architect.
- E. Standard GFI cover plates shall be Pass & Seymour 4600, Raco 5028-0, or equal. GFI cover plates shall be provided with a CAM lock mechanism with two keys or a padlock hasp that does not protrude through the face of the cover and will allow the shank of locks keyed Corbin No. 60 keys.

3.03 IDENTIFICATION OF CIRCUITS AND EQUIPMENT

- A. Provide descriptive nameplates or tags permanently attached to switchboards, motor control centers, transformers, panelboards, circuit breakers, disconnect switches, starters, pushbutton control stations and other apparatus installed for operation or control of circuits, appliances, fire alarm control panel(s), fire alarm annunciator(s), power supplies, terminal cabinets, energy management control units, and Information technology system backbone and distribution equipment points.
- B. Provide nameplates of engraved laminated plastic, or etched metal. Submit Shop Drawings denoting dimensions and format to Architect before installation. Fasten to equipment with escutcheon pins, rivets, self-tapping screws, or machine screws. Self-adhering or adhesive backed nameplates are not permitted.
- C. Fasten tags to feeder wiring in conduits at every point where runs are broken or terminated, including pull wires in empty conduits. Indicate circuit, phase, and function. Tag branch circuits in panel boards and motor control centers. Tags may be manufactured of pressure-sensitive plastic or embossed self-attached stainless steel or brass ribbon.
- D. Provide circuit identification cards and cardholders in all panel boards. Cardholders shall consist of metal frame retaining a clear plastic cover permanently attached to inside of panel door. List of circuits shall be typewritten on a card. Circuit description shall include name or number of circuit's area and connected load.
- E. Junction and pull boxes shall have covers stenciled with box number when indicated on Drawings, or circuit numbers according to panel schedules. Data shall be lettered in a conspicuous manner with a color contrasting with finish.
- F. Name shall be correctly engraved, with a legend indicating function or areas, when required by codes or indicated on Drawings.

3.04 PROTECTION

- A. Protect Work of this section until Substantial Completion.

3.05 CLEANUP

- A. Remove rubbish, debris, and waste materials and legally dispose of off Project site.



Department of Neighborhood Services and Public Safety
GOLETA TRAIN DEPOT PROJECT

END OF SECTION



SECTION 26 05 19 LOW-VOLTAGE WIRES (600 VOLT AC)

PART 1 - GENERAL

1.01 SUMMARY

- A. Provisions of Division 01 apply to this section.
- B. Section Includes: Low-voltage wire, splices, terminations and installation.

1.02 SUBMITTALS

- A. Provide in accordance with Division 01.
- B. List of Materials: Submit a complete list of proposed materials.
- C. Shop Drawings: Provide detailed and dimensioned Shop Drawings indicating kind, weight and thickness of materials, insulation type, resistivity, conductivity, impedance, and conductance. Drawings shall contain sufficient information to assemble and install equipment at the Project site without further instructions.
- D. Prior to start of construction; provide letter from wiring and electrical cables manufacturer certifying that the products are qualified/ listed as low electromagnetic field products.

1.03 SUBSTITUTIONS

- A. Deviations/Substitutions from these requirements shall not be accepted without written approval from OWNER'S Design Standards Section and Maintenance and Operations Technical Unit. When deviating are proposed the following information shall be submitted:
 - 1. Substitution request form stating reasons and benefits to OWNER.
 - 2. OWNER'S approval shall be obtained for any equipment or materials substitutions.
 - 3. Proposed substitutions requests shall provide proof of compliance with OWNER'S requirements and applicable standards.
- B. Submittals must comply with contract general provisions.

1.04 QUALITY ASSURANCE



- A. Components and materials shall be listed and approved for the intended application by Underwriter's Laboratories (UL), or other Nationally Recognized Testing Laboratory (NRTL), and in compliance with applicable industry standards and codes.
- B. Wiring installation shall be performed under the supervision of state certified electricians. Contractor or Installer's electricians shall be certified in accordance with Labor Code sections 3099, and 3099.2 and section 209.0 of the California Code of Regulations.
- C. Contractor shall have adequate experience installing systems of similar size and complexity.
 - 1. Qualifications of Installer: Minimum five years of experience installing products and systems of similar scope and complexity.
 - 2. Installer shall have completed at least five projects of equivalent scope and complexity.
 - 3. Contractor shall have completed and commissioned a minimum of five service agreements that provide similar support services to those needed for this project.
 - 4. System startup and testing shall be performed under direct observation of the Project Inspector and OAR.
- D. The Project Inspector will observe installation of feeder cables. Notify the Project Inspector not less than two working days in advance of the proposed time of feeder installation.

1.05 WARRANTY

- A. Provide a one year labor warranty.
- B. Provide material warranty of no less than 10 years.
- C. Warranty period begins at substantial completion or project acceptance for beneficial occupancy.
- D. CONTRACTOR shall warranty all products and materials. Multiple warranty sources is not acceptable.

PART 2 - PRODUCTS

2.01 WIRES



- A. Pressure cable connectors shall be pre-insulated 3M Scotchlok, Ideal Wing Nut, O-Z/Gedney or equal.
- B. Wires shall be single conductor type THHN or THWN insulated with polyvinyl chloride and covered with a protective sheath of nylon, rated at 600 volts. Wires may be operated at a maximum continuous conductor temperature in dry locations of 90 degrees C. and 75 degrees C. in wet locations. Wires and cables shall be listed by Underwriter's Laboratories (UL) Standard 83 for thermoplastic insulated wires, and listed for installation in accordance with Article 310 of the California Electrical Code (CEC).
- C. Conductors shall be solid copper for 12 AWG and smaller conductors, and stranded copper for 10 AWG and larger conductors.
- D. Conductors shall be insulated with PVC and sheathed with nylon.
- E. Wires shall be identified by surface markings indicating manufacturer's identification, conductor size and metal, voltage rating, UL symbol, type designations and optional rating. Indentations for lettering are not permitted.
- F. Wires shall be tested in accordance with the requirements of UL standard for types THWN and THHN.
- G. Conductors shall be solid Class B or stranded Class C annealed uncoated copper in accordance with UL standards, or another Nationally Recognized Testing Laboratory (NRTL).

2.02 STANDARDS

- A. THWN/THHN wires shall comply with the following standards:
 - 1. UL 83 for thermoplastic insulated wires.
 - 2. UL 1063 for machine tool wires and cables.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Wires shall not be installed until debris and moisture is removed from conduits, boxes, and cabinets. Wires stored at site shall be protected from physical damage until they are installed and walls are completed.
- B. Wire-pulling compounds furnished as lubricants for installation of conductors in raceways shall be compounds approved and listed by UL, NRTL, or equal. Oil, grease, graphite, or similar substances are not permitted. Pulling of 2 AWG or larger conductors shall be performed with a cable pull machine. Any runs shorter than 50



feet are exempt. When pulling conductors, do not exceed manufacturer's recommended values

- C. At outlets for light, power, and signal equipment, pigtail splices with 8-inch circuit conductor leads for connection to fixtures, equipment, and devices.
- D. Pressure cable connectors, Yellow, Red, or Blue spring-loaded twist-on type, may be furnished in splicing number 8 AWG or smaller wires for wiring systems. Listed Push-in spring clamp wire connectors, Ideal In-Sure, or equal may be used in luminaires for fixture wiring.
- E. Joints, splices, taps, and connections to switchboard neutral, bonding or grounding conductors, conductors to ground busses, and transformer connections for wires 6 gage and larger shall be performed with high-pressure cable connectors approved for installation with copper conductors. Connectors shall be insulated with heavy wall heat shrink WCSM, or cold-applied roll-on sleeve RVS. Insulation level shall be a minimum of 600V and joints, splices, and taps shall be qualified to ANSI C 119.1, UL, NRTL, or equal listed mechanical pressure connections.
- F. Connections to any bussing and high-press cable connectors shall be securely bolted together with corrosion-resistant plated carbon steel, minimum grade five machine screws secured with constant pressure-type locking devices.
- G. Connection of any bonding or grounding conductors shall be securely bolted together with corrosion-resistant plated carbon steel, minimum grade five machine screws secured with constant pressure-type locking devices.
- H. Wire switchboards, panel cabinets, pull boxes, and other cabinets except public address, shall be neatly grouped and tied in bundles with nylon ties at 10-inch intervals. In switchboards, panels and terminal blocks, wires shall be fanned out to terminals. If bundles are longer than 24 inches, a maximum of nine current carrying conductors may be bundled together.
- I. Install conductor lengths with a minimum length within the wiring space. Conductors must be long enough to reach the terminal location in a manner that avoids strain on the connecting lug.
- J. Maintain the conductor required bending radius.
- K. Neutral conductors larger than 6 gage, which are not color identified throughout their entire length, shall be taped, painted white or natural gray, or taped white where they appear in switchboards, cabinet, gutters or pull boxes. Neutral conductors 6 gage and smaller shall be white color identified throughout their entire length.
- L. Fire alarm and clock wiring shall be continuous from terminal cabinets or from equipment to each device. Splices are not permitted between devices and/or terminal



cabinets at junction and pull boxes. Wiring shall be terminated at terminal blocks or devices only.

- M. Wiring systems shall be free from short circuits and grounds, other than required grounds. The contractor shall be responsible for the testing of feeder and branch circuit conductor's insulation resistance. The insulation of the conductors shall be tested prior to connections to any panelboards, switchboards, variable frequency drives, lighting control systems, ballasts, and wiring devices such as but not limited to GFI receptacles, TVSS receptacles, or equipment. Insulation testing of panelboards and switchboards shall be independently performed from the insulation testing of any conductors as specified in other sections of this specification.
1. Utilize the services of an approved independent testing laboratory to perform megger time-resistance insulation testing of feeder conductors. Tests must be conducted with wires disconnected at both ends.
 - a. Provide calibration program records to assure the testing instrument to be within rated accuracy. The test equipment accuracy shall be in accord with the requirements stated by the National Institute of Standards and Technology (NIST).
 - b. Test equipment shall be provided with a label stating the date of last calibration. As a minimum the equipment shall have been calibrated within the past 12 months.
 - c. Test reports shall include the following:
 - 1) Identification of the testing organization.
 - 2) Equipment identification.
 - 3) Ambient conditions.
 - 4) Identification of the testing technician.
 - 5) Summary of project.
 - 6) Description of equipment being tested.
 - 7) Description of tests.
 - 8) Test results.
 - 9) Analysis, interpretation and recommendations.
 2. Utilize the services of an approved independent testing laboratory or a qualified contractor's employee (Technician certified in accordance with ANSI/NETA ETT-2000 Standard for Certification of Electrical Testing Personnel) to perform megger time-resistance insulation testing of branch circuit conductors. Tests must be conducted with wires disconnected at both ends.



- a. Test equipment and report requirements stipulated under paragraph 3.01.N.1 apply to branch circuit testing.
- 3. Tests shall be performed in the presence of the Project Inspector.
- 4. Insulation resistance shall not be less than 100 mega-ohms.

3.02 COLOR CODES

A. General Wiring:

- 1. For phase and neutral conductors 6 gage or larger, permanent plastic-colored tape may be furnished to mark conductor end instead of coded insulation. Tape shall cover not less than 2 inches of conductor insulation within enclosure.
- 2. Color code conductor insulation as follows:

SYSTEM VOLTAGE		
Conductor	208Y/120	480Y/277
Phase A	Black	Brown
Phase B	Red	Orange
Phase C	Blue	Yellow
Neutral	White	Natural Gray

Neutrals shall be colored-distinguished if circuits of two voltage systems are used in the same raceway.

- 3. Where two voltage systems are combined in an enclosure; CONTRACTOR shall apply a permanent color code label where the circuits originate.
- B. Signal Systems: Wires for signal systems shall be color-coded and installed under observation of the Project Inspector. Except where otherwise specified, color-coding shall be as follows:

EDIT NOTE: IN NEW SCHOOLS AND SOME EXISTING SCHOOLS THE PROGRAM SIGNAL IS THROUGH THE PA SYSTEM; PROGRAM BELLS ARE NOT PRESENT. DELETE REFERENCE TO PROGRAM BELLS AS NEEDED.

<u>SYSTEM</u>	<u>COLOR CODE</u>
Clocks	Pink, Gray and Orange
Program Bells (some existing elementary schools)	White (Common)Black



Initiating Devices (Non-Addressable)	Red (+) and Black (-)
Program Bells (some existing secondary schools)	White (120 volt, common) Black (C.R. program) Blue (Shop program) Brown (Gym program) Yellow (Auditorium fire alarm)
Fire Alarm Horns	Pink (+) and Gray (-)
Fire Alarm Strobes	Orange (+) and Blue (-)
Un-Interruptible 24 Volt Power (Annunciator, Water Flow, and Audible Device)	Yellow (+) and White (-) Note: A single white wire may be common to both
Interruptible 24 Volt Power (4 wire smoke detectors, duct detectors)	Brown (+) and White (-) Note: A single white wire may be common to both
Switch-Leg Sprinkler Bell (Between water flow and audible device)	Violet (+) and White (-)
Door Holding Magnets (Non Power Limited)	Black (+) and White (-)

3.03 FEEDER IDENTIFICATION

- A. Feeder wires and cables shall be identified at each point the conduit run is broken by a cabinet, box, gutter, etc. Where terminal ends are available, identification shall be by means of heat shrink wire markers, which provide terminal strain relief. Markers shall be by Tyco Electronics, Panduit, Brady Perma-Sleeve, or equal. Identification in other areas shall be by means of wrap-around tape markers from Tyco Electronics, Panduit, Brady Perma-Code or equal. Markers shall include feeder designation, size, and description.

3.04 TAPE AND SPLICE KITS

- A. Splices, joints, and connectors joining conductors in dry and wet locations shall be covered with insulation equivalent to that provided on conductors. Free ends of conductors connected to energized sources shall be taped. Voids in irregular connectors shall be filled with insulating compound before taping. Thermoplastic insulating tape approved by UL, NRTL, or equal for installation as sole insulation of splices shall be furnished and shall be installed according to manufacturer's printed specifications.

3.05 PROTECTION

- A. Protect the Work of this section until Substantial Completion.

3.06 CLEANUP



Department of Neighborhood Services and Public Safety
GOLETA TRAIN DEPOT PROJECT

- A. Remove rubbish, debris and waste materials and legally dispose of off the Project site.

END OF SECTION



SECTION 26 05 26 GROUNDING AND BONDING

PART 1 - GENERAL

1.01 SUMMARY

- A. Provide and install an effective grounding and bonding system.
- B. Related Requirements:
 - 1. Refer to related sections for their system grounding requirements.
 - 2. Division 01 - General Requirements.
 - 3. Division 26 – Electrical.
 - 4. Division 27 – Communications.
 - 5. Division 28 - Electronic Safety and Security.

1.02 QUALITY ASSURANCE

- A. Reference Standards:
 - 1. IEEE 142 Green Book.
 - 2. Underwriter's Laboratories (UL).
 - 3. California Electrical Code.
 - 4. Building Industry Consultant Services International (BICSI).
 - 5. EIA/TIA (Signal and power).
 - 6. Nationally Recognized Testing Laboratory (NRTL).

1.03 SYSTEM DESCRIPTION

- A. Equipment, components, or materials that enclose electrical conductors, or are likely to be energized by electrical currents shall be effectively grounded.
- B. Metal equipment parts such as switchboards, panelboards, metal enclosures, raceways, equipment grounding conductors, and earth grounding electrodes shall be effectively bonded into a continuous grounding path.



- C. Metallic systems or electrically conductive materials shall be effectively bonded to the building's grounding electrode system.
- D. A separately derived AC system shall be grounded to the equipment grounding conductor and to a separate "made" electrode of building grounding electrode system.
- E. Provide effective electrical equipment bond continuity to all metal raceways and enclosures. Grounding shall be achieved through a code sized green insulated grounding conductor provided within each raceway.
 - 1. Each flexible conduit over six feet in length shall be provided with a green insulated grounding conductor of required size.
 - 2. Provide code sized equipment grounding conductor in all flexible conduits as required by CEC.
 - 3. The length of flexible conduit installations shall not be less than six feet.
 - 4. Effectively ground metal raceways and enclosures at each end.
- F. Cold water, or other utility piping systems, shall not be utilized as grounding electrodes. In addition to bonding to cold water pipe provide at least one of the following made grounding electrodes:
 - 1. A dedicated "made" electrode, fabricated of at least 20 feet of uncoated galvanized 1/2 inch diameter rebar encased by at least two inches of concrete, and placed next to the bottom of a concrete foundation, or footing in direct contact with earth. A welded extended portion shall surface at the location of the common grounding electrode bus bar and be extended by a 3/0 exothermic welded bare copper cable, or be welded directly to the bus. The exothermic weld shall be at least four inches above finished floor in a dry location. The main grounding electrode and associated grounding conductors shall be in an enclosure and in conduit.
 - 2. Concrete enclosed electrode, fabricated of at least 20 feet of No. 2 AWG, minimum size, bare copper conductor, encased by at least two inches of concrete, located within or near bottom of a concrete foundation, or footing, which is in direct contact with earth. Footing rebar shall be connected to copper wire with approved connectors.
 - 3. An external grounding electrode, as specified hereafter or as required by the CEC shall be installed and connected to foundation or footing rebar.
 - 4. Extend the ground connections to the reinforcing steel of the concrete pads. Connect ground connections to 20 feet minimum of one or more of concrete pad reinforcing steel bars not less than 1/2 inch diameter. Provide a concrete



- encased electrode consisting of 20 feet of bare copper conductor not smaller than No. 4 AWG.
5. Ground metal sheathing and any exposed metal, vertical structural elements of buildings. Ground metal fences enclosing electrical equipment. Bond any metal equipment platforms which support electrical equipment to that equipment. Provide good electrical contact between metal frames and railings supporting push button stations, receptacles, instrument cabinets, etc., and raceways carrying circuits to those devices.
- G. Non-current carrying metal parts of high-voltage (1000 Volts or more) equipment enclosures, signal and power conduits, switchboard and panelboard enclosures, motor frames, equipment cabinets, and metal frames of buildings shall be permanently and effectively bonded to the grounding system. Provide a CEC sized equipment grounding conductor in every raceway.
- H. Metallic or semi-conducting shields and lead sheaths of cables operating above 1000 Volts shall be permanently and effectively grounded at each splice and termination.
- I. Neutral of service conductors shall be grounded as follows:
1. Neutral shall be solidly grounded at only one point within the Project site for that particular service. Preferable location of grounding point shall be at the service switchboard, or main switch.
 2. Equipment and conduit grounding conductors shall be bonded to that grounding point.
 3. If other buildings or structures on the Project site are served from a switchboard or panelboard in another building, power supply is classified as a feeder and not as a service.
 4. Equipment grounding conductor shall be installed from switchboard to each individual building. At building, grounding conductor shall be bonded with power equipment enclosures, metal frames of building, etc., to “made” electrode for that building.
 5. Feeder neutrals shall be bonded at service entrance point only; neutrals of separately derived systems shall be bonded at the source only.
- J. If there is a distribution transformer at a building the secondary neutral conductor shall be grounded to “made” electrode serving the building.
- K. Within every building, the main switchboard or panelboard, shall be bonded to the cold water line. Metallic piping systems such as gas, fire sprinkler, or other systems shall be bonded to the cold water line.



1.04 SUBMITTALS

- A. Provide in accordance with Division 01.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Furnished yard boxes shall be precast concrete and shall be approximately 14 inches wide by 19 inches long by 12 inches deep or larger.
- a. Boxes shall be furnished with bolt-down, checkered, cast iron covers and cast-iron frames cast into the yard boxes.
 - b. Provide yard boxes with hinged Frame Locking Cover.
 - c. Approved products include Brooks No. 36 HFL, Jensen Precast, Oldcastle Precast, Western Precast, Kistner, or equal.
- B. External ground electrodes shall be copper-clad steel ground rods, minimum 3/4-inch diameter by ten feet long.
- C. Clamps and fittings used in ground boxes below grade shall be listed for direct burial.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Grounding electrodes shall be installed in the nearest suitable planting area, where not otherwise indicated on Drawings, and each electrode shall terminate within a concrete yard box installed flush with finish grade. In planting areas, finish elevation of concrete yard boxes shall be two inches above planting surfaces.
- B. If concrete enclosed electrode is provided, grounding wire shall be terminated to a suitable copper plate with grounding lugs and must be enclosed in a raceway or box.
- C. Grounding rods shall be driven to a depth of not less than eight feet. Permanent ground enhancement material, (GEM) as manufactured by Erico Electrical Products, Loresco Powerset, Tessco Ultrafil or equal, shall be installed at each ground rod to improve grounding effectiveness. Install in accordance with manufacture's installation instructions.
- D. Grounding electrodes shall provide a resistance to ground of not more than 25 ohms.



- E. When installing grounding rods, if resistance to ground exceeds 25 ohms, two or more rods connected in parallel, or coupled together shall be provided to meet CEC grounding resistance requirements.
- F. Ground rods shall be separated from one another by not less than ten feet.
- G. Parallel grounding rods shall be bonded together with listed fittings and grounding conductors in galvanized rigid steel conduit, buried not less than 12 inches below finish grade.

3.02 TESTING

- A. Provide the services of an approved independent testing laboratory to test grounding resistance of “made” electrodes, ground rods, bonding of building steel, water pipes, gas pipes and other utility piping. Tests shall be performed as follows:
 - 1. Visually and mechanically examine ground system connections for completeness and adequacy.
 - 2. Perform fall of potential tests on each ground rod or ground electrode where suitable locations are available per IEEE Standard No. 81, Section 8.2.1.2. Where suitable locations are not available, measurements will be referenced to a known dead earth or reference ground.
 - 3. Perform the two-point method test per IEEE No. 81, Section 8.2.1.1 to determine ground resistance between ground rod and building steel, and utility piping - such as water, gas and panelboard grounds. Metal hand railings at building entrances and at handicapped ramps shall also be tested.
 - 4. Test shall be performed in the presence of the Inspector.
- B. Submit 3 copies of test results to the Architect. Test results shall be submitted on an official form from the independent testing laboratory recording Project location, test engineer, test conditions, test equipment data, ground system layout or diagram, and final test results.

3.03 PROTECTION

- A. Protect the Work of this section until Substantial Completion.

3.04 CLEANUP

- A. Remove rubbish, debris, and waste materials and legally dispose of off the Project site.

END OF SECTION



SECTION 26 05 33
RACEWAYS, BOXES, FITTINGS, AND SUPPORTS

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

1. Raceways and wire ways.
2. Conduit installation.
3. Underground requirements.

B. Related Requirements:

1. Section 26 05 00: Common Work Results for Electrical.
2. Section 26 05 13: Basic Electrical Materials and Methods.
3. Division 27: Communications.
4. Division 28 - Electronic Safety and Security.

C. Applicable Standards and Codes.

1. EIA/TIA 569 Standards.
2. National American Standards Institute (ANSI).
3. National Electrical Manufacturer's Association (NEMA).
4. Nationally Recognized Testing Laboratory (NRTL).
5. California Electrical Code (CEC).
6. Uniform Building Code (UBC).
7. Underwriters Laboratory (UL).

1.02 SUBMITTALS

- A. Materials List: Provide in accordance with Division 01.**

PART 2 - PRODUCTS

2.01 RACEWAYS

A. Conduit Materials:

1. Metallic conduit, and tubing shall be manufactured under the supervision of an UL, or another NRTL factory inspection and label service program. Each ten-



- foot length of conduit and tubing shall bear the UL or another NRTL label and manufacturer's name.
2. Rigid metallic conduit shall be rigid steel, heavy wall, mild steel, zinc-coated, with an inside and outside protective coating manufactured in accordance with ANSI C 80.1. Couplings, elbows, bends, conduits, bushings and other fittings shall be the same materials and finish as the rigid metallic conduit. Fittings, connectors, and couplings shall be threaded type, manufactured in accordance with ANSI C 80.1 and UL 6.
 3. Electrical metallic tubing shall be steel tubing, zinc-coated with a protective enamel coating inside, manufactured in accordance with NEMA C 80.3. Fittings, couplings, and connectors shall be gland compression type, set screw couplings and connectors not permitted. All parts shall be manufactured in accordance with NEMA C80.3 and UL 6A Electrical metallic tubing is designated hereinafter as EMT. Steel and rain tight fittings shall be approved and listed for the intended application.
 4. Flexible steel conduit shall be of flexible interlocking strip construction with continuous zinc coating on strips, manufactured in accordance with UL 1.
 - a. Connectors and couplings shall be required fittings of the type, which threads into convolutions of flexible conduit.
 5. Liquid-tight flexible metal conduit shall be galvanized heavy wall, flexible locked steel strip construction, UV rated, with smooth moisture and oil-proof, abrasion-resistant, extruded plastic jacket. Connectors shall be as required for installation with liquid-tight flexible conduit and shall be installed to provide a liquid-tight connection.
 6. Non-metallic conduit shall be rigid PVC electrical conduit extruded to schedule 40 dimensions of Type II. Grade 1 high impact, polyvinyl chloride, sweeps, couplings, reducers and terminating fittings shall be listed under the UL, or another NRTL, and shall bear the manufacturer's listed marking.
 7. Multi-cell raceway shall be four inch PVC, Type 40, UL or another NRTL listed for underground use with optical fiber and signal system cables. Raceway shall be furnished with 3-1/2 inch factory installed inner ducts with required internal spacers, and required couplers, sweeps, and end bells. Multicell raceway shall be Carlon Multigard, or District approved equal.
 8. Metal Clad (MC) cable system is not allowed.
- B. Sleeves for Conduits: Sleeves shall be adjustable type by Carlon, U.S. Plastic, PEP Plastic or equal.



- C. Where conduit enters a building through a concrete foundation below grade, or ground water level, or where it is necessary to seal around a conduit where it passes through a concrete floor or wall, provide O-Z/Gedney Type FSK Thru Wall and Floor Seal, equivalent Cooper Crouse Hinds Thru-Wall, Legrand Thru-Wall, or equal.
- D. Expansion Joints-Seismic Separations between building(s) and other locations as indicated on drawings:
1. Provide Thomas & Betts XJG-TB, O-Z/Gedney. type AX with bonding strap and clamps, Cooper XJGD or equal. At exterior locations, provide Thomas & Betts XJG-TB, O-Z/Gedney type EX, Cooper XJGD, or equal. Provide O-Z/Gedney type AXDX, or equal combination deflection/expansion fittings at all seismic separations. Provide manufacture's internal and external bonding jumpers at all locations. Liquid-tight metal conduit or flexible metal conduit shall not be approved at expansion joints, separations between buildings or seismic separations.
 2. Provide expansion fittings at intervals not exceeding 100 feet in conduits exposed to direct sunlight. Fittings may be installed in the conduit run or where conduit attaches to junction or pull boxes. OZ/Gedney type AX, TX or EXE series, or equivalent by Thomas and Betts, Crouse-Hinds or approved equal.
- E. Conduit Seal Fittings:
1. Provide conduit seal fittings where indicated on the Drawings. Conduit seals shall be of rigid galvanized steel. Seals in horizontal conduit installations shall be Thomas & Betts EYS, Appleton Type ESU, Crouse Hinds Type EYS, or equal. Seals in vertical conduit installations shall be Thomas & Betts EYD, Appleton Type SF, Crouse Hinds Type EYD, or equal, with continuous drain. When installing conduit seals make provision for percent fill space reduction in accordance with CEC.
 2. Install sealing compound after wire has been installed. Ensure drain is not blocked in vertical seals when installing compound. Where conduit seals are installed in hazardous area applications, there shall be no conduit coupling, fitting, etc., between seal and boundary of hazardous area.
- F. Surface Steel Raceway:
1. The surface steel raceway system for branch circuit wiring, data network, voice, video, and other low voltage wiring shall be as manufactured by the Wiremold Company, Hubbell, or Mono-Systems, Inc. or equal. The raceway system may be supplied pre-wired in accordance with all sections of these specifications and requirements herein, and shall be UL or another NRTL listed. Computer data installation shall be as required by other sections of this Division.



- G. Factory Pre-Wired Surface Metal Raceway:
 - 1. Standard non-OEM wiring devices shall be used as specified.

PART 3 - EXECUTION

3.01 CONDUIT INSTALLATION

- A. General Requirements:
 - 1. Provide complete and continuous systems of rigid metallic conduit, outlet boxes, junction boxes, fittings and cabinets for systems of electrical wiring including lighting, power, and signal systems, except as otherwise specified.
 - 2. EMT may be installed in interior concealed applications and in areas approved by owner. EMT shall not be installed in concrete, directly buried underground, outdoors, in boiler rooms, elevator pits, or where subject to damage.
 - 3. Within buildings, flexible steel conduit may be installed instead of rigid steel conduit where permitted by code. Flexible steel conduit shall be installed:
 - a. For continuous lengths not exceeding more than 50 feet between pull points (pull boxes, outlet boxes, etcetera).
 - b. With no maximum total raceway length located within a building interior when the flex is located in concealed locations.
 - 4. Flexible Steel conduit shall not exceed 1-1/2 inches in size.
 - 5. Liquid-tight flexible steel conduit shall only be installed, except where otherwise specified, for final connection of motor terminal boxes, shop equipment, cafeteria equipment, HVAC equipment and other equipment, or for frequent interchange, and shall be of sufficient length, not exceeding 36 inches, to permit full travel or adjustment of motor on its base. Liquid-tight flexible conduit shall not be used for equipment not requiring adjustment or frequent interchange.
 - 6. Connectors for flexible metal conduit shall be made of steel, and of the types which threads into convolutions of conduit. Connectors for watertight flexible metal conduit shall be as required for installation and shall be installed to provide a watertight connection.
 - 7. Exposed conduit shall be installed vertically and horizontally following the general configuration of the equipment, using cast threaded hub conduit fittings where required and shall be clamped to equipment with suitable iron brackets and one hole pipe strap.
 - 8. If connection is from a flush wall-mounted junction box, install an approved extension box.
 - 9. Underground feeder distribution conduits for systems may be non-metallic conduit instead of rigid conduit except where otherwise specified or indicated.



10. Conduit shall be concealed unless otherwise indicated. Conduits exposed to view, except those in attic spaces and under buildings, shall be installed parallel or at right angles to structural members, walls, or lines of building. Conduits shall be installed to clear access openings.
11. Bends or offsets will not be permitted unless absolutely necessary. Radius of each conduit bend or offset shall be as required by ordinance. Bends and offsets shall be performed with standard industry tools and equipment or may be factory fabricated bends or elbows complying with requirements for radius of bend specified. Heating of metallic conduit to facilitate bending is not permitted. Public telephone conduit bends and offsets shall be provided with a radius which is not less than ten times trade size of conduit unless otherwise permitted. Refer to underground installation, specified in this section, for radius of bends and offsets required for underground installations.

B. Underground Requirements:

1. Conduits and multicell raceways installed underground shall be entirely encased in three inch thick concrete on all sides , except where otherwise specified. Provide required spacers to prevent any deflection when concrete is placed and to preserve position and alignment. Conduits and raceways shall be tied to spacers. Anchors shall be installed to prevent floating of conduits and raceways during placing of concrete. Provide red colored concrete to encase conduits of systems operating above 600 volts.
2. Underground conduits and raceways shall be buried to a depth of not less than 24 inches below finished grade to top of the concrete envelope, unless otherwise specified.
3. Assemble sections of conduit with required fittings. Cut ends of conduit shall be reamed to remove rough edges. Joints in conduits shall be provided liquid-tight. Bends at risers shall be completely below surface where possible.
4. Conduits and raceways in a common trench shall be separated by at least three inches of concrete. Electrical power and/or lighting conduit runs installed in a common trench with conduits containing signal system wiring such as public address, telephone, intrusion detection, fire alarm, television, computer networking, and clock systems shall maintain a separation of a minimum of six inches from these types of signal system conduits and raceways. Electrical power, lighting and signal conduits and raceways installed in a common trench with other utility lines such as gas, water, sewer and storm lines shall maintain 12 inches separation from these types of utility lines.
5. Non-metallic conduit installations shall comply with following additional requirements. Joints in PVC conduit shall be sealed by means of required solvent-weld cement supplied by conduit manufacturer. Non-metallic conduit bends and deflections shall comply with requirements of applicable electrical



- code, except that minimum radius of any bend or offset for conduits sized from 1/2 inch to 1 1/2-inch inclusive shall not be less than 24 inches. Bends at risers and risers shall be PVC-coated rigid steel conduit. Radius of curve of bends or offsets in non-metallic conduit for public telephone system shall be not less than ten times trade size of conduit, unless otherwise specifically permitted.
6. Underground conduit systems provided for utility companies shall be furnished to meet the requirements of the utility companies requiring service.
 7. Protect inside of conduit and raceway from dirt and rubbish during construction by capping openings.
 8. Add bell-end bushings for conduit stub-up including underground entries to pull boxes, and manholes. Under floor standing switchboards and motor control centers provide a four-inch galvanized nipple with ground bushing.
- C. Rooftop conduit shall be supported from channels, stands, clamps, trapezes, rollers, or structures mounted on 100% rubber, UV resistant rooftop supports with reflective strips, Dura-Blok, or equal. Roller type supports shall be provided below and above conduit to prevent its dislodgement. Bottom of conduits shall clear the roof surface by 10 inches.
1. At PVC roofing provide walk tread, polyester reinforced, UV resistant, with surface embossment at rooftop supports. Heat welding of walk pads shall only be done by manufacturer certified installers.
 - a. Sika-Sarnafil and Carlisle: Walk tread shall be no more than one inch larger than the plan area of the pipe support blocks and adhered to the roof membrane with Sika 1A or Carlisle Universal Single-Ply sealant, as applicable.
 - b. Johns Manville: Walk tread shall be installed under the pipe support blocks and adhered to the blocks, if possible, and left loose laid on top of the PVC roof system. Walk-pad shall have a minimum of 4 inches of material past perimeter on all 4 sides of block.
 2. Built-up roofing: Provide APP granulated modified torch-down at each pipe support block. Torch-down shall extend 2 to 4 inches beyond the edges of the block and adhered by torch application over existing cap sheet membrane. This work shall be performed by a certified roofer.
- D. Slabs on Grade:
1. Unless specifically reviewed by the Architect, conduits 1 1/4-inches and larger are not permitted to be installed in structural concrete slabs. Where conduits are permitted, and are installed in concrete slabs on grade, slabs shall be thickened at



bottom where conduits occur to provide three inches of concrete between conduit and earth. Required excavation shall be part of the Work of this section.

2. If concrete slab is five inches or more in thickness with a moisture barrier plastic sheet between earth and slab, one inch and smaller conduits shall be installed in the slab with a minimum of one inch concrete between earth and conduit.

- E. Concrete Walls, Beams, and Floors: Provide sleeves where conduits pierce concrete walls, beams, and floors, except floor slabs on grade. Sleeves shall provide 1/2 inch clearance around conduits. Sleeves shall not extend beyond exposed surfaces of concrete and shall be securely fastened to forms. Where conduits pass through walls below grade, seal with required sealant and backer materials between conduit and sleeve to provide a watertight joint. Sealant shall be as indicated in Section 07 92 00: Joint Sealants.

3.02 STUBS

- A. Floor: At points where floor stubs are indicated in open floor areas, for connections to machines and equipment, conduits shall be terminated with couplings, tops flush with finished floor. Stubs shall extend above couplings the indicated distance. Where capped stubs are designated, couplings shall be closed with cast iron plugs with screw drive slots

- B. Underground:

1. Underground conduit stubs shall be terminated at locations indicated, and shall extend five feet beyond building foundations, steps, arcades, concrete walks and paving. Rigid metallic conduit stubs and non-metallic conduit stubs shall be capped by installing a coupling flush in end wall of concrete encasement and plugging with a permitted plug. Project record drawings shall indicate location of ends of underground conduit stubs fully dimensioned and triangulated with reference to buildings or permanent landmarks. These dimensions, including depth below finished grade, shall be marked on project record drawings in presence of the Inspector before backfilling trench. Where extending existing concrete encased stubs, clean, chip and wire brush end of existing concrete and brush on a heavy coat of neat cement paste or epoxy bonding agent.
2. Over ends of individual underground conduit stubs or groups of conduit stubs, install four-inch by 18-inch deep PVC filled with concrete, flush with finished grade in asphaltic concrete or lawns, and two inches above finished grade in planting areas. Cast a three-inch by three-inch brass plate engraved "ELECT" flush in top of concrete. Secure plate to concrete with brass dowels or as indicated on drawings.

3.03 PROTECTION

- A. Protect the Work of this section until Substantial Completion.

3.04 CLEANUP



Department of Neighborhood Services and Public Safety
GOLETA TRAIN DEPOT PROJECT

- A. Remove rubbish, debris and waste materials and legally dispose of off the Project site.

END OF SECTION



SECTION 26 05 86 MOTORS AND DRIVES

PART 1 - GENERAL

1.01 SUMMARY

- A. Section Includes: Furnishing and installation of electric motors, machinery drives, and equipment as indicated. Sizes, capacities, and operating conditions shall be as tabulated on equipment schedules.
- C. Related Requirements:
 - 1. Division 01 - General Requirements.
 - 2. Section 23 05 48: HVAC Sound, Vibration and Seismic Control.
 - 3. Section 23 20 13: HVAC Piping.
 - 4. Section 23 60 00: Central Cooling Equipment.
 - 5. Section 23 80 00: Heating, Ventilating and Air Conditioning Equipment.
 - 6. Section 23 09 00: HVAC Instrumentation and Controls.

1.02 ELECTRICAL REQUIREMENTS

- A. Except where modified by specific requirements of an individual mechanical section, the following electrical Work required by Division 23 is included under Division 26, 27 and 28, and as indicated on Drawings:
 - 1. Motor starters and disconnect switches for motors.
 - 2. Line voltage wiring and conduit to motors, motor starters and controls.
 - 3. Installation of line voltage wall-mounted electric controls.
- B. Power Supply: Provide necessary power supplies for the intended operation and application as indicated on the Drawings. Verify indicated power supplies with Architect/Engineer prior to ordering equipment.
- C. Pre-wired Control Panels: Where pre-wired control panels or equipment are provided under Division 23, internal wiring shall extend neatly to a terminal strip which shall have same designation for terminals that are indicated on wiring diagrams. Pre-wired panels shall be listed and labeled by UL, or other Nationally Recognized Testing Laboratory (NRTL).



- D. Workmanship: Where Work of Division 23 includes either factory or field wiring, materials and workmanship shall conform to requirements of Division 26, 27 and 28 Specifications and governing codes.

1.03 SUBMITTALS

- A. Provide in accordance with Division 01 and 23 05 00: Common Work Results for HVAC.
- B. Manufacturer's Data
 - 1. Complete material list of items proposed to be provided under this section.
 - 2. Manufacturer's specifications and other data required to demonstrate compliance with specified requirements.
 - 3. Shop Drawings indicating complete system layout, diagrams, and schedules.
 - 4. Manufacturer's recommended installation procedures.
- C. Manufacturer's recommended installation procedures, when reviewed by the Architect, will become basis for inspecting actual installation procedures.

1.04 QUALITY ASSURANCE

- A. Manufacturer and Installer Qualifications: Comply with provisions stated under Section 23 05 00: Common Work Results for HVAC.
 - 1. Qualifications of Manufacturers: Products furnished for the Work of this section shall be produced by manufacturers regularly engaged in manufacture of similar items and with a five-year history of successful production.

1.05 PRODUCT HANDLING

- A. Protection, Replacement, Delivery, and Storage: Comply with provisions stated under Section 23 05 00: Common Work Results for HVAC.

PART 2 - PRODUCTS

2.01 EQUIPMENT

- A. Electrical Motors: Motors shall provide adequate starting torque to bring driven equipment up to rated speed in the stipulated time intervals:
 - 1. In general, motors 1/2 horsepower and larger shall be squirrel cage induction type for 3-phase, 60 cycle power supply.



2. Motors below 1/2 horsepower shall be capacitor start, induction run type or split-phase type for single phase, 60 cycle power supply.
- B. Motors Furnished with Equipment: Where motors are an integral part of equipment, motors shall be as recommended by the equipment manufacturer.
- C. Motor Operation Criteria:
1. Motors that are not directly exposed to weather, and are located in non-hazardous spaces, shall be furnished with drip-proof enclosures and shall be continuous duty rating of 100 degrees F.
 2. Motors installed unprotected in outdoor locations shall be totally enclosed, fan-cooled, and continuous duty rating at 130 degrees F.
 3. Single phase motors shall be furnished with built-in overload protection. Overload protectors shall be single pole automatic reset type, except where frequent start/stop may constitute a hazard, reset shall be manual.
 4. Hermetic polyphase motors shall be furnished with built-in hermetic thermostatic protection devices, which shall interrupt the control circuit to protect the motor from overheating.
 5. Motors shall be furnished with UL, or other NRTL approved terminal boxes. All motors including mountings and shaft sizes, shall be built to NEMA standard dimensions; except where integral with hermetic equipment
 6. Where application is unique, or location is contaminated or hazardous, high starting torque totally enclosed or explosion-proof motors shall be provided.
 7. Where Drawings schedule 3-phase for motors smaller than 1/2 horsepower or single phase for motors larger than 1/2 horsepower, specifically verify schedule with the Architect before ordering motors.
 8. Two-speed motors shall be separately wound if speeds required are not a two-to-one ratio. If two-to-one speed ratio is required, motors shall be single wound. Two-speed motors shall be furnished with variable horsepower.
 9. Motors shall be furnished with sealed lifetime lubricated ball bearings.
 10. Motors shall be energy efficient complying with NEMA standards.
- D. Machinery Drives:
1. Couplings: Where couplings are specified for direct drive, non-lubricated types shall be furnished and rating shall be at least 125 percent motor horsepower rating.



- E. Machinery Accessories:
 - 1. Lubricating Devices: Provide level gages, oil pressure gages, grease cups, and grease gun fittings as required by the equipment. Extend lubricating fittings to readily accessible locations.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Install equipment as indicated on Drawings and in compliance with manufacturer's recommendations, with vibration isolation, mounting pads or foundations as specified in other sections.

3.02 PROTECTION

- A. Protect the Work of this section until Substantial Completion.

3.03 CLEANUP

- A. Remove rubbish, debris and waste materials and legally dispose of off the Project site.

END OF SECTION



SECTION 26 08 00 ELECTRICAL SYSTEMS COMMISSIONING

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Section Includes:

1. General requirements for Commissioning (Cx) of lighting systems components, lighting controls and HVAC systems line voltage interconnection components, including installation, start-up, testing and documentation according to construction documents and Commissioning Plan (CxP).
2. Standard procedures for the execution of commissioning work shall be in conformance with Division 1. Coordinate work with the Commissioning Services Provider (CxSP).

1.02 RELATED REQUIREMENTS

- A. Division 01 - General Requirements.
- B. Section 01 91 13: General Commissioning Requirements.
- C. Section 01 79 00: Maintenance and Operations Staff Demonstration and Training.
- D. Section 23 80 00: Heating, Ventilation, and Air Conditioning Equipment.
- E. Section 23 08 00: HVAC Systems Commissioning.
- F. Section 23 09 23: Environmental Control and Energy Management Systems.
- G. Section 23 08 13: Environmental Controls and Energy Management System Commissioning.
- H. Section 26 05 00: Common Work Results for Electrical.
- I. Section 26 05 13: Basic Electrical Materials and Methods.
- J. Section 26 05 26: Grounding and Bonding.
- K. Section 26 05 86: Motors and Drives.

1.03 REFERENCES

- A. Applicable codes, standards, and references: inspections and tests shall be in accordance with the following applicable codes and standards:
 1. National Electrical Testing Association – NETA.
 2. National Electrical manufacturer’s Association – NEMA.
 3. American Society for Testing and Materials – ASTM.



4. Institute of Electrical and Electronic Engineers – IEEE.
5. American National Standards Institute – ANSI.
6. National Electrical Safety Code – NESC.
7. California Building Code – CBC.
8. California Electrical Code – CEC.
9. California Green Building Standards Code (CalGreen).
10. Conglomerate for High Performance Schools (CHPS).
11. Insulated Power Cables Engineers Association – IPCEA.
12. Occupational Safety and Health Administration – OSHA.
13. National Institute of Standards and Technology – NIST.
14. National Fire Protection Association – NFPA.
15. California Electrical Code.
16. ANSI/NFPA 70B – Electrical Equipment Maintenance.
17. NFPA 70E – Electrical Safety Requirements for Employee Work Places.
18. ANSI/NFPA 101– Life Safety Code.

PART 2 - PRODUCTS

2.01 TEST EQUIPMENT

- A. Equipment to be utilized in the commissioning process shall meet the following requirements:
 1. Provide test equipment as necessary for the equipment and systems to be commissioned.
 2. Provide testing equipment and accessories that are free of defects and certified for use.
 3. Provide testing equipment with current calibration labels per NIST Standards.
 4. Testing equipment shall be UL Listed.

PART 3 – EXECUTION

3.01 COMMISSIONING PROCESS REQUIREMENTS

- A. Work to be performed prior to commissioning:
 1. Complete all phases of the work so the system(s) can be started, tested, adjusted, balanced, and otherwise commissioned.



2. Start-up services required to bring each system into full operational state and ready for functional performance testing:
 - a. Completion of authorized manufacturer representative's start-up procedures and recommendations.
 1. Provide Manufacture's start-up completed forms.
 - b. Completion of pre-functional checklists.
 - c. Copy of required manufacturer and field testing.
 - d. Motor rotation check.
 - e. Control sequences of operation.
 - f. Full and partial load performance.
 3. If modifications or corrections to the installed systems are required to bring the system(s) to acceptance levels due to CONTRACTOR's incorrect installation or defective materials, such modifications or corrections shall be made at no additional cost to the OWNER.
 4. Functional tests shall not start until each system is complete and the above items have been documented and submitted to the Engineer of Record, Cx Services Provider and OWNER for review.
- B. Pre-commissioning Responsibilities: Inspection, calibration and testing of the equipment and devices necessary to commission the following systems:
1. Electrical Lighting Systems.
 2. Lighting Controls.
 3. HVAC line voltage electrical components.
 4. Line voltage interface of Environmental Controls and Energy Management System with other systems.
 5. Photovoltaic Systems.
- C. Commissioning Process Requirements: Refer to Section 01 9113 General Commissioning Requirements, related sections and Cx Plan for information on meetings, start-up plans, Pre-Functional and Functional Performance Testing (FPT), operations and maintenance data, and other Commissioning activities.
- 3.02 PREPARATION
- A. Provide certified electricians and/or qualified personnel as required with adequate tools and equipment necessary to perform Cx activities.
 - B. Provide all equipment required for the commissioning of equipment and systems indicated in article 3.01.B.
 - C. Provide certified testing agency personnel or report(s) as required in the Cx Plan.



3.03 TESTING

- A. Testing documentation shall include the following minimum information:
1. Test number.
 2. Equipment used for the test, with manufacturer and model number and date of last calibration.
 3. Date and time of the test.
 4. Indication of whether the record is the first commissioning test, or a retest following correction of a previously identified issue.
 5. Identification of the system, subsystem, assembly, or equipment.
 6. Conditions under which the test was conducted, including (as applicable) ambient conditions, set points, override conditions, and status and operating conditions that impact the results of the test.
 7. Systems and assemblies test results, performance and compliance with contract requirements.
 8. Issue number and description of corrected issue that prompted retesting.
 9. Name and signature(s) of witnesses and the person(s) who performed the test(s).
- B. Test lighting and controls systems to verify performance, operation, functionality, light levels, energy usage, and compliance with construction documents.
1. Start up, test and document results under the observation of the CxSP.
 2. Execute the Functional Performance Test (FPT) under the observation of the CxSP.
 3. Provide completed and signed FPTs to CxSP for inclusion in the commissioning report.
 4. Functions and Testing Conditions:
 - a. Occupancy sensors and timer controls for lighting:
 - 1) Verify that specified functions and features are set up, debugged and fully operable at time of test.
 - 2) Verify that occupant override feature functions as intended in the contract documents.
 - 3) Verify that sensors response times/durations are set properly.
 - 4) Test the sequence of operation for features and modes and confirm that adjustable times match the design specifications and contract documents.
 - 5) Verify that sensors are located per manufacturer's recommendations.



- b. Electric lighting dimming, photocells and controls:
 - 1) Test the dimming controls during daytime when conditions are such that controls should be dimming electric lighting.
 - 2) Verify that amperage changes in light fixtures are proportional to external light changes. Verify that dimmed light levels uniformity at the specified work plane remain within specified limits.
 - 3) Verify that delays and ramp times are set and functioning so that the speed of change of light fixture output is slow enough to not bother occupants, and in compliance with the specifications.
 - 4) Verify that dimming does not cause lower than specified light levels in adjacent “non-dimmed” spaces.
 - 5) Verify that the controls and sensors cannot be easily overridden or disabled by occupants.
 - c. Illumination Levels, Night Conditions:
 - 1) Verify that lighting throughout the building is operating automatically.
 - 2) Test with doors closed (to simulate actual occupancy) and after finishes are complete.
 - d. Illumination Levels, Day Conditions:
 - 1) Verify that lighting levels comply with average maintained foot-candle levels shown on plans.
 - e. Emergency Lighting System: Verify that the system operates automatically under any condition, without human intervention, and that it resets back to normal operations after the power failure or emergency condition is over or cleared.
5. Acceptance Criteria:
- a. Lighting Controls: For the conditions, sequences and modes tested; dimming, occupancy, photocell, and timing controls, integral components and related equipment shall respond to changing conditions and parameters defined in the Contract Documents.
 - b. Illumination Levels: Average light levels in the tested space at the work plane elevation shall be in the range of plus or minus 10% of the specified light level range for the space.
 - c. Power factors on lighting circuits shall be greater or equal to 0.95, or as required by lighting fixture specifications.



- d. Electrical equipment AIC ratings shall be as indicated in construction drawings.
 - e. Feeders % voltage drop. Flag feeders with voltage drop greater than 3%.
 - 6. Sampling Strategy for Identical Units:
 - a. Lighting Controls: Test all automatic interior lighting controls.
 - b. Illumination Levels: Test all spaces, zones and rooms to verify as proper light levels.
 - C. HVAC Electrical Component Testing
 - 1. Document HVAC Division 23 electrical components using the startup procedure submitted by CONTRACTOR and accepted by the CxSP.
 - 2. Complete and submit Start-up, Pre-functional, and Functional Checklists.
 - 3. Verify the following information prior to HVAC system equipment startup.
 - a. Voltage.
 - b. Phase.
 - c. Motor Size.
 - d. Lock Rotor Amperage.
 - e. Full Load Amperage.
 - f. Minimum and Maximum Circuit Ampacity.
 - g. Feeder protection or branch circuit protection, breaker or fuse size as applicable.
 - 4. Coordinate and check corresponding unit electrical protection.
- 3.04 ADJUSTING
- A. Incorrect installations, including improper adjustments may result in additional work being required for Cx acceptance.
 - 1. Perform work required to correct installations not meeting contract requirements at no additional cost to the OWNER.
 - B. Corrective work shall be completed in a timely manner to permit completion of the Cx process.
 - 1. Refer to the Cx Plan for retesting requirements necessary to achieve required system performance.
 - 2. If the systems' Cx deadline, as defined in the Cx Plan, goes beyond the scheduled completion of commissioning without resolution of the problem, the OWNER reserves the right to obtain supplementary services or equipment to resolve the problem.



- a. The cost of additional and/or supplementary services inquired by OWNER as a result of CONTRACTOR's lack of performance, or inability to resolve identified issues will be solely the responsibility of the CONTRACTOR.

3.05 TRAINING

- A. Provide training and documentation as required in construction documents.

END OF SECTION



SECTION 26 09 23 LIGHTING CONTROL SYSTEM

PART 1 – GENERAL

1.01 SECTION INCLUDES

- A. Lighting control system requirements.

1.02 RELATED SECTIONS

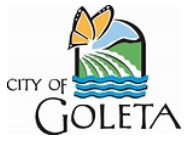
- A. Section 26 05 26, Common Work Results for Electrical
- B. Section 26 05 19, Low Voltage Wires and Cables
- C. Section 26 24 16, Panelboards
- D. Section 26 50 00, Lighting

1.03 MEASUREMENT AND PAYMENT

- A. General: Lighting control system, as specified herein, will not be measured separately for payment but will be paid for as part of the Contract lump-sum price for Electrical Work as indicated in the Bid Schedule of the Bid Form.

1.04 REFERENCES

- A. Institute of Electrical and Electronics Engineers (IEEE):
 - 1. IEEE C62.41 IEEE Recommended Practice for Surge Voltages in Low-Voltage AC Power Circuits
- B. California Code of Regulations (CCR):
 - 1. Title 24 Building Energy Efficiency Standards
- C. Illuminating Engineering Society of North America (IES):
 - 1. IES Lighting Handbook, Reference and Application
- D. National Electric Manufacturing Agency (NEMA):
 - 1. NEMA 250 Enclosure for Electrical Equipment (1000 Volts Maximum)
 - 2. NEMA PB 1 Panelboards
 - 3. NEMA PB 1.1 General Instructions for Proper Handling, Installation, Operation, and Maintenance of Panelboards Rated 600

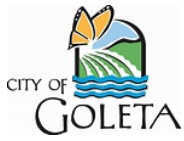


Volts or less

- E. National Fire Protection Association (NFPA):
 - 1. NFPA 70 National Electrical Code
 - 2. NFPA 101 Life Safety Code
- F. Underwriters Laboratories Inc. (UL):
 - 1. UL 50 Standard for Safety Enclosures for Electrical Equipment, Non-environmental Considerations
 - 2. UL 67 Standard for Safety Panelboard
 - 3. UL 916 Standards for Safety Energy Management Equipment
 - 4. UL 924 Standards for Emergency Lighting and Power Equipment
- G. International Organization for Standardization (ISO):
 - 1. ISO 9001 Quality Management Systems

1.05 SUBMITTALS

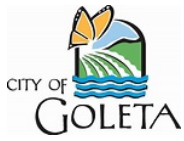
- A. Refer to Section 01 33 00, Submittal Procedures, and Section 01 33 23, Shop Drawings, Product Data, and Samples, for submittal requirements and procedures.
- B. Submit product data including the following:
 - 1. Catalog sheets and specifications
 - 2. Ratings, configurations, wiring diagrams, dimensions, service conditions, options, and features
- C. Submit shop drawings including the following:
 - 1. Single line, schematic, block, and wiring diagrams
 - 2. Equipment layout of lighting control system components
 - 3. Plan view details and component topologies
 - 4. Photometric drawings and network riser diagrams
 - 5. Hard copy of lighting control programming, program flow chart, and time schedule matrix
- D. Installation procedures: Include tools and materials list, mounting templates, and dimensions.



- E. Submit test reports including the following:
 - 1. Certified test reports of factory and field tests performed
 - 2. Title 24 Acceptance Testing Documentation in accordance to Title 24, Part 6
 - 3. Seismic analysis report
- F. Software: Include copy of lighting control software on USB drive with user manual.
- G. Manufacturer's certificates: Include certificate ensuring products meet or exceed specified requirements.
- H. Submit the operation and maintenance manual, in accordance with Section 01 78 23, Operations and Maintenance Data, including the submittal items mentioned above and the following:
 - 1. Sequence of operation identifying control operation for each room or space
 - 2. Preventive maintenance procedure
 - 3. Spare parts list and ordering form
 - 4. Troubleshooting guide for common issues

1.06 QUALITY ASSURANCE

- A. Manufacturer requirements: The manufacturer of the equipment shall have a minimum of five years manufacturing experience and be the manufacturer of the major components within the assembly.
- B. Manufacturer's Certification: A qualified factory-trained manufacturer's representative shall certify in writing that the equipment has been installed, adjusted and tested in accordance with the manufacturer's recommendations. The Contractor shall provide three copies of the manufacturer's representative's certification.
- C. Installer requirements: The installer shall be a certified lighting control professional or technician with experience performing the Work of this section.
- D. Performance requirements: System components shall be manufactured, assembled, and installed to maintain performance criteria stated by the manufacturer that is free from defects, damage, or failure.
- E. Code and certification requirements:
 - 1. System components shall be UL listed and certified.
 - 2. Installed system components shall comply with the latest National Electrical Code (NEC).
 - 3. The manufacturer shall be ISO 9001 and Restriction of Hazardous Substances



Directive (RoHS) certified.

- F. Coordination requirements: The lighting control system shall be comprised of non-proprietary hardware and software and shall be capable of integrating with existing lighting control systems.
- G. Seismic requirements: Provide submittals in accordance with Section 20 30 14, Seismic Performance Requirements for Equipment.

1.07 DELIVERY, HANDLING, AND STORAGE

- A. Equipment shall be delivered, handled and stored in accordance with manufacturer's instructions until ready for installation.

1.08 PROJECT CONDITIONS

- A. Maintain environmental conditions for temperature, humidity, and ventilation within limits recommended by the manufacturer. Products shall not be installed under environmental conditions outside manufacturer's specifications.

1.09 WARRANTY

- A. The manufacturer shall provide a five year warranty beginning after the date of Acceptance, which include repair, parts, labor, travel, and living expenses for the manufacturer's certified technician.

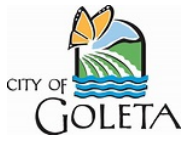
PART 2 – PRODUCTS

2.01 MANUFACTURERS

- A. Manufacturers:
 - 1. Wattstopper
 - 2. Lutron
 - 3. Or equal

2.02 SYSTEM REQUIREMENTS

- A. The lighting control system (LCS) shall include hardware, software, control devices, networking devices, and associated items required for complete operation. The LCS shall be configured based on site-specific requirements for normal or emergency use as indicated. Refer to Standard Drawings ES87 and ES88 for typical network lighting control systems and sequence of operation.

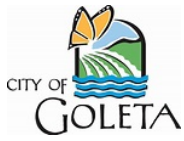


B. General Requirements:

1. Input Voltage: 120/277 VAC plus or minus ten percent
2. Input frequency: 60 hertz
3. Enclosure: As indicated
4. LCS configuration: Normal Lighting: Network Based
Emergency lighting: Relay Bypass Module
5. The LCS shall comply with Title 24, Section 110.9, Mandatory Requirements for lighting control systems, devices and Luminaires.
6. The LCS shall be capable of monitoring and controlling lighting control zones based on time-of-day scheduling, astronomical time, daylight savings, holidays, and support control inputs for photocells, control switches, dimmers, and occupancy sensors.
7. The LCS shall facilitate remote and local configuration, monitoring, reporting for operation of groups, channels, zones, schedules, and general system information of luminaires and devices.
8. The LCS shall be capable of interfacing with existing LCS and equipment on the same network.
9. The emergency LCS shall be fail-safe. In conditions where failure is detected within the system, functional luminaires will bypass ON, regardless of pre-programmed operating conditions.
10. Scheduled events for time schedules, photocells, and other control devices shall run autonomously.
11. Self-contained emergency lighting control relays shall be UL-924 listed and provide control that is independent of the LCS. Self-contained units shall only be permitted for luminaires in difficult access areas or on switched circuits and shall be equipped with auxiliary contacts for remote testing with a push to test button on the unit for local testing.
12. The LCS shall be equipped with a maintenance test switch to bypass lighting under scheduled sequence of operation to full ON. Surface of enclosure shall be equipped with LED indicators for input power and system bypass indication.
13. The use of wireless based controls is not permitted in passenger stations or areas that may interfere with train control communications operations under 2.4GHz frequency.

C. Network Lighting Control System:

1. Network Manager: The network manager shall locally manage network communications of lighting and devices over RS-485 (MS/TP) via network bridge.



The network manager shall include an IP addressable port, Ethernet (TCP/IP), and be compatible with Modbus TCP/IP network protocols for remote management of the system. Access to lighting control settings shall be controlled through log in security with user-defined name and password.

2. Network Bridge: The network bridge shall connect devices under a local network to the network device manager via optically isolated RS-485 (MS/TP) transceiver. The network bridge shall include spare RJ45 ports for communication with daisy chained communication devices as indicated.
3. Area Controller: The area controlled shall be Class 2.0-10V dimming for lighting loads.
4. Control Device: Control devices for automatic or manual control of lighting shall be self-configuration, and digitally addressable.
5. Input Module: Provide input module for conversion of photocell signal or addition of externally mounted manual bypass switch.
6. Handheld Device: The handheld device shall be capable of two-way infrared communications between the LCS and operator with the ability to read and modify parameters for lighting control sequence of operation.
7. Daisy chain connections for network bridge, area controller, control device, and input module, shall utilize manufacturer pre-terminated communication cables that support both power and data. Cables not derived from the manufacturer shall be individually tested and observed by an authorized service representative prior to use.

D. Relay Bypass Module:

1. General Requirements:
 - a. Input Voltage: 120/277 Vac plus or minus ten percent
 - b. Testing: Push-to-test button
 - c. Inputs: Auxiliary contracts
2. The device shall be UL 924 listed, din-rail mounted, equipped with a button for testing emergency lighting circuits, and include auxiliary contacts for receiving remote commands or interfacing with external devices.
3. The relay bypass module shall bypass pre-programmed sequence of operation for designated emergency lighting to full ON upon loss of normal power or activation of the fire alarm system.
4. The relay bypass module shall work in tandem with normal lighting controls for sequence of operations of normal and emergency lighting.
5. The relay bypass module is permissible for use on switched circuits, difficult access areas, or lighting designed for 24-hour operation as indicated on the



lighting control sequence of operation.

E. Network:

1. Ethernet (TCP/IP) communication cable shall be CAT 6A type, RJ45 connector, shielded, with drain wire. Refer to Section 27 13 01, Communication Cables and Related Equipment, for details and grounding requirements.
2. The IP addressable, Ethernet (TCP/IP) control and parameters shall be made available locally and remotely with compatibility to Modbus (TCP/IP) protocol.

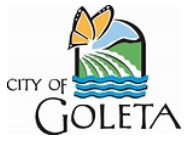
F. Control Devices:

1. Photocell

- a. Exterior photocells shall be mounted in an area free from obstruction, facing north, with no direct exposure to nighttime illumination.
- b. Interior photocells shall be mounted above existing luminaires and located central to the area requiring control.
- c. The photocell shall include an internal time delay and dead band to preclude cycling of luminaires.
- d. The photocell shall be capable of overriding time-of-day, astronomical time schedules due to unforeseen overcast conditions, and in response to parking structure daylighting requirements.

2. Area Control Switch

- a. The area control switch shall be single-pole, 20A, 120V, toggle type or user programmable, wall mounted, momentary push-button type, offered in 1 through 8 button configurations, and shall be mounted adjacent to the lighting control panelboard.
- b. Area control switches located in spaces accessible to patrons shall be equipped with a lockable, hinged cover plate, in brushed stainless steel finish.
- c. Bypass switch: The bypass switch shall allow manual control of overriding existing programmed lighting control functions. Luminaires shall be commanded ON or OFF contingent upon emergency, maintenance, or demand response requirements as indicated.
 - 1) Install bypass switches adjacent to lighting control equipment or enclosure surface, station agent booths, and additional areas as indicated.
 - 2) Bypass switch installed on enclosure surface shall be rotary type, two-position, maintained, 20A. Include adhesive labeling indicating rotary position for auto and bypass modes.



d. Dimmer switch: The dimmer switch shall be compatible with 0-10V dimmable drivers with lighting loads in single or multi-way applications.

3. Occupancy Sensor

- a. Occupancy sensors shall be passive infrared (PIR) or dual-technology PIR/Ultrasonic with 360-degree coverage. Utilize multiple segmented lens with internal grooves to eliminate dust and residue build-up.
- b. The occupancy sensor shall turn luminaires off or reduce light levels automatically through a time delay when a room or area is vacated.

G. Software:

1. LCS software shall include:

- a. Time-of-day, astronomical time, daylight savings, and holiday scheduling
- b. Monitoring and control of luminaries and control devices
- c. Status indications for alarm conditions
- d. Modification of control logic for sequence of operation
- e. User interface for local and remote connections.
- f. Data logging

2. The software shall be compatible with the latest Windows operation system.

3. Software license encryption through an external device is not permitted.

2.03 FACTORY TESTING

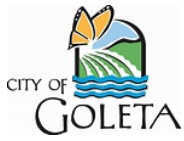
- A. The factory service shall provide adequate testing of the supplied equipment and software to ensure that the system performs as intended by the specification.

PART 3 – EXECUTION

3.01 INSTALLATION

- A. The Contractor shall furnish, install and terminate conductors and associated conduits external to any factory supplied equipment.
- B. Conductors wiring and routing shall be per the manufacturer's recommendations and as shown on the Contract Drawings.

3.02 FIELD QUALITY CONTROL



- A. Provide the services of a qualified factory-trained manufacturer's representative to assist the Contractor in starting-up and programming the system for a period of two working days. The manufacturer's representative shall be factory-trained and shall have a thorough knowledge of the software, hardware and system programming.
- B. The Contractor shall provide three copies of the manufacturer's field startup.
- C. The following system programming shall be provided by the factory trained manufacturer's representative:
 - 1. Assist the owner in developing a practical control scenario for each application
 - 2. Program the owner supplied control scenario
 - 3. Explain the operation of the control program to the owner
- D. Verify complete system operation including hardware, software and communication devices.
- E. Verify networking performance with interfacing systems by other manufacturers.

3.03 TRAINING

- A. Training shall consist of in classroom and on-site training.
- B. The training session shall be conducted by a manufacturer's qualified representative. Training program shall include instructions on the control system, programming, and other major components.
- C. The training program shall include:
 - 1. System review of system components and their function
 - 2. System review of management software and its function
 - 3. Hands-on training with the lighting controller and related programming devices to develop experience with software and control applications.

END OF SECTION



SECTION 26 24 16 PANELBOARDS

PART 1 - GENERAL

1.01 SUMMARY

- A. Section Includes: Lighting and power distribution facilities, including panelboards.
- B. Related Requirements:
 - 1. Division 01 - General Requirements.
 - 2. Section 26 05 00: Common Work Results for Electrical.
 - 3. Section 26 05 13: Basic Electrical Materials and Methods.
 - 4. Section 26 26 00: Power Distribution Units.
 - 5. Section 26 50 00: Lighting.
 - 7. Division 28: Electronic Safety and Security.

1.02 SUBMITTALS

- A. Provide in accordance with Division 01.
- B. Shop Drawings: Include a front elevation indicating cabinet dimensions, make, location and capacity of equipment, size of gutters, type of mounting, finish, and catalog number of locks. General layout of internal devices, wiring drawings with wire numbers and device connections, vendor cut sheets of devices in enclosure and bill of materials listing description, manufacturer, part number, and quantity of items shall be included.
- C. Installation Instructions: Submit manufacturer's written installation instructions.

1.03 DESIGN REQUIREMENTS

- A. Panelboards:
 - 1. Panelboards shall be wall-mounted, enclosed safety type with 120/240 volt, three-wire solid neutral 277/480 volt, four-wire or 120/208 volt, four-wire solid neutral mains as indicated on Drawings or specified. First panelboard of each building shall be provided with main or sub-feeder circuit breakers where so indicated.



2. Single pole branches shall be molded case, thermal magnetic circuit breakers with inverse time delay, trip free, quick-make, quick-break mechanism and silver alloy contacts. Circuit breakers shall be fully rated, with ampere rating marked on handle and shall indicate on/off and tripped positions. Ground fault interrupters shall be incorporated into circuit breakers where indicated. They shall be listed by UL, or other NRTL as ground fault devices. Provide appropriate lug kit of sufficient size to accommodate the feeders.
3. Two- and three-pole branches shall be enclosed, and shall be thermal magnetic circuit breakers with inverse time delay, tamper-proof, ambient compensated, single handle, internal common trip, and quick-make, quick-break mechanism with silver alloy contacts. Circuit breakers shall be fully rated or as otherwise indicated on the Drawings.
4. Main and subfeeder circuit breakers shall be enclosed, thermal magnetic type with inverse time delay, single handle common trip, quick-make, quick-break mechanism, corrosion-resistant bearings and silver alloy contacts. Ampere frame size and trip rating shall be as indicated on Drawings. Breakers over 225 amperes shall be furnished with interchangeable trip units. Handles of main and subfeeder circuit breakers shall be provided cabinet door. Voltage rating shall be as indicated on Drawings.
5. Circuit breakers shall be fully rated and of one-piece, bolt-on type and shall meet short-circuit interrupting capacity requirements indicated on Drawings. Series rated circuit breaker combinations are not acceptable.
6. Internal connections shall be fabricated with plated copper bus bars and the busses shall extend for full length of space available for branch circuit breakers. Feeder cable connectors shall be installed at point of feeder entrance. Terminals shall be furnished with copper conductors. Panelboards fed by conductors having over-current protection greater than 200 amperes shall be protected on supply side by over-current devices having a rating not greater than that of panelboards. Copper bussing shall be fully rated. Heat rated bussing is not acceptable.
7. Except where otherwise indicated, circuit breakers shall be in two vertical rows connected to bus bars in a distributed phase arrangement. Two-pole branches shall be balanced on busses. Single pole branches shall be numbered adjacent to its circuit breaker, with odd numbers on left and even numbers on right.
8. Specified circuit breaker spaces shall be furnished with hardware required for future installation of circuit breakers.
9. Provide locking devices for individual circuit breakers. Padlocking devices shall be secured to circuit breakers and by panel dead front plates.



B. Panelboard Cabinets:

1. Panelboard cabinets shall be code gage galvanized steel or blue steel; fronts, doors, and trims shall be code gage furniture steel. Cabinets shall be furnished with at least six-inch high gutters at top and bottom where feeder cable size exceeds four gage or where feeder cable passes through cabinet vertically. Cabinets shall be furnished with top and bottom gutters sized as required by inspection department having jurisdiction, but never less than six inches where more than one feeder enters top or bottom of cabinets. Side gutters shall not be less than four inches wide. Width of cabinets shall be 20 inches, unless otherwise indicated on Drawings.
2. Doors shall be cut true, shall accurately fit opening and finish smooth across joints. Rabbets shall be inside. Hinges shall be entirely concealed except for barrels and pins. Hinge flanges shall be welded to door and trim. Doors shall be equipped with flush type, spring-latching, Corbin locks for metal doors, keyed to Corbin No. 60 keys.
3. Where contactors, time switches, and control devices are specified or indicated to be installed within panelboard cabinets, a separate compartment and door shall be provided at top of cabinet for such devices. Door shall be sized as required to permit removal of contactor and other devices intact. Gutters shall be provided at sides and top of compartment. Doors shall be equipped with flush type, spring-latching, Corbin locks for metal doors keyed to Corbin No. 60 keys.
4. Provide and install panelboard manufacturer's permanent circuit number kit option.
5. Panelboards with control devices in compartment shall arrive at the Project site completely assembled with control devices installed and wired.

C. Panelboard Schedule: Provide a neatly typewritten schedule with number or name of room or area, or load served by each panelboard circuit. Room numbers or names shall be determined at the Project site and shall not necessarily be those indicated on the Drawings. Schedule shall also indicate panel designation, voltage and phase, building and distribution panel or switchboard from which it is fed. Schedule shall be installed in a frame under transparent plastic 1/32 inch thick on inside of each panelboard cabinet door.

D. Panelboard nameplate: Provide a nameplate identifying panelboard. Plates shall be black and white plastic nameplate stock, with character cut through black exposing white and shall bare designation of service. Name plate shall be mechanically fastened to switchboard.



- E. Provide additional labeling on dead-front of panelboard. Label shall be a P-Touch or equal with a minimum width of 3/8 inch with black letters on white background. Label shall re-identify panelboard and also identify name and location of power source feeding this panel. Location information shall include building name if located in different building and name or room location. If power source is installed in same room, label should indicate source name and “In this Room”
- F. Panelboard Standards: Panelboards shall be UL, or other NRTL listed and labeled. Panelboards shall meet latest revisions of following standards:
 - 1. California Electric Code, Article 384.
 - 2. UL 67, Panelboards.
 - 3. UL 50, Cabinets and Boxes.
 - 4. UL 943, GFCI.
 - 5. UL 489, Molded Case Circuit Breakers.
 - 6. NEMA PB1.
 - 7. Federal Specifications W-P- 115C and WC-375B.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Panelboards shall be manufactured by Siemens, W.A. Benjamin, General Electric, Cutler Hammer, Square D or equal.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Panelboards shall be located so they are readily accessible and not exposed to physical damage.
- B. Panelboard locations shall provide sufficient working space around panels to comply with the California Electrical Code.
- C. Panelboards shall be securely fastened to structure and mounted on surface by at least four points.



- D. Unused openings in cabinets shall be effectively closed as required by the manufacturer.
- E. Cabinets shall be grounded as specified in Article 250 of the California Electrical Code.
- F. Conduits shall be installed so as to prevent moisture or water from entering and accumulating within the enclosure.
- G. Lugs shall be suitable and listed for installation with the conductor being connected.
- H. Conductor lengths shall be maintained to a minimum within the wiring gutter space. Conductors shall be long enough to reach the terminal location in a manner that avoids strain on the connecting lugs.
- I. Maintain the required bending radius of conductors inside the cabinet.
- J. Clean the cabinet of foreign material such as cement, plaster, and paint.
- K. Distribute and arrange conductors neatly in the wiring gutters.
- L. Use the manufacturer's torque values to tighten lugs.
- M. Before energizing panelboards, the following steps shall be taken:
 - 1. Retighten connections to the manufacturer's torque specifications. Verify that required connections have been provided.
 - 2. Remove shipping blocks from component devices and panelboard interiors.
 - 3. Manually exercise circuit breakers to verify they operate freely.
 - 4. Remove debris from panelboard interior.
- O. Follow manufacturer's instructions for installation.
- P. Do not install in highly corrosive environments, unless rated for the application.

3.02 PROTECTION

- A. Protect the Work of this section until Substantial Completion.

3.03 CLEANUP

- A. Remove rubbish, debris, and waste materials and legally dispose of off the Project site.

END OF SECTION



SECTION 26 26 00

SWITCHBOARDS

PART 1 - GENERAL

1.01 SUMMARY

- A. Section Includes: Power distribution units, main circuit breaker and all associated work.
- B. Related Requirements: Drawings and general provisions of the Contract, including General and Supplementary Conditions, Division 01 and other applicable specification sections, including:
 - 1. Division 01 - General Requirements.
 - 2. Section 03 30 00: Cast-In-Place Concrete.
 - 3. Section 05 50 00: Metal Fabrications.
 - 4. Section 26 05 13: Basic Electrical Materials and Methods.
 - 5. Section 26 05 26: Grounding and Bonding.
 - 6. Section 26 24 16: Panelboards and Signal Terminal Cabinets.
 - 7. Section 26 08 00: Electrical Systems Commissioning.
- C. RELATED STANDARDS
 - 1. ANSI/NEMA 250 – Enclosures for Electrical Equipment (1000 Volts Maximum).
 - 2. California Electrical Code (CEC).
 - 3. IEEE C57.12.28 – Standard for Pad-Mounted equipment Enclosure Integrity.
 - 4. IEEE 551 - Recommended Practice for Calculating AC Short-Circuit Currents in Industrial and Commercial Power Systems.
 - 5. IEEE 1584 – Performing Arc-Flash Hazard Calculations.
 - 6. NETA-ATS – Standard for Acceptance Testing for Electrical Power Equipment and Systems.
 - 7. UL/ANSI 891 – Standard for Safety Switchboards.



1.02 SUBMITTALS

- A. Provide in accordance with Division 01.
- B. Shop Drawings:
 - 1. Indicate dimensions, finish, elevations, and locking devices.
 - 2. Indicate equipment make, catalog number, size and/or capacity, line and load conduit entrance location. Layout shall indicate locations of equipment.
 - 3. Indicate size and/or capacity of bussing, barriers, catalog numbers of locks, nameplate inscriptions, and interlocking facilities.
- C. Fault Current, Coordination and Arc-Flash Reports: the following reports shall be prepared using SKM Systems Analysis, ETAP Powering Success, EasyPower, or equal.
 - 1. Provide a short-circuit and coordination report signed and stamp by a registered electrical engineer. Studies shall be in accordance with applicable IEEE guidelines. Submit two copies of each study for review prior to ordering and installing equipment.
 - 2. Provide a system coordination report for main and branch circuit protective devices including transformers secondary protective devices. Study shall be recorded on log paper. The circuit protective devices shall be set based on the coordination study. A final written record of protective device settings shall be submitted.
 - 3. Provide a complete arch-flash report based on installed equipment, and feeders' sizes and lengths. Prepare the report in accordance with code requirements and IEEE 1584 standard. The report shall indicate trip times for protective device(s) settings, arcing fault current values, and incident energy and flash boundaries. The arc-flash report shall indicate clothing requirements for each piece of equipment.
 - 4. Provide installation detail and seismic anchorage notes for switchboards.

PART 2 - PRODUCTS

2.01 EQUIPMENT

- A. Power center shall consist of a transformer, a primary main circuit breaker and/or a panel and a secondary distribution panel with a main circuit breaker.



- B. As indicated on construction drawings distribution units shall be provided with multifunctional digital meter(s) with true RMS measured Amperes (each phase and neutral) Volts (line-to-line and line-to-neutral), Power Factor, VA, VAR, Watts, and KWH. Meter(s) shall be Veris Industries 8163 Energy series or equal.
 - 1. Meter communication protocol shall match those of the site's energy management system.
 - 2. Meter with peripheral devices and equipment shall be integral to the power center enclosure and be installed by the manufacturer of the power distribution equipment.
- C. Power Center Enclosures:
 - 1. Weatherproof formed sheet steel. Provide with catch and lock on doors of breakers and panels; furnish with padlocks.
 - 2. Manufactured by Siemens, Benjamin Electric Company, Square D Company, General Electric, Cutler-Hammer, or equal.
- D. Panelboards: Panelboards shall comply with Section 26 2416-Panelboards and Signal Terminal Cabinets.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Isolate and separate primary main circuit breaker and distribution panel from transformer by means of steel barrier. Bolt circuit breakers to panel with panel manufacture's machine bolts, or equal. Self-tapping screws are not allowed.
- B. Install two, 2-inch underground conduit stub-outs, from each panel to outside edge of concrete pad. Refer to Section 26 0533: Raceways and Boxes Fitting and Supports.
- C. Functional operation of the power center shall be demonstrated to Project Inspector.
- D. Do not install in highly corrosive environments, unless rated for the application and approved by Project Inspector.
- E. Distribution equipment and system components shall be free from short circuits and grounds, other than required grounds. The contractor shall be responsible for the testing of bolted electrical connections, perform insulation resistance tests on each bus section, phase-to-phase and phase-to-ground for one minute in accordance with requirements stated in NETA-ATS 2021 table 100.



1. Utilize the services of an approved independent testing laboratory to perform megger time-resistance insulation testing of bussing, circuit breakers and/or fused switches. The fused switches shall be equipped with fuses or temporary jumpers in place of fuses. Breaker and fused switches shall be tested in the closed position. No wiring shall be connected to the line or load side of the power distribution unit during testing.
 - a. Provide calibration program records to assure the testing instruments to be within rated accuracy. The test equipment accuracy shall be in accord with the requirements stated by the National Institute of Standards and Technology (NIST).
 - b. Test equipment shall be provided with a label stating the date of last calibration. As a minimum the equipment shall have been calibrated within the past 12 months.
 - c. Test reports shall include the following:
 - 1) Identification of the testing organization.
 - 2) Equipment identification.
 - 3) Ambient conditions.
 - 4) Identification of the testing technician.
 - 5) Summary of project.
 - 6) Description of equipment being tested.
 - 7) Description of tests.
 - 8) Test results.
 - 9) Analysis, interpretation and recommendations.
2. Tests shall be performed in the presence of the Project Inspector.
3. During testing, provisions shall be made to prevent damage to any solid-state components, or electronic equipment such as TVSS equipment that may be tied onto power distribution unit bussing.
4. Test results shall meet manufacturer's recommendations or NETA ATS-2017 recommendations, whichever is more stringent.

3.02 PROTECTION



Department of Neighborhood Services and Public Safety
GOLETA TRAIN DEPOT PROJECT

- A. Protect the Work of this section until Substantial Completion.

3.03 CLEANUP

- A. Remove rubbish, debris, and waste materials and legally dispose of off the Project site.

END OF SECTION



SECTION 26 31 00

PHOTOVOLTAIC (SOLAR) ROOF SYSTEMS

PART 1 - GENERAL

1.01 SUMMARY

- A. These specifications cover Photovoltaic (PV) Systems requirements including, but not limited to PV roof tiles (modules), non-PV roof tiles, equipment, hardware, software, all accessories required for complete (PV) systems installation and operation of the system. Using manufacturer's installation methods, the work includes moisture protection, flashings, roof penetration sealing documentation, including labor, materials, and supervision required for the installation of grid-connected PV systems.
- B. Section Includes, but is not limited to the following:
 - 1. Infrastructure, wiring, connections, and testing.
 - 2. Solar tiles and panel arrays.
 - 3. Non-solar tile roofing.
 - 4. Disconnects.
 - 5. DC combiners.
 - 6. Inverters.
 - 7. Monitoring equipment and Control software.
 - 8. Metering equipment and interfacing with utility company meter.
 - 9. Identifications and signs.
 - 10. Training.

1.02 RELATED REQUIREMENTS

- A. Division 01 - General Requirements
- B. Division 05: Metals.
- C. Division 06: Woods, Plastics, and Composites.
- D. Division 07: Thermal and Moisture Protection.
- E. Section 26 05 00: Common Work Results for Electrical.



- F. Section 26 08 00: Electrical Systems Commissioning.
- G. Section 26 05 13: Basic Electrical Materials and Methods.
- H. Section 26 05 19: Low Voltage Wires (600 Volt AC).
- I. Section 26 05 26: Grounding and Bonding.
- J. Section 26 05 33: Raceways, Boxes, Fittings, and Supports.
- K. Section 26 26 00: Power Distribution Units.
- L. Division 32: Exterior Improvements.

1.03 REFERENCES

- A. Installation, inspections and tests shall be in accordance with the most current applicable codes and standards.
 - 1. ANSI Z21.83 – Solar Photovoltaic Performance and Safety.
 - 2. ANSI C2-1999 – National Safety Code.
 - 3. AMSE PTC 50 – Solar Photovoltaic Performance.
 - 4. ASCE 7-05 – Standard for Minimum Design Loads for Buildings and Other Structures, Chapter 13.
 - 5. ASTM D3161 – Wind Resistance of Shingles
 - 6. CBC – California Building Code.
 - 7. CEC – California Electrical Code.
 - 8. IEEE 929-2000 – Recommended Practice for Utility Interface of Photovoltaic Systems.
 - 9. IEEE 1262-195 – Recommended Practice for Qualification of Photovoltaic (PV) Modules and Panels.
 - 10. IEEE 1537 – Standards for Interconnecting Distributed Resources with Electric Power Systems.
 - 11. NFPA72 – National Fire Code.
 - 12. NFPA 853 – Solar Photovoltaic near Buildings.
 - 13. NRTL – Nationally Recognized Testing Laboratory.



14. TAS 100 – Standard Test Method for Wind and Wind Driven Rain
15. UL 790 Class A – Fire Test of Roof Covering
16. UL 1703 – Flat-Plate Photovoltaic Modules and Panels.
17. UL 1741 – Standard for Static Inverters and Charge Controllers for Use in Photovoltaic Systems.
18. UL 2900 – Standard for Software Cybersecurity for Network-Connectable Products, Part 1: General Requirements.
19. UL 9703 – UL LLC Outline of Investigation for Distributed Generation Wiring Harnesses.
20. UL 61730 – PV Module Safety Standards
21. SCE Solar Program Guidelines.

1.04 SUBMITTALS

- A. Shop Drawings on standard 24 inches by 36 inches size shall include but not be limited to:
 1. Cover page with legend, common notes, symbol schedule, vicinity and key map, code compliance, contractor and engineer's names and contact information and drawing index.
 2. Plan showing infrastructure layouts, PV arrays locations, and identifiable features.
 3. Riser diagram and General Notes:
 - a. Connection to utility AC disconnects and main electrical switchboard.
 - b. Indicate conduits, power and communication wires, and combiners, disconnects, inverters, meters, etc.
 - c. Provide PV system(s) power production calculations and total system(s) rating.
 4. Complete point to point PV System interconnection diagram(s):
 - a. Identify DC and AC components.
 - b. Indicate conduit and wire characteristics, sizes and quantities.
 - c. Indicate conduit fills and voltage drops.



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- d. Provide combiner box schedule.
- e. Provide bill of materials.
5. Floor plans and roof plan, PV arrays, inverters, combiner boxes, disconnects, edge zones, electrical equipment room, roof access hatches, skylights, etcetera.
 - a. Plan showing tile layout including PV modules, full roofing tiles and partial roofing tiles. Manufacturer shall calculate and determine the required area for PV modules for the project.
 - b. Indicate system(s) interface connections.
 - c. Provide AC and DC wiring plans.
 - d. Provide electrical equipment room layouts and equipment elevation details.
6. Assembly Details. Provide as minimum the following details:
 - a. Array attachment details.
 - b. Structural support details and spacing dimensions.
 - c. Deflector attachment details.
 - d. Module to module wiring diagrams.
 - e. DC wire tray attachment and DC combiner mounting details.
 - f. Data acquisition System (DAS) wiring details.
 - g. Roof mounted conduit supports, stub ups, and roof penetrations.
 - h. Grounding connection details.
 - i. Warning typical signs details.
 - 1) Utility lockable AC disconnects sign.
 - 2) Interactive system point of interception sign.
 - 3) DC switches warning sign.
 - 4) Solar array warning sign.
7. Roofing Details. Provide as minimum the following:



- a. Moisture protection underlayment.
 - b. Flashing and trim details – rake, eave, rake, cap, valley, ridge, etc..
 - c. Roof penetrations.
8. Operations and Maintenance Manuals.
 9. Installation Instructions of each control device.
 10. PC monitoring Workstation.
 11. Software licenses and electronic keys.
 12. Supplemental local or factory training schedule for post warranty support.
 13. A complete list of recommended spare parts with pricing for the OWNER’s use in keeping the PV system downtime to a minimum.

1.05 QUALITY CONTROL

- A. The contractor shall have a California Solar or Electrical contractor’s license.
 1. Components and interconnection wiring shall be installed by PV systems certified electricians. Contractor or Installer’s electricians shall be certified in accordance with Labor Code sections 3099, and 3099.2 and section 209.0 of the California Code of Regulations.
- B. Contractor shall have adequate experience installing systems of similar size and complexity.
 1. Qualifications of Installer: Minimum five years experience installing products and systems of similar scope and complexity.
 2. Installer shall have completed at least five projects of equivalent scope and complexity.
 3. Installer shall submit PV systems installation certification from the product/s manufacturer, indicating that installer meets the minimum qualification requirements for the installation of PV equipment.
 4. Installer shall maintain a fully equipped service organization capable of furnishing repair services for the equipment installed.
 5. Installer shall furnish a letter from manufacturer of equipment certifying equipment has been installed according to factory standards and that system is operating properly.



6. Contractor shall have completed and commissioned a minimum of five service agreements that provide similar support services to those required for this project.
 7. System startup and testing shall be performed under the direct observation of the Project Inspector, OAR, and Commissioning Services Provider.
- C. Materials and equipment installed shall be new and listed as an approved technology by the California Energy Commission (CEC) Emerging Technology Buydown Program.
- D. The installer shall provide the system components required by code for safety of the OWNER's service personnel.
- E. System components shall operate per industry standards.
- F. Comply with requirements for system commissioning.

1.06 WARRANTY

- A. Solar Roof System shall be warranted as follows:
1. Product/s warranty: Protection against manufacturer defects in design and/or material for 25 years.
 2. Weatherization warranty: Protection against damage from wind and rain for 25 years.
 3. Performance warranty: PV (Solar) Roof's performance won't fall to less than 95% in five years and won't decrease more than 0.5% per year for the following 20 years.
- B. System components (other than PV modules) shall be guaranteed against defects in materials, fabrication and execution for a minimum of 10 years from date of system acceptance. Provide labor and materials to repair, reprogram, or replace components at no charge to the OWNER during the warranty period. Corrective work or system modifications shall be updated on user documentation and archived software disks.
1. Warranty shall include annual on-site inspection, including system testing (operating current of each electrical system), system adjustments and routine maintenance.
 2. Repair or replacement of defective parts.
 3. System performance monitoring and historical data access for customer via secure website. Data is required to include system energy and power production, ambient temperature, wind speed, and insolation.



- a. At Owner's direction, the system shall be connected ahead of the facilities computer network firewall. Provide necessary work, materials and installation to connect the system to the MPOE.
4. Daily system monitoring by vendor, including reporting of problems to customer and dispatch of resources for expeditious resolution of problems.
5. The maintenance agreement shall include a response time of four hours for major system failures (emergency service), and 48 hours for minor repairs (routine service). Proposed agreement shall include biannual site visits for preventative maintenance inspection so that systems are validated prior to the warranty expiration date.
- C. Provide a list of applicable warranties for equipment and components, this list shall include warranty information, names, addresses, telephone numbers, and procedures for filing a claim and obtaining warranty services.
- D. Respond to the OWNER's request for warranty service within four hours during normal business hours. For calls, submit records of the nature of the call, the work performed, and the parts replaced, or service rendered.

1.07 TRAINING

- A. Provide a factory employed instructor to provide full instructions to designated OWNER personnel in the system's operation, maintenance, and programming. Training shall be specifically oriented to installed equipment and systems.
 1. The instruction period shall be scheduled and coordinated by the OAR.
 2. Provide four hours of onsite OWNER familiarization and training for the installed system. Training shall include system overview, override commands, normal and emergency operation and response, programming features and report generation. OWNER employees attending this training session shall be provided with the following documentation:
 - a. System layout point to point connection diagram.
 - b. System components cut sheets.
 - c. Operations and maintenance data.
 - d. Safety rules for the operations and maintenance of PV systems.
 3. Programmer and maintenance training shall include database entry; trend logs application programs, diagnostic routines, reporting, failure recovery and calibration.



- a. Provide a 40 hours training session as follows:
 - 1) Training session shall accommodate a minimum of 20 OWNER's personnel and be facilitated at a location no more than 50 miles from the OWNER's Headquarters. Contractor shall obtain OWNER's approval for training locations exceeding 50 miles from OWNER's headquarters; in such cases, the contractor shall be responsible for OWNER's personnel transportation expenses.
 - 2) Training shall cover instruction, theory, and expose the trainees to system's features, components, architecture, operations, programming, report generation, communications, and any other pertinent information required for the operations and maintenance of the system.
 - 3) Instructor(s) shall give the trainees the opportunity to practice on a simulated or actual (installed) system.
 - 4) The training session shall cover, but not be limited to the following instruction modules or sessions:
 - a) System Architecture:
 - (1) System layout and components interrelations and hierarchical structure.
 - (2) Controllers interfacing and functions.
 - (3) Server functionality and data management, error messages, and alarm conditions.
 - (4) Connectivity and communication losses.
 - b) User Operations:
 - (1) Familiarization and system operability.
 - (2) Windowpanes, menus, navigation buttons, alarm response windows, system passwords and accessibility features and options, monitoring and managing data points (inputs, outputs, numeric values, time and date, strings).
 - (3) Views: Provide sufficient information as to train OWNER staff on how and where to access



programs, functions, adjust or alter diagnostic points and related data, override messages, reports creation.

- c) Trending: Setting trend(s) intervals, accessing data trends and history logs for diagnosis of system performance and reporting. Working with trended data graphical displays, including but not limited to hiding points, setting display types and colors, viewing and setting scales.
- d) Graphics: Standard symbols and color codes, graphics customization, how and where to access and manage the system with the graphic displays, including changing points and values, viewing results, mapping to or with other graphic sources and functions, including groups, navigation, sequence of operations, and displays and reports.
- e) Alarms: Reading and interpreting alarms, acknowledging and silencing alarms, routing and setting priorities, viewing and responding e-mailed and paged alarms.

PART 2 – PRODUCTS

2.01 MANUFACTURER

- A. Basis of Design: Model #SR60T1 14-Cell Module as manufactured by Tesla Inc., 3500 Deer Creek Road Palo Alto, CA 94304, website: www.tesla.com/teslaaccount, telephone: (877)373-7652. Substitution is not allowed.
- B. Solar Roof System tiles shall be made of Glass, Polymers, Fiberglass and Silicon materials.
 - 1. Types of Tiles:
 - a. PV Modules
 - b. Full Roofing Tiles
 - c. Partial Roofing Tiles
 - 2. The array shall achieve the required kWp DC STC output for the entire system under peak sun conditions.



3. PV modules shall be California Energy Commission standards compliant.
4. DC Photovoltaic Panel Output:
 - a. PV Module Open-Circuit Voltage per manufacturer.
 - b. PV String Open-Circuit Voltage shall be 600V or less.
- C. Integrated Solar and Battery System:
 1. Model: Powerwall 3.
 - a. Number of units as required to power up the facility demand.
- D. Inverters:
 1. Inverters shall be California Energy Commission standards compliant.
 2. The PV system shall have at least one inverter. Inverter units shall be solid state device capable of accepting the output of the photovoltaic panels and providing rated output as indicated in construction documents.
 - a. The inverter shall be equipped with the following items:
 - 1) DC input disconnect.
 - 2) Surge protection.
 - 3) Ground fault interrupter.
 - 4) Isolation transformer.
 - 5) AC output circuit breaker.
 - 6) Data Monitoring System.
 3. The inverter shall be able to sustain an overload across its output terminals up to 150 percent load, while supplying any load within its rating and without reducing its output voltage.
 4. The inverter shall be capable of at least 300 percent current for short circuit conditions. If the short circuit is sustained, the inverter shall shutdown and disconnect automatically from the load bus.
 5. Each inverter unit shall be equipped with fault sensing and static isolation, and with an output circuit breaker for removal of faulted module(s) from the system.



6. Power semiconductors in the inverter shall be fused with fast acting fuses to prevent cascading failures. Each fuse shall be provided with a blown fuse and alarm indicating diodes on the control panel.
 7. AC Inverter System Output:
 - a. Voltage regulation plus or minus 0.5 percent balance load. Plus, or minus two percent for 50 percent unbalanced load.
 - b. Voltage adjustment range plus or minus five percent manually.
 - c. Frequency regulation 0.1 percent.
 - d. Phase Displacement:
 - 1) Balanced load, 120 percent plus or minus one percent.
 - 2) Fifty percent unbalanced, 120 percent plus or minus three percent.
 8. Approved products: As manufactured by Delta Electronics LTD. or approved product recommended by manufacturer.
 9. Equal or better Energy Commission approved inverters may be submitted for review by the OWNER. Installations shall not be allowed without written consent from the OWNER. Proposed inverters shall have equal or smaller footprint.
- C. Combiner Box: As recommended by the PV modules manufacturer.
1. The system shall have at least a terminal box or boxes, providing the electrical the electrical string(s) a waterproof entry to the conduit leading to the combiner box(es).
 2. The terminal box and combiner box can be one physical unit.
 3. The PV system shall have a combiner box(es), containing fuses and a bus to combine the outputs of the strings. A set of wires shall run from the combiner box to the inverter(s).
 4. Combiner output shall be compatible with inverter input.
- D. Edge Connector: As indicated by the PV module manufacturer.
1. Method of electrical interconnection for PV laminates shall be by means of a factory supplied plug connecting cable.



2. Cables measuring 12 to 18 inches shall be supplied with a male-type connector on each end, or with newer technology as recommended by the solar manufacturer.
 3. Each laminated light for PV modules shall be provided with a factory supplied female-type connector.
- E. Accessories: Junction boxes, anchors, wiring lugs and other accessories shall be provided in accordance with Division 26 requirements, and in compliance with California Electrical Code requirements and the PV modules manufacturing recommendations.
- F. Data Acquisition System: System approved by the California Energy Commission that meets applicable state regulations.
- G. System Performance Meters: Provide revenue grade Interval Data Recording (IDR) meters complete with industry standard telemetry for communication with Ethernet, cellular or other common output capabilities. Refer to contract drawings for meter(s) location(s).
1. Provide connection to a password protected website accessible by OWNER's personnel for the purposes of metering, monitoring and data collection of solar production.
 2. Meters shall be connected to a monitoring or data collection recording solar production through Time of Use (TOU) increments applicable to the local utility standards, with a minimum 15-minute intervals.
 3. Equal or better meters listed by the California Energy Commission could be submitted for review. No installations shall be allowed without written consent from the OWNER.

2.02 SYSTEM RATING

- A. System shall be sized to provide the KW system output required, unless indicated on drawings otherwise at full load rated power.
- B. The systems shall be rated for outdoor installation. The system equipment shall be capable of operating under the locations maximum and minimum documented temperatures during summer and winter times. The entire system must be rated and warranted to withstand and operate under these conditions.
- C. Rated PV system capacity shall be specified in direct current (DC) kilowatts peak under both STC and PTC conditions.



1. The STC or Standard Test Conditions rating assumes direct current referred as “kWdc-stc”. It is also referred as kilowatts peak, or “kWp”. Specific PV module manufacturer maximum and minimum power data must be specified for this rating.
2. The PTC rating or PV USA Test Conditions rating is based on 1,000 Watts per square meter solar irradiance, 20-degree Celsius ambient temperature and one meter per second wind speed.

2.03 STRUCTURAL IMPACT AND WIND LOADING

- A. The PV array weight shall add no more than eight pounds per square foot to the facility roof structure in the array area.
- B. The system shall be installed as part of a structural support system designed for the application.
- C. Deviations from approved construction drawings shall be documented with structural calculations and construction details; these engineering data shall be submitted for Architect's approval prior to commencing any work.
- D. PV arrays shall be seismically restrained from falling off the roof or excessive movement on the roof. Panels shall be installed to resist sliding and pop-up resulting from lateral and vertical seismic forces and displacements per CBC.

2.04 MOISTURE PROTECTION

- A. Underlayment to prevent moisture and water infiltration shall be provided over the roof substrate as part of the Solar Roof system installation.

PART 3 – EXECUTION

3.01 GENERAL

- A. PV system shall not be used for any purpose other than its intended functions.
- B. Where occurs, equipment mounted in exterior locations shall be rated NEMA 3R.
- C. Semiconductor devices shall be hermetically sealed. Vacuum tubes shall not be used.
- D. Relays shall be dust tight.
- E. Wiring methods for power distribution and controls shall be as defined in the Division 26 specifications. Wire types shall conform to manufacturers' recommendations.



- F. Bolted connections of bus bars, lugs, and cables shall be in accordance with applicable codes and industry standards.
- G. Power connection shall be marked and torque to the required value.
- H. Commissioning requirements of Divisions 01 and 26 apply to this section.
- I. Contractor shall coordinate the Work with other aspects of roofing, mechanical, structural, and electrical systems to obtain a complete and operating system.

3.02 SYSTEM INSTALLATION

- A. Contractor shall provide all equipment and required wiring with required conductor terminations to devices for the PV system to function as specified and indicated on Drawings. Refer to Section 26 05 19: Low-Voltage Wires (600 Volt AC), for installation and color-coding requirements.
- B. Terminations shall be in terminal cabinets or on equipment terminals.
- C. Conductors shall be installed within conduits, boxes, and terminal cabinets in a totally enclosed installation. Provide conductors required to connect incoming and outgoing circuits.
- D. Wiring within equipment and terminal cabinets shall be installed to conform to contract documentation and NFPA 72 standards. Wiring shall be cabled, laced, and securely fastened in place so that no weight is imposed on equipment or terminals.
- E. Conductors shall be color-coded per specification section 26 05 19 Low Voltage Wires (600 Volt AC) and tagged with code markers at terminal cabinets, and equipment. A wire index shall be typed and installed on terminal cabinet doors. Index shall be covered with clear plastic adhesive covers. Wiring shall be identified as to building and location of devices.
- F. Complete installation shall comply with local building codes, manufacturer's instructions, and applicable industry standards.
- G. Location of boxes and raceways on Drawings is approximate, unless dimensions are indicated. Do not scale Drawings to determine locations and routing of conduits. Location of the infrastructure and equipment shall conform to architectural features of the building and other Work already in place and must be ascertained in the field before the start of Work.
- H. Drawings generally indicate Work to be provided, but do not indicate all bends, transitions or special fittings required to clear beams, girders or other Work already in



place. Investigate conditions where conduits are to be installed and furnish and install required fittings.

- I. The roof shall be inspected prior to start of any work. Any observed deficiencies shall be brought up to the attention of the OAR prior to commencing any work.
- J. Prepare substrate to receive PV modules in accordance with manufacturer's recommendations and in compliance with accepted shop drawings.
- K. Provide trims and flashings on roof penetrations to ensure water-tight installation using PV manufacturer's flashing system.
- L. Adequate ventilation shall be provided to ensure that system components are operated within their environmental ratings.
- M. Temperature sensors shall be provided to monitor the temperature of indoor system components, such as Inverters and power monitoring system. Upon detection of temperatures in excess of the manufacturer's recommended operating temperature range, the sensor shall trigger local audible and visual alarms, and send a message to OWNER designated M&O group and Integrator in charge of the projects' maintenance.
- N. Provide warning signs as required by applicable codes.

3.03 MONITORING

- A. Provide an on-site Data Acquisition System (DAS). The DAS shall be equipped to log the information critical to the evaluation of system performance, including AC current energy production, solar irradiance, ambient temperature, and wind speed.
- B. The information shall be stored on the logger at 15-minute intervals and transmitted to an OWNER designated processing facility. Information shall be stored and backed-up per CEC and utility company requirements.
- C. For the duration of the service agreement between OWNER and the third-party monitoring company, data services shall include the processing, quality assurance, storage, and daily backup of system performance data.
- D. Provide annual reports of system's performance on the anniversary of the system.
 - 1. The report shall include a full-color chart showing the predicted energy output for a typical year, the predicted energy output for the current year, and the actual energy produced in each month of the year.
 - 2. The report shall be prepared for each individual system in the site, and as an aggregate for the entire site's electrical energy production.



3. The DAS shall include a data logger, modem for data retrieval, NEMA 4 enclosure, dry bulb measuring device, anemometer, solar sensor and radiation shield.

3.04 TESTING

- A. A 48-hour notice shall be provided to the OWNER authorized Representative (OAR), Engineer of Record (EOR), Project Inspector, and Commissioning Agent before final testing.
- B. Demonstrate in presence of the Project Inspector, and Commissioning Agent that circuit and wiring tests are free of shorts and grounds and that installation performs as specified herein and within manufacturer's guidelines.
- C. PV modules shall be factory tested for design performance.
- D. Inverter shall be factory tested for performance; results shall be included in the Operation and Maintenance Manual.
- E. Provide commissioning and system startup, pre-functional and functional tests report as part of the commissioning process. Perform all tests in the presence of the OWNER Commissioning Agent.
- F. Installer is responsible for identifying required tests, coordinating, scheduling, and conducting tests before Substantial Completion. Tests shall include the following:
 1. System response, data logging and transmission, and performance.
 2. System features and components under normal operation.
 3. System shutdown from utility override switches.
 4. Before energizing the cables and wires, check for correct connections and test for short circuits, ground faults, continuity, and insulation.
 5. When the system is equipped with optional features, consult the manufacturer manual to determine proper testing procedures.
- G. Defects resulting from tests shall be corrected prior to substantial completion.
- H. Software Modifications:
 1. Provide the services of a factory trained and authorized technician to perform system software modification, upgrades or changes. Response time of the technician to the Project site shall not exceed 24 hours.



3.05 SERVICE MANUALS

- A. Contractor shall deliver to OAR, three copies of the service manuals. Each manual shall include the following:
1. Installation manuals, programming manuals, user manuals, and part numbers if applicable for every major system component. Catalog cut sheets are not acceptable.
 2. A printed copy of the system configuration, including system labeling codes, and passwords.
 3. An electronic copy of the system configuration program on compact disk.
 4. Final test report.
 5. Detailed explanation of the operation of the system.
 6. Instructions for routine maintenance.
 7. Detailed wiring diagrams and updated shop drawings that include revisions made in the field via plan changes, RFC's, Field Change Directives, and any other construction change documents including interface details with other systems.
 8. Provide an electronic copy of the updated system As-Built Drawings to the OAR, prepare this copy in the latest version of AutoCAD; along with the electronic copy provide a full-size bond copy. Include one external drive with a copy of the up-dated As-Built Drawings into each of the Service Manuals. flash drive and folded drawings shall be secured and inserted into the Service Manuals in appropriate drawings and flash drive holders.
 9. Materials and required deliverables shall be submitted to the OAR.

3.06 PROTECTION

- A. Protect the Work of this section until Substantial Completion.

3.07 CLEANUP

- A. Remove rubbish, debris, and waste materials and legally dispose of off Project site.

END OF SECTION



SECTION 26 50 00

LIGHTING

PART 1 – GENERAL

1.01 SECTION INCLUDES

- A. Lighting fixtures.
- B. Fixture mounting hardware.
- C. Lamps.
- D. Emergency Lighting.
- E. Lighting control equipment.
- F. Source quality control.
- G. Standard fixtures.

1.02 RELATED SECTIONS

- A. Lighting control panel boards (addressable panels) are specified in Section 26 09 26, Lighting Control Systems.
- B. Refer to Section 20 70 26, Common Materials and Methods for Electrical Systems, for requirements.

1.03 REFERENCES

- A. American National Standard Institute (ANSI):
 - 1. ANSI C136 Series Standards for Roadway and Area Lighting Equipment
 - 2. ANSI C82.77-5 Lighting Equipment – Voltage Surge Requirements
 - 3. ANSI/AISC 360 Specification for Structural Steel Buildings
- B. American Society for Testing and Materials (ASTM):
 - 1. ASTM A123/A123M Standard Specification for Zinc (Hot-Dip Galvanized) Coating on Iron and Steel Products



2. ASTM A1008/
A1008M Standard Specification for Steel, Sheet, Cold-Rolled,
Carbon, Structural, High-Strength Low-Alloy, High-Strength
Low Alloy with Improved Formability, Solution Hardened,
and Baked Hardenable

- C. DesignLights Consortium (DLC)

- D. Environmental Protection Agency (EPA)

- E. International Dark Sky Association (IDA)

- F. Illuminating Engineering Society of North America (IES):
 1. IES Lighting Handbook, Reference and Application
 2. LM-79 Optical and Electrical Measurements of Solid State Lighting Products
 3. LM-80 Measuring Luminous Flux and Color Maintenance of LED Packages,
Arrays, and Modules
 4. TM-21 Projecting Long-Term Lumen, Photon, and Radiant Flux Maintenance
of LED Light Sources

- G. Institute of Electrical and Electronics Engineers, Inc. (IEEE):
 1. IEEE C62.41.1 IEEE Guide on the Surge Environment in Low-Voltage
(1000 V and less) AC Power Circuits
 2. IEEE C62.41.2 IEEE Recommended Practice on Characterization of
Surges in Low-Voltage (1000 V and less) AC Power
Circuits

- H. National Electrical Manufacturers Association (NEMA):
 1. NEMA C81 Series Electric Lamp Bases and Holders
 2. NEMA WD7 Occupancy Motion Sensors Standard

- I. National Fire Protection Association (NFPA):
 1. NFPA 1 Fire Code
 2. NFPA 70 National Electrical Code



3. NFPA 101 Life Safety Code
4. NFPA 110 Standard for Emergency and Standby Power Systems
5. NFPA 130 Standard for Fixed Guideway Transit and Passenger Rail Systems
- J. Underwriters Laboratories Inc. (UL):
 1. UL 94 Standard for Safety Tests for Flammability of Plastic Materials for Parts in Devices and Appliances
 2. UL 496 Standard for Safety Lampholders
 3. UL 508 Standard for Safety Industrial Control Equipment
 4. UL 773 Standard for Safety Plug-In, Locking Type Photocontrols for Use with Area Lighting
 5. UL 916 Standard for Safety Energy Management Equipment
 6. UL 924 Standard for Emergency Lighting and Power Equipment
 7. UL 1598 Standard for Safety Luminaires
 8. UL 8750 Standard for Safety of Light Emitting Diode (LED) Equipment for use in Lighting Products

1.04 REGULATORY REQUIREMENTS

- A. Federal Communications Commissions (FCC):
 1. Title 47 Rules and Regulations
- B. California Code of Regulations (CCR):
 1. Title 8 Industrial Relations
 2. Title 22 Social Security
 3. Title 24, Part 2 California Building Code
 4. Title 24, Part 3 California Electrical Code
 5. Title 24, Part 6 California Energy Code



6. Title 24, Part 11 California Green Buildings Standards Code

1.05 SUBMITTALS

- A. Refer to Section 01 33 00, Submittal Procedures, and Section 01 33 23, Shop Drawings, Product Data, and Samples, for submittal requirements and procedures.
- B. Submit product data including the following:
 - 1. Catalog sheets and specifications
 - 2. Ratings, configurations, wiring diagrams, dimensions, service conditions, options and features
 - 3. Table matrix showing the specification requirement and the product data showing specifications are met
- C. Submit Shop Drawings including the following:
 - 1. Single line, schematic, block, and wiring diagrams
 - 2. Equipment layout of lighting system components
 - 3. Plan view details and component topologies
 - 4. Photometric drawings and network riser diagrams
 - 5. Luminaire marking and labeling
- D. Installation procedures: Include tools and materials list, mounting templates, and dimensions.
- E. Calculations:
 - 1. Lighting photometric analysis shall reference the IES recommended calculations using a lighting software tool. Report shall include the following:
 - a. Calculations at L70 and another at initial lumens.
 - b. Lighting fixture schedule shall include symbol, quantity, arrangement, lighting loss factor (LLF), manufacturer and luminaire name, luminaire type, wattage, color correlated temperature (CCT), house shield if any, distribution type, color rendering index (CRI).
 - c. Calculation areas shall include visible lighting luminaire pattern, area dimensions, and calculation points.



- d. Calculation and statistical summary shall be separate for each area as indicated. Each statistical area shall be highlighted differently.
 - e. Rendering view of calculated areas.
 - f. Contract number and title, Contractor name, revision, date.
 - g. Surface reflectance.
2. Submit details of lighting pole, foundation, and anchorage with supporting loads and structural design calculations.
 3. Submit details of luminaire mounting and bracket with supporting loads and structural design calculations.
- F. Submit test reports including the following:
1. Certified test reports of factory and field tests performed.
 2. Title 24 Acceptance Testing Documentation in accordance to Title 24, Part 6, as indicated.
 3. Seismic analysis report.
 4. LM-79, LM-80, and TM-21.
 5. Testing and Commissioning Testing Results.
- G. Manufacturer's certificates: Include certificate ensuring products meet or exceed specified requirements.
- H. Submit the operation and maintenance manual, in accordance with Section 01 78 23, Operation and Maintenance Data, including the submittal items mentioned above and the following:
1. Sequence of operation
 2. Preventive maintenance procedure
 3. Spare parts list and ordering form
 4. Troubleshooting guide for common issues
- 1.06 *LABELING*
- A. Lighting fixtures, light poles, lighting control equipment shall be labeled. Labelling shall be approved by the Engineer.



- B. Emergency lighting luminaire shall be identified.
- C. Luminaire labeling information shall include panel and circuit number, and contract number.

1.07 *NAMEPLATE*

- A. Mark fixtures clearly with manufacturer's name, voltage, wattage, UL listings.

1.08 *DELIVERY HANDLING AND STORAGE*

- A. Deliver luminaries and lighting equipment to the Jobsite complete with related items, completely wired and assembled.

PART 2 – PRODUCTS

2.01 LIGHT EMITTING DIODE (LED) LIGHTING

A. LED Luminaire

1. LED fixture requirements are as described below:

- a. The LED fixture shall consist of LED lamps, driver, assembly, and mounting hardware.
- b. Each fixture shall have its own LED driver. LED drivers shall be placed within LED fixture, unless otherwise specified.
- c. Input voltage and frequency: 120 VAC to 277 VAC plus or minus 10 percent, 60Hz.
- d. Efficacy: as indicated.
- e. NEMA Rating: as indicated.
- f. Brightness and glare: Lighting systems shall be free from distracting and uncomfortable glare.
- g. Warranty: minimum 5 years.
- h. Cooling System: Cooling system shall not have fans, pumps, or liquids and shall be resistant to debris and dust buildup.
- i. LED fixtures shall be rated for Class I Division II Hazardous Locations, as indicated.
- j. Lens: as indicated.
- k. Shields: as indicated.
- l. LM-80 and TM-21 shall be used to determine lifespan outside L70 controlled lab settings.
- m. Outdoor LED Luminaires shall comply with Title 24 Part 6 – 130.2(b) for luminaire cutoff requirements.
- n. Fixture shall be UL Listed.

B. LED lamp



1. LED lamp requirements are as described below:
 - a. Definition: LED lamp Assembly is the LED assembly without LED driver.
 - b. Correlated Color Temperature (CCT): 3000K to 3500K indoor, 4000K to 4500K outdoor and tunnels.
 - c. Color Rendering Index (CRI): greater than or equal to 80, except for parking lots where it shall be greater than or equal to 70.
 - d. Operating hours shall be determined by LM-80 and TM-21. Reported L70 hours shall be minimum 50,000 hours.
 - e. Difficult access areas such as on top of escalators and stairs shall have reported L70 of 60,000 hours, minimum.

C. LED Driver General Requirements:

1. LED driver general requirements as described below:
 - a. Input voltage: 120 VAC to 277 VAC (plus or minus 10 percent).
 - b. Frequency: 60Hz.
 - c. Operating temperature: minus 20 degrees Celsius to plus 50 degrees Celsius.
 - d. Minimum efficiency: 85 percent.
 - e. Driver shall be dimmable.
 - f. LED dimmable driver requirements are as described below:
 - 1) There shall be no visible change in light output with a variation of plus or minus 10 percent line voltage input.
 - 2) Driver shall provide step-free, continuous dimming from 100 percent to 10 percent; and shall respond similarly when rising from 10 percent to 100 percent.
 - 3) LED dimming driver shall provide continuous step-free, flicker free dimming over the operating range, with "Fail-Safe" 0 to 10 V dimming standard.
 - g. Driver shall be self-protected, including surge protection and short circuit protection and shall comply with ANSI or IEEE standards.
 - h. Comply to FCC CFR, Title 47, Section 15.
 - i. LED driver shall have a minimum of 50,000 operating hours under warranty.
 - j. Power Factor (PF) greater than or equal to 0.90.
 - k. Each fixture shall have its own LED driver. LED drivers shall be placed within LED fixture, unless otherwise specified.

2.02 FIXTURE MOUNTING HARDWARE

A. Requirements:

1. Luminaire mounting hardware shall be in accordance to the luminaire



manufacturer's recommended requirements.

2. When exposed to public view, fabricate and finish hardware in material matching the fixture body.

B. Light poles:

1. Provide the type, configuration, and dimensions indicated. Light pole shall resist wind loads in accordance with the California Building Code,. Maximum deflection of pole shall be five percent when fully loaded. Furnish poles as indicated with handhole and flush cover with tamper proof screw and grounding stud, luminaire mounting tenon/bracket, base cover and mounting hardware including anchor bolts, nuts, washers, and baseplate to permit accurate alignment and installation of pole and luminaire as indicated. Light pole anchor bolt covers shall have tamper proof screw.
2. Light pole ladder and safety cable shall conform to CCR Title 8, Industrial Relations, Division 1, Chapter 4, Subchapter 7, Group 1, Article 4, Section 3277(m), Ladder Safety Systems, and CAL/OSHA.
3. Lowering types pole specifications shall be as follows:
 - a. Poles shall be 50 feet galvanized round tapered steel and shall include pole shaft, hand hole, support plate, anchor base, anchor bolts with washers and nuts, and brackets to mount camera box.
 - b. The pole shall resist wind loads in accordance with the California Building Code.
 - c. Pole shall be equipped with a hand hole with cover plate. Hand hole shall allow adequate clearance for installing, servicing, and maintaining the lowering device system. Hand hole shall include a steel cover plate and shall be sealed and feature covered pulldowns to ensure weather tight protection. The hand shall be lockable for added safety and security. Hand hole rim shall conform to ASTM standards. Designation, Hand hole cover shall conform to ASTM standards.
 - d. Base plate, support plate, and anchor bolts shall be per ASTM standards.
4. Lowering device specifications shall be as follows:
 - a. Lowering device shall have internal motor with a minimum of 1 hp heavy reversing type electrical motor with a stalled torque at least twice that required to operate the lowering device.
 - b. Lowering device shall have internal winch assembly. Lowering device shall consist of spun aluminum copper free cover, cast high strength copper free aluminum latch barrel, stainless steel latch pin, galvanize steel luminaire ring, stainless steel centering spring and steel adjustment nut, stainless steel wire rope



grip, on-marking guide arm roller and cast aluminum iris guide arm, junction box and reflection latch indicator.

- c. Lowering device shall be top latching, centering arm unit with an internal winch. Internal drive lowering device shall be able to hold multiple luminaires, 50 foot pole height, stainless steel hoist, winch cable, with camera ready provisions, and with special arm assemblies on frame.

2.03 LIGHTING CONTROL EQUIPMENT

- A. Refer to Section 26 09 26, Lighting Control System for lighting control equipment requirements.

2.04 EMERGENCY LIGHTING

- A. Emergency lighting system shall be as indicated.
- B. Emergency lighting system shall comply with CBC, CEC, UL924, NFPA 101, NFPA 110, and NFPA 130.

2.05 SOURCE QUALITY CONTROL

- A. The lighting fixture to be tested shall be typical of the unit it represents, clean and free from mechanical defects, equipped with the proper fittings, and with the lamp of the size and type in the position recommended for service operation.
- B. Test UL-listed material, equipment, and components in accordance with UL standards. Test material, equipment, and components not covered by UL standards in accordance with nationally recognized standards. Provide material, equipment, and components bearing a label tag or certification of such inspection.
- C. Perform and report tests for photometric performance in accordance with the approved methods outlined by the IES Lighting Handbook for photometric testing, and include data on candlepower, distribution, zonal lumens, maximum luminance values, and luminaire efficiency, including complete coefficients of utilization tables to indicate compliance with performance requirements.
- D. Test data shall be reported on 8-1/2 inch by 11-inch sheets and shall be certified by a nationally recognized independent testing laboratory.

2.06 STANDARD FIXTURES

- A. Tunnel Fixtures: Provide fixtures that are UL listed for wet locations, and that include the following features, appurtenances, and accessories:

1. Housing shall be 0.125 inch extruded aluminum with anodized finish. Housing



upper portion shall have an integral continuous clevis on each side, accommodating a slide grip hanger assembly, eliminating all mounting hole requirements.

2. End caps shall be 0.150 thick cast aluminum with service entry hubs on each end for 1/2-inch conduit. End caps and hub assembly shall be firmly held against the extruded housing and lens by a cast aluminum bracket on each end.
 3. Reflector/driver cover shall be of 0.05 inch aluminum and chain hinged for ease of access with baked-on white enamel finish.
 4. Provide gasket continuous along the length of lens/housing intersection with one piece 0.250 inch close celled neoprene gasket. Gasket the entire inner wall of each end cap with 0.250 inch close celled neoprene gasket.
 5. Provide wall-mounting bracket for 45 degree mounting tilt. Bracket shall be galvanized plate steel and moveable along the entire length of fixture housing. Two brackets per fixture are required.
 6. Diffuser shall be of 0.125 acrylic with internal prisms for low brightness and smooth external surface for minimizing dirt collection.
 7. Tunnel lighting fixtures and mounting devices shall be designed to withstand air pressure waves ranging from plus 80 psf to minus 80 psf repetitively with each passing train.
- B. Emergency Trip Station Blue Light: Provide fixtures that are UL listed for wet locations, and that include the following features, appurtenances, and accessories:
1. Provide housing and outlet box of glass reinforced (30 percent) polyester material conforming to UL 94V-0. Polyester housing and box shall be nonfading, permanent gray color, ultraviolet resistant.
 2. Provide blue enclosing globe of heat-resistant glass with integral male threads for mounting into housing with white LED lamp and metal guard.
 3. Boxes shall be tapped for 3/4-inch conduit. Plugs shall be of same polyester material. Provide box with mounting ears, as indicated.
 4. The blue light shall be composed of two ultra-bright, long lasting LED lamps and shall be visible at any point within 250 feet from its designated mounting location.
 5. The blue light LED lamp shall provide a minimum of 750 effective lumens.



- C. Operator's Access Aisle Fixture: Provide fixtures that are UL listed for wet locations, and that include the following features, appurtenances, and accessories:
1. Provide one piece housing of die cast aluminum with integral cooling fins over the optical chamber and electrical compartments and double thick gussets on the support arm-mounting end. Housing shall form a half-cylinder shape with 55 degree front face plane providing a recess to allow a flush single-latch detail. All hardware shall be stainless steel.
 2. Provide lens frame and cam-latch of die cast aluminum and mate with 1 inch minimum depth around the gasket flange. Provide integral cast hinges with stainless steel pins that allow removal, without tools, from the housing. Cam-latch shall provide positive locking and sealing of the optical chamber.
 3. Provide clear tempered glass lens 3/16-inch thick with one piece molded perimeter gasket seal retained by eight stainless steel clips.
 4. Provide reflector assembly of specular alzak aluminum mounted in an aluminum frame attaching to fixture housing as a one piece module. Reflector module shall be field rotatable in 90 degree increments.
 5. Provide factory pre-wired electrical module components on a single plate with a socket to a quick-disconnect plug and include a wire seal through the barrier wall. Attach module to housing with no-tool hinges and latches, accessible by opening the lens frame only.
 6. Support arm shall be one piece extruded aluminum, fully radiussed internal bolt guides top and bottom and circular cut for specified round pole. Provide luminaire to pole attachment by internal draw bolts and include a pole reinforcement plate with wire strain relief.
 7. Provide finish housing, lens frame, latch and support arm with thermoset polyester powder coat paint in natural aluminum color. Components shall be thoroughly cleaned and primed with protective chromate conversion coating prior to powder coating. Powder coating shall be 2.5 mils nominal thickness.
 8. Provide LED lamp, 277 VAC.
- D. Cross Passage Yellow Light: Fixture shall be identical to emergency trip blue light fixture. It shall be equipped with amber or yellow enclosing globe. Enclosing globe shall be of heat-resistant glass with integral male threads for mounting into housing.
- E. Wet Standpipe Valve White Light: Fixture shall be identical to emergency trip blue light fixture. It shall be equipped with white enclosing globe.



2.07 SPARE PARTS

- A. General: Refer to Section 01 78 44, Spare Parts and Maintenance Materials, for spare part requirements.
- B. Luminaire: Furnish 2 percent of each style of lighting luminaire, or a minimum of 5 each, whichever is greater.
- C. Light Poles: Furnish 1 percent of each style of light pole assembly, or a minimum of 2 each, whichever is greater.

PART 3 – EXECUTION

3.01 INSTALLATION OF LIGHTING FIXTURES

- A. Install lighting fixtures as indicated and in accordance with the manufacturer's installation instructions and recommendations, complete with lamps, hangers, brackets, poles, fittings, and accessories, ready for operation.
- B. Align, mount, and level lighting fixtures uniformly.

Avoid interference with, and provide clearance for, the equipment. Where the indicated locations for the lighting fixtures conflict with the locations for other equipment, change the locations for the lighting fixtures by the minimum distances necessary and as approved by the Engineer.
- C. For suspended lighting fixtures, provide the indicated mounting height clearances between the bottoms of the fixtures and the finished floors.
- D. Anchor lighting fixture supports to the structural slab or to structural members as indicated. Supports shall maintain the fixture positions after cleaning and re-lamping. Provide supports for seismic loading in accordance with applicable requirements of the California Building Code and the California Electrical Code.
- E. Surface-mounted lighting fixtures shall be bracketed rigidly from the mounting surfaces. Provide 1/4-inch clearance between surfaces when the fixture is flat-mounted against concrete surfaces. Install fixtures with a non-cumulative dimensional alignment tolerance of 1/16-inch when mounted in continuous runs with one inch spacing between individual fixtures. Nipples carrying wires between fixtures shall be watertight.
- F. Where aluminum is placed in contact with dissimilar materials, except galvanized steel, zinc, and stainless steel, treat contact surfaces as follows:

1. Dissimilar metals: Apply a prime coat of zinc chromate primer followed by two



coats of aluminum and masonry paint.

2. Concrete, masonry, and plaster: Apply zinc chromate primer, bituminous paint, aluminum and masonry paint, or pressure-sensitive tape to aluminum contact surfaces.
 3. Wood or other absorptive materials: Apply two coats of aluminum house paint, and protect aluminum contact surfaces with bituminous paint.
- G. Provisions for coating and electrically isolating aluminum and stainless steel, or any other dissimilar metals in contact, when exposed to salt water, water immersion, or burial shall be provided.
- H. Welding:
1. Locate welds in assemblies to be anodized so as to conceal visible discoloration in the heat-affected zone.
 2. Where weld metal will be exposed after anodizing, select filler alloys to closely match composition of base metal. Follow manufacturer's recommendations for such filler alloys.

Provide pendant fixtures with stem swivel hangers to assure a plumb installation with a minimum 45-degree swing from horizontal in all directions. Where 45-degree movement of fixture is not possible due to field conditions, provide, in addition to above, cross bracing of aircraft cable to restrict movement in direction of potential contact. Tubing shall be not less than 3/16-inch diameter. Motion of swivels or hinged joints shall not cause sharp bends in conductors or damage to insulation. For heavy pendant-mounted fixtures, where support is to be independent of the outlet box, provide stem swivel hangers with fixture studs.

- I. Install fixtures to be pole-mounted in accordance with the manufacturer's installation instructions.

3.02 INSTALLATION OF DRIVERS

- A. Install drivers, other than those mounted integrally within luminaries, in such a manner that the driver is protected from weather, moisture, and other atmospheric conditions, and in ambient temperatures that will not cause the temperature of the driver housing hot-spot to exceed UL requirements.
- B. Voltage drop to lamp, due to remote driver mounting, shall not exceed one percent of the nominal lamp voltage. Provide secondary driver conductors with 600 V insulation. When more than one driver is mounted at one location, the minimum spacing between



driver shall be 6 inches in a horizontal direction and 12 inches in a vertical direction. Mount driver components securely in such a manner as to obtain the necessary heat dissipation.

3.03 INSTALLATION OF LIGHT POLES

- A. Determine surface and structure load ratings prior to installation of equipment.
- B. Install light poles as indicated and in accordance with the manufacturer's installation instructions and recommendations. Light poles shall be grounded as indicated on the Contract Drawings.

3.04 CONCRETE BASES

- A. Provide necessary templates and anchor kits before starting work, and coordinate installation of anchors in concrete with the work specified under Division 3 - Concrete.

3.05 INSTALLATION OF EXPOSED PARTS OF FIXTURES

- A. Install exposed parts of fixtures after construction, painting, and general cleanup of completed area.

3.06 FIELD QUALITY CONTROL

- A. Inspect luminaries, lamps, and associated hardware before and after installation to ensure that they are of the quality and type specified and indicated, and are free of defects and damage.
- B. Whenever practicable, test lighting systems at the same time that the distribution panelboard or switchboard is tested.
- C. Replace lamps that fail within 90 Days after final acceptance without additional cost to the District.
- D. Test light poles for continuity to the grounding system.
- E. Inspect lighting fixtures, light poles, and lighting control equipment for labelling.

3.07 TESTING AND COMMISSIONING

- A. Contractor shall test and commission installed system per testing and commissioning procedures.

1. Provide checklist of individual lighting fixtures with verification that



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lighting fixtures are functioning.

2. Provide lighting level measurements per IES or as indicated in Contract Drawings.

END OF SECTION



SECTION 28 16 00 INTRUSION DETECTION SYSTEMS

PART 1 - GENERAL

1.01 SUMMARY

- A. This section includes fully functional, state-of-the-art, digital Intrusion Detection System (IDS) including control panels, sub-panels, wiring, keypads, system control devices, and an appropriate array of zones and sensors that provide effective security coverage.
- B. Principal items of Work in this Section include but are not limited to:
1. Infrared motion detectors and associated power supplies, batteries, and cables.
 2. Door switches and cables.
 3. Controller, annunciator, expansion modules, power modules, TCP/IP network modules and batteries.
 4. Connect Intrusion Detection System equipment to adequate electrical grounding in accordance with manufacturer's specifications.
 5. Installation of power and signal circuits for all equipment, including associated raceway, wiring and terminal cabinets as required for a complete and operable system.
- C. Related Requirements:
1. Division 01- General Requirements.
 2. Section 26 05 00: Common Work Results for Electrical.
 3. Section 26 05 13: Basic Electrical Materials and Methods.
 4. Section 26 05 26: Grounding and Bonding.
 5. Section 26 05 19: Low-Voltage Wires (600 Volt AC).
 6. Section 26 05 33: Raceways and Boxes Fitting and Supports.
 7. Section 26 24 16: Panelboard and Signal Terminal Cabinets.



1.02 REFERENCES

- A. Electronics Industries Alliance (EIA):
 - 1. EIA/TIA-568: Commercial building telecommunications wiring standard.
 - 2. EIA/TIA-569: Commercial building standard for telecommunications pathways and spaces.
 - 3. EIA/TIA-606: Administration standard for telecommunications infrastructure of commercial buildings.
 - 4. EIA/TIA-607: Commercial building grounding and bonding requirements for telecommunications.
- B. California Electrical and Fire Codes.
- C. Building Industry Consultant Service International (BICSI):
 - 1. Telecommunications Distribution Methods Manual
- D. Federal Trade Commission (FTC):
 - 1. Green Guides, 16 CFR Part 260, Guides for the Use of Environmental Marketing Claims.
- E. Underwriters Laboratory listings and other labels
- F. ANSI, ASTM, UL, NEMA, IEEE and FCC standards as applicable.

1.03 SUBMITTALS

- A. Materials list: Submit a complete material list for the materials and products of this section. Each submittal shall be bound and shall contain an index organized vertically by assembly and item number and horizontally by columns. The first assembly shall be the major head end equipment. The leftmost column shall be the item number; next shall be the description, followed by the applicable Specification section number, followed by the specified item, which is followed by the submitted item. The rightmost column shall be for notes, which shall be used to reference the reason for submitting items, other than as specified.
- B. Product Data: Include Product Data sheets and catalog cut sheets for items listed in index. Items shall be arranged in the same order as the index and if more than one item is indicated, the submitted items shall be highlighted or marked appropriately. Product Data shall be sufficiently detailed to allow the Architect to review the product and to allow other trades to provide necessary coordination.



C. Shop Drawings:

1. Provide Shop Drawings, in the same size as the Drawings. Shop Drawings shall be prepared in latest version of AutoCAD with three electronic copies submitted along with full sized Shop Drawings.
2. Shop Drawings shall indicate typical wire connections and cable types for detectors and detector wiring, single gang deep box location for security key switch and keypad locations for all main and remote security panels. Provide wiring schematics including point-to point, terminal blocks, connections to batteries, and power supplies, including the estimated anticipated wiring lengths required for all connection points (i.e., zone and system communications bus runs) within the system. Indicate interfaces to equipment furnished by others.
3. Submit dimensioned Shop Drawings indicating mechanical layout of all intrusion detection equipment, including cabinets and interconnecting conduit for the main security panel, typical remote security panel and single gang deep box for security key switch, keypad and indicator locations, identifying all parts by manufacturer and part number. Indicate mounting details for the motion detectors appropriate to each ceiling type.
4. Shop Drawings shall be accompanied by engineering documentation including:
 - a. Floor Plans indicating components, raceways, and terminal boxes and cabling.
 - b. Riser diagram indicating connections in a manner following the floor plan layout.
 - c. Cabling diagram indicating the CONTRACTOR's designed routing and number of cables in specific raceways or conduits, from the main alarm panel connecting to other sub-panels, modules or devices. Diagram shall include length, in wire feet, and capacitance calculation charts for all Bus cables.
 - d. Zone schedule indicating code numbers and its protected areas.
 - e. Infrared motion detector mounting and all other necessary details.
5. Submit preliminary design calculations and system architecture plan For OWNER's review prior to the start of work. Installation shall not commence prior to CONTRACTOR receiving OWNER's acceptance of design and architecture.
6. Installation and coordination drawings for items in other sections shall be included with Shop Drawings submittals.



- D. Permits and Inspections: CONTRACTOR shall obtain and pay for required permits and inspections; deliver certificates of inspection to the PROJECT INSPECTOR.
- E. Burglar Alarm Licensing: Provide evidence that the CONTRACTOR is properly licensed by the Bureau of Security and Investigative Services of the State of California Department of Consumer Affairs, including, but not limited to the following licenses: Alarm Company Operator, Qualified Manager, and/or Alarm Agent.
- F. CONTRACTOR shall have completed at least five projects of equal scope to systems described herein and shall have been in the business of supplying and installing specified type of systems for at least five years.
- G. Include in the Material List Submission copies of the manufacturers' certifications that the CONTRACTOR is an authorized distributor and service provider of the submitted manufacturers' products and CONTRACTOR's staff has been adequately trained and certified in the installation of those products.
- H. Provide a letter from the Manufacturer guaranteeing the availability of spare parts common to proposed system for a period no less than five years on all components.
- I. Provide Samples of material and equipment as required by the ARCHITECT. If Samples are requested, they shall be submitted within 10 days from date of request.

1.04 SUBSTITUTIONS

- A. Equipment and materials that deviate from these requirements shall not be accepted without written approval from OWNER'S ITD project manager. When deviating or substituting equipment, the following information shall be submitted:
 - 1. Substitution request form substantiating reasons and benefits to OWNER.
 - 2. OWNER'S approval shall be obtained for any equipment or materials substitutions. Proposed substitutions requests shall provide proof of compliance with OWNER'S criteria described in this specification.
 - 3. Submittals must comply with contract general provisions.

1.05 QUALITY ASSURANCE

- A. Use adequate numbers of skilled personnel who are manufacturer certified, trained and experienced on the necessary crafts and familiar with the specified requirements and methods needed for the proper performance of the work.
- B. Only a qualified CONTRACTOR holding licenses required by legally constituted authorities having jurisdiction over the work, shall do the work.



- C. Only persons skilled in trade represented by work, and in accordance with all applicable building codes, shall install system in accordance with best trade practice.
- D. Burglar Alarm Licensing: Provide evidence that the CONTRACTOR is properly licensed by the Bureau of Security and Investigative Services of the State of California Department of Consumer Affairs, including, but not limited to the following licenses: Alarm Company Operator, Qualified Manager, and/or Alarm Agent.
- E. CONTRACTOR shall have completed at least five projects of equal scope to systems described herein and shall have been in the business of supplying and installing specified type of systems for at least five years.
- F. Include in the Material List Submission copies of the manufacturers' certifications that the CONTRACTOR is an authorized distributor and service provider of the submitted manufacturers' products and CONTRACTOR's staff has been adequately trained and certified in the installation of those products.
- G. Provide a letter from the Manufacturer guaranteeing the availability of spare parts common to proposed system for a period no less than five years on all components.
- H. Provide Samples of material and equipment as required by the Architect. If Samples are requested, they shall be submitted within 10 days from date of request.
- I. Coordinate cable runs, and equipment locations with OWNER's Authorized Representative prior to the start of installation. CONTRACTOR and OWNER representative must agree as to the final location of all devices and the cable plant design.
- J. Provide sufficient personnel and tools required to participate in OWNERs Quality Assurance testing as detailed in Attachment A of this specification.
 - 1. Items on check list of Attachment "A" will be examined as a minimum at the Alarm Head End and one remote security panel. Should the examination show deficiencies related to items in the checklist, OWNERs acceptance testing will be discontinued until corrections have been made. When the CONTRACTOR has completed the corrections, a subsequent Quality Assurance test shall be initiated. This procedure is in addition to the system functionality testing required below.

1.06 PROJECT RECORD DOCUMENTS

- A. Operation and Maintenance Manual: Supply, as a condition of final payment and acceptance, three complete bound sets containing the following documentation:



1. Each manual shall include a page with Project site and Project name, date of Substantial Completion, CONTRACTOR name, address, telephone, and fax numbers.
2. Each manual shall contain a letter, signed by an officer of the company indicating the beginning and ending date of any warranties described in Article 1.07 of this section and shall describe the companies' commitment to service the warranty during the terms specified.
3. One page shall contain a list describing all furnished materials by Manufacturer and model number.
4. Site and building zone maps and zone codes indicating areas served, materials, brochures, wiring and connection diagrams of equipment, plot plan of Project site indicating conduit and cable runs and cable counts between termination points, and cable identification. A sample of a typical site plan zone map is included in this specification as an example of the required finished product.
 - a. The project site plan zone map shall be supplied in a single drawing on two USB drives that include all project drawings in AutoCAD format as well as three paper copies, and shall contain the following information:
 - 1) Site layout of buildings indicating the physical locations of all buildings on the campus. The drawing shall coincide with the architectural as built of the project as constructed.
 - 2) Each building shall be labeled with hardware zones of coverage as built. (An example of typical labels is: Administration Building – Z1-8).
 - 3) Site Zone maps shall show School Location Code, School Name and School Address on the upper right side of Drawing. Refer to Attachment C for sample.
 - b. Floor Plans on separate drawings shall show each building, all equipment placement locations with: areas of coverage, room numbers or other designators if numbers are not available, and the individual hardware zones for each room or covered area. Each device and its location, including but not limited to PIR's, all modules, point to point cabling and all panels, shall be clearly shown.
 - c. AutoCAD files (software copies) supplied shall be multi-layer drawings with the following layers as a minimum:
 - 1) Layer 1 shall contain title blocks only.



- 2) Layer 2 shall contain building or site plan backgrounds only.
 - 3) Layer 3 shall contain hardware zone identifiers only.
 - 4) Layer 4 shall contain all devices and cabling only.
 5. One complete riser, site and building drawing set. Size A (8-1/2 inch by 11 inch) and size B (11 inch by 17 inch) shall be bound into the manual. Larger drawings shall be folded and inserted into transparent envelopes and bound into the manual.
 6. A block diagram showing how the LX/Keypad-Bus (es) feeds from the main panel controller to re-power modules, with modules numbered in enrollment sequence, and labeled as to physical location. Diagram should also include how the re-power module(s) feed(s) LX-Keypad-Bus (es) to keypad, Expansion modules and any other modules.
 7. Index of material in bound set including page numbers.
 8. Manufacturer maintenance brochures.
- B. Record Drawings: Prior to start of system Testing, submit three paper record copies on "E" size, and two copies of drawing representations on a labeled USB drive (DWG drawing format prepared with current Microsoft Windows version of AutoCAD). Layer information shall be organized as required in section 3.04 of this specification.

1.07 WARRANTY

- A. Warranty that materials and workmanship provided are free from defects of material for a period of three years excluding specific items of work that require a warranty of a greater period.
- B. Immediately upon receipt of written notice from the OWNER, repair or replace at no expense to the OWNER, defective material or work discovered before final acceptance of work or within the warranty period; material or work damaged thereby; and adjacent material or work that may be displaced in repair or replacement. Examination of or failure to examine work by the OWNER shall not relieve CONTRACTOR from these obligations.
- C. Equipment or materials failure rates of 10% or more during the warranty period:
 1. The OWNER will monitor the performance and reliability of the installed base of Equipment and Materials installed in this Contract. Any deficiencies or malfunctions will be referred to the CONTRACTOR for repairs or equipment replacement.



- D. If the OWNER detects a defect within a warranty period as defined here in, it shall notify the CONTRACTOR Representative in writing (“Notice of Defect”). The CONTRACTOR shall make available and provide the OWNER with the telephone number of a fax machine and email address to receive Notices of Defect. This fax machine and email address shall be available to receive faxes and emails 24 hours per day 7 days per week, including all weekends and holidays.
- E. Upon receipt of written notice from the OWNER of any failure or defect (“Defect”) in any such Equipment or Work, the CONTRACTOR shall diligently perform all work necessary to determine the cause thereof, and the time necessary to remedy the Defect, and shall propose in writing to the OWNER how and in what manner it will remedy the Defect. If the OWNER determines that the proposal complies with the terms of the Contract, it shall authorize CONTRACTOR to proceed to redesign, repair, or replace the defective or failed Equipment or Work within the agreed time period.
- F. In determining the cause of the Defect, the CONTRACTOR shall perform such investigations and tests as may be required to determine the cause, and to verify that such redesign, repairs, and replacements comply with the requirements of the Contract Document. All cost associated with such investigation, redesign, repair, replacement, and testing, including, but not limited to, the removal, replacement, and reinstallation of equipment and materials necessary to gain access to defective Equipment, shall be borne by the CONTRACTOR. Should the CONTRACTOR fail to promptly make the necessary investigations, redesign, repair, replacement, and test, the OWNER may perform or cause to be performed the same at the CONTRACTOR’s expense.
- G. The CONTRACTOR will warrant the redesigned, repaired, or replaced Equipment against defective design, materials, and workmanship for the remainder of the warranty period or a period of to five (5) years from and after the date of acceptance of the redesigned, repaired or replaced Equipment thereof, whichever occurs later.
- H. The CONTRACTOR shall be liable for the satisfaction and full performance of the warranties as set forth herein.
- I. All warranties hereunder are deemed and acknowledged to explicitly extend to the future performance of the Equipment warranted.
- J. The rights and remedies provided for herein are cumulative, and shall not be exclusive and are in addition to any other rights and remedies provided by law, whether in contract or tort, or under this Contract.
- K. CONTRACTOR is deemed and acknowledged to be a merchant with respect to all components and replacement parts furnished pursuant hereto, and the OWNER is acknowledged not to be a merchant with respect thereto.



- L. In the event any Supplier or manufacturer offers any extended warranty not specified herein, CONTRACTOR shall state the terms of such warranty or warranties in writing and shall extend the same to the OWNER without additional cost to the OWNER.
- M. All warranties and guarantees of Suppliers of any tier and Manufacturers, whether expressed or implied, are deemed to be made for the benefit of the OWNER regardless of whether stated as such, and CONTRACTOR shall enforce such warranties and guarantees for the benefit of the OWNER.
- N. CONTRACTOR shall include a letter signed by a corporate officer, partner, or OWNER of the contracting company describing their service organization, its capabilities and commitment to servicing the warranty on all work executed and materials furnished.

PART 2 – PRODUCTS

2.01 MATERIALS

- A. Detectors/ Sensors:
 - 1. Shall support passive infrared and microwave motion detection.
 - 2. Shall be tightly integrated with OWNER's Integrated Security Management System (ISMS) platform. Refer to Specification Division 28 0500 Integrated Security Management System for compliance.
 - 3. UL listed.
 - 4. All motion detectors shall be field adjusted for sensitivity and correct aim per manufacturer's specification.
 - 5. Wall mounted detectors shall be used only if shown on Drawings or as directed by OWNER Authorized Representative (OAR).
- B. Glass Break Detectors:
 - a. Shall detect shattering of framed glass by direct impact.
 - b. Contractor shall test the installed detectors for true range with an FG-701 glass break simulator/tester.
 - c. Glass break detectors shall be ceiling mounted adjacent to windows and store fronts that are accessible from the exterior.
- C. Contacts:
 - a. Operational up to 5 years using a single user replaceable AAA lithium battery.
 - b. Provide contacts at Café refrigerator doors and Café freezer doors.
 - c. The door switches shall be concealed recessed units mounted at the top of each leaf, opposite the hinge side, 12 inches from outer edge of door.



- D. Cables: Zone cables shall be, as follows:
1. Shall be in conformance with equipment manufacturer products specifications.
 2. Four-conductor, #22 West Penn 240 or equal, for power and detector contact for indoor applications.
 3. Four-conductor, #22 West Penn AQC240 or equal for detector contact and power for outdoor and underground applications.
 4. Two conductor door switch cables, #22 West Penn 221, or equal. Larger size conductor shall be furnished when higher mechanical strength is required.
 5. Four conductor bus cables, #22 West Penn 240, or equal, for indoor applications and West Penn AQC 240 or equal for outdoor applications, in accordance with Intrusion System Manufacturer's specifications and installation practices, unless otherwise noted herein.
 6. Power cable shall be 2 #12 for 120 VAC and 2 #18 for 16 VAC.
 7. Wire and cables shall meet FR-1 Flame Test and shall be UL listed.
 8. Wire and cables shall be indexed with a code marker and identified on a sheet, one copy of which shall be left in each equipment cabinet and one copy placed in as-built data.
 9. Wire and cables shall be installed in raceway, partitioned cable tray or conduit.
 10. Cable not directly connected to circuit board or terminal equipment shall be terminated on 66M blocks mounted on 89B mounting spacers.
 11. Cabling Topology: Loop or Hierarchical Star as indicated on drawings.
- E. Locks/Keys:
1. Each panel door shall be furnished with a flush type lock, Corbin or equivalent, keyed for CCL Cat. 102 key.
 2. Provide raceway, deep box, and cable for OWNER-furnished, OWNER-installed bypass key switch as required on Drawings.
- F. Component Enclosure: Housings; power supply enclosures, terminal cabinets, control units, and other component housings, collectively referred to as enclosures shall be so formed and assembled as to be sturdy and rigid. If sheet steel is used in the fabrication of enclosures, it shall be not less than an 18 gauge door with a 20 gauge box frame. Where exposed pins, the hinges shall be of the tight pin type or the ends of hinge pins shall be tack welded to prevent ready removal. Doors having a latch edge length of less



than 24 inches shall be provided with a single lock. Where the hinged door latch edge is 24 inches or more in length, doors shall be provided with three-point latching device with lock; or alternatively with two locks, one located near each end.

G. Electronic Components

1. All system electronic components shall be solid-state type, mounted on printed circuit boards. Light duty relays and similar switching devices shall be solid-state type or electromechanical.
2. The panel shall have an over current notification LED that lights when devices connected to the Keypad Bus and Loop Expansion LX-Bus(es) draw more current than the panel is rated for. When the over current LED lights, the Loop Expansion LX-Bus (es) and Keypad bus are shut down.

H. Main Security Panel (MSP):

1. A battery test shall be automatically performed to test the integrity of the standby battery. The test shall disconnect the standby battery from the charging circuit and place a load on the battery. This test shall be performed no more than every 180 seconds.
2. The control unit shall be capable of operating and supervising notification appliance devices as well as addressable initiating detection devices and an integrated supervised dual line digital communicator.
3. Control unit must be “Flash ROM” updatable, and program must be held in non-volatile RAM. The panel shall be able to function while the update is in process.
4. Control unit shall be capable of operating using an optional built in Encrypted Alarm Router application that is certified by NIST (National Institute of Standards and Technology) for 128-bit or 256-bit AES (Advanced Encryption Standard) Encryption communications.
5. The optional built-in Encrypted Alarm Router shall be capable of compliance with and UL 2050 standards.

I. Remote Security Panels:

1. The system shall support a maximum of sixteen (16) supervised remote annunciators with the identical capabilities, functions and display layout. Operation of the remote annunciators shall be limited to authorized users by the use of a code or key.
2. The remote annunciators shall be capable of operating at a maximum wiring distance of 15,000 feet from the control unit on unshielded, non-twisted cable.



- J. Control Designations: Controls shall be provided to ensure ease of operation of all specified characteristics. Where applicable, clockwise rotation of controls shall result in an increasing function; controls, switches, visual signals and indicating devices, input and output connectors, terminals and test points shall be clearly marked or labeled on the hardware to permit quick identification of intended use and location.
- K. Test Function:
1. The system shall include a provision that permits testing from any alphanumeric keypad. The test shall include standby battery, alarm bell or siren, and communication to the central station.
 2. The system shall include a provision for an automatic, hourly, daily, weekly, thirty (30) day, or up to sixty (60) day communication link test from the control panel installation site to the central station.
 3. The system shall include a provision for displaying the internal system power and wiring conditions. Internal monitors shall include the bell circuit, AC power, battery voltage level, charging voltage, panel box tamper, phone trouble line 1 and trouble line 2, transmit trouble, and network trouble.
- L. Power Supplies:
1. Power supplies for the control unit shall operate from 120V AC, supplied at the respective protected areas. Standby batteries shall be supplied to power the system in the event of a utility power failure. Batteries shall be sized to provide 105% capacity for eight hours. Standby batteries shall be sealed lead-acid. Power supplies shall be all Solid State.
 2. Controls shall be designed to maintain full battery charge when alternating current is available. Batteries shall be recharged to 85% capacity within 24 hours from battery use. The system shall be automatically transferred to battery power upon loss of alternating current power and return to alternating current power upon restoration. Intrusion alarms shall not be initiated during switch over; a signal shall be initiated upon failure of battery or alternating current power.
- M. Software:
1. The system shall interface with computer software with the capability to fully program the panel by connecting to the panel through:
 - a. Direct cable connection interface card.
 - b. Receiver phone line connection.
 - c. Standard phone line connection.



- d. Ethernet network connection.
 - e. Network connection across the Internet.
 - f. Cellular network connection using the 263C or 263H Cellular Communicators.
2. The system shall interface with computer software capable of locking down all controlled doors.
 3. The system shall interface with computer software capable of monitoring and logging all events.
 4. The system shall interface with computer software capable of exporting reports in the following file formats:

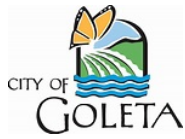
Excel spreadsheet (*.xlsx)	Text (*.txt)
Rich Text (*.rtf)	Comma-separated (*.csv)
Windows Metafile (*.wmf)	HTML document (*.htm)
QuickReport (*.grp)	

5. The system shall interface with computer software capable of printing custom, filtered reports including:

All Events	Door Access Granted
Zone Action	Door Access Denied
Arming/Disarming	Opening/Closing Schedule Changes
Area Late to Close	System Monitors
User Code Changes	System Events

N. Control Panel Capability

1. The minimum requirements for the control panel are as follows:
 - a. Zone Requirement:
 - (1) Programmable zones: 500
 - (2) Control panels zones: 8
 - (3) Control panel fire zones: 2
 - (4) Hardwired expansion zones: 500
 - (5) Wireless expansion zones: 500



- (6) Powered smoke zones up to: 200
- (7) Shall be capable of zone expansion buses
- (8) Shall be capable of zone expander modules
- b. Keypad Requirement:
 - (1) Minimum supervised keypad: 16
 - (2) Minimum access doors: 8
 - (3) Shall be full keypad programmable
- c. User Information Requirement:
 - (1) User codes/access cards: 100
 - (2) Event memory: 1,000
 - (3) Zone monitor.
- d. System Information Requirement:
 - (1) Shall support Contact ID (CID) format
 - (2) Reporting paths: 4
 - (3) Shall be Remote Access Compatible.
- e. Communication Requirement:
 - (1) LAN/WAN/IP Network Communication
 - (2) Cellular Communications
- f. False Alarm Reduction Requirement:
 - (1) Cross zoning
 - (2) Abort reporting
 - (3) Programmable Entry/Exit delay
 - (4) Transmit delay



- (5) Swinger zone bypassing
 - (6) Report bypass to central station
 - (7) Unique duress code
 - (8) Support applications for IOS and Android mobile devices
- g. Security Features Requirement:
- (1) Encryption: AES 128 or 256 bit
 - (2) Two-Man rule
 - (3) Card plus pin by areas
 - (4) Early morning ambush
- h. Compliance Requirement:
- (1) ANSI/UL 365 Police Connected Burglar
 - (2) ANSI/UL 609 Local Burglar
 - (3) ANSI/UL 1610 Central Station Burg
 - (4) SIA-CP-01-2010 False Alarm Reduction
 - (5) ULC-S304 Standard for Central and Monitoring Station Burglar Alarm Units

2.02 FUNCTIONAL DESCRIPTIONS

A. System Description

1. The system areas and zones shall be programmable, and the system shall store, log, display, and transmit specific custom designations for system areas, zones, and user names.
2. To ensure continued, one-call support, the system shall be constructed of sensing components provided directly by the system manufacturer or manufacturer's authorized VARs, such as power supplies, motion detectors, door and window position switches, glass break detectors, or other sensing devices that the manufacturer offers.
3. The system controller, user interfaces, zone input devices, relay output devices, and the system signal receiving equipment shall be engineered, manufactured,



assembled, and must be distributed from a location within the United States of America.

4. The system shall support user interaction by way of a keypad, web browser, system software, key switch, or radio frequency wireless control, text messaging, or smart phone application using integrated or auxiliary devices provided by the system manufacturer.
5. The system shall support controller zone input connections, system keypads, system zone expansion modules, and wireless zone input modules, and must support zone input connections by way of at least two competitive products.
6. The system shall provide capability for addressable modules.
7. System relay outputs shall have the capability of being triggered as a result of a command from the user interface, changes in system status, changes in zone status, or by a programmable schedule.
8. System relay output states shall be programmable for momentary, maintained, pulsed, or must follow the state of an associated system zone input.
9. The system shall be completely programmable either locally from a keypad or remotely through a standard dial-up, and network connections by way of a LAN, WAN, and/or by way of the Internet, cellular communications paths.
10. The control unit shall be completely programmable using remote annunciators, and/or using upload/download software that communicates using SDLC or IP addressed data network.
11. The control unit shall be equipped with an anti-reversing circuit breaker to prevent damage due to accidental reversal of battery leads.

B. Zone Configuration

1. Each zone shall function in any of the following configurations: Night, Day, Exit, Supervisory, Emergency, Panic, Auxiliary 1, Auxiliary 2, Fire Verification, Cross Zone, Priority, and Key Switch Arming.
2. The digital SLCs and the annunciator/keypad bus shall be able to operate from the control panel. All related cabling shall be in conformance with manufacturer equipment specifications.
3. Each zone shall function in any of the following configurations:

Night	Supervisory	Auxiliary 1	Cross-Zone
Day	Emergency	Auxiliary 2	Priority
Exit	Panic		Arming

C. Communication

1. The system shall be capable of signaling to 4 remote monitoring station receivers. Paths shall be capable of being assigned as either a “primary” or



“backup” path. In such a manner the system shall have multiple primary paths to multiple remote monitoring stations as well as multiple backup paths to multiple monitoring stations.

2. The system shall allow a backup communication path programmed for Network or Cellular to switch to the backup path should the Primary path become unavailable and automatically reverse back to the Primary path upon restoration of service.
3. The system shall leverage the enterprise IP infrastructure which may include, but not limited to, PSTN, existing data networks, satellite communication, fiber optic networks, LAN, Wireless LAN, WAN, cellular communication, and retail data networks.

D. Network Communication

1. The control panel shall be capable of asynchronous network communication with a retry time between 2 and 240 minutes and a fail time of 2 and 240 minutes. If communication is unsuccessful the control panel shall be capable of attempting backup communication through any of the available communication methods to the same receiver or a backup receiver.
2. Network communication between the control panel and the receiver shall be in a proprietary communication format.
3. The control panel shall be capable of supporting Dynamic Host Communication Protocol (DHCP) Internet Protocol (IP) addressing.
4. Underwriters Laboratories (UL) shall list network communication by the control panel for Standard or Encrypted Line Security.
5. The control panel shall be capable of two-way network communication using standard Ethernet 10/100 BaseT in a LAN, WAN, or Internet configuration.
6. The control panel shall be capable of communication by means of a 128-bit or 256-bit AES (Advanced Encryption Standard) Encryption.
7. The control panel shall be UL listed.

2.03 INTEGRATED INTRUSION ALARM AND ACCESS CONTROL OPERATION

- A. Access Authority Levels: The system shall be capable of programming access credentials authority levels to check whether the user has access to a specific area and also has the authority to disarm or arm the area. If the user access credential has access and disarm/arm authority the system shall provide the user the option to disarm the area simultaneously upon opening the door, or to open the door and begin an entry delay timer. With the timer option the user then disarms the area using an intrusion control keypad inside the area. If the user only has access authority to the area and the area is in an armed condition, the user is denied access to the area.



- B. Common Area: The system shall be capable of programming a common area to be armed when the last area in the system is armed and disarmed when the first area in the system is disarmed. To ensure the common area works properly it shall not have any user codes assigned to the common area. The system shall also be capable of programming multiple common areas.
- C. Area Access Control
 - 1. The system shall be capable of integrating area access control capability where specified into the same control panel with the ability to have up to 10,000 user credentials. User access is limited to custom profiles and/or schedules. Anti-passback shall be available. The networked version shall support a Two-Man Rule feature. The system shall support up to sixteen (16) access doors, connected to the system using a manufacturer-approved interface module.
 - 2. The System shall support a minimum of eight (8) access doors connected to the system using a manufacturer-approved interface module.
- D. Access Control Equipment: Access Control equipment shall communicate to the system by way of the control panel keypad bus.
- E. Use designated special code to test the system. The One-Man Walk Test feature allows a single technician to check the panel response to burglary, fire, panic, and supervisory zones.
- F. Multi-lingual Display Option: The system shall be programmed to display the User Menu and Status Display text in multiple languages.
- G. User Inactivity Audit: System shall allow user code inactivity to notify the central station after a programmable period of days of no activity. The system shall be programmable from 0-365 days.
- H. Communication Function Diagnostics: The system shall have enhanced diagnostic menu that enables technicians to check network and cellular communication status and cell signal strength from the keypad.
- I. GUEST Operation: The system shall be capable of in the Home/Sleep/Away with Guest House operation, create up to three separate systems (main and two guests).
- J. Keypads in each system can selectively arm the perimeter, interior, or bedrooms for only their protected areas. Main system users can add authorized users to all protected areas, but guests can add users only for their protected system.

2.04 CERTIFICATION AND TESTING



- A. Overview: Intrusion detection system shall detect entry through a door-switched door or motion of a body taking no more than two steps in an area secured with motion detection equipment.
- B. Prior to calling for a walk test, the following shall be completed:
 - 1. Submit to the ARCHITECT the Project Site Map and Installation Worksheets described below.
- C. Alarm System Initialization:
 - 1. Upon notification from the CONTRACTOR, the PROJECT INSPECTOR will contact the OWNER and request a pre-walk test meeting and a two-day system test buffer report.
 - 2. System shall be complete and properly operating. In addition to other completion criteria, the event buffer shall be free of unexplainable false alarm reports and system errors.
- D. Walk Test:
 - 1. Prior to start of system Testing, complete and submit to the PROJECT INSPECTOR the six program sheets referred to as Attachment B.
 - 2. Walk the system with the PROJECT INSPECTOR before or after normal building hours, holidays or Saturdays at OWNER's option. Coordinate time of test with the PROJECT INSPECTOR. A "Walk Test" shall be performed with the PROJECT INSPECTOR present to verify correct programming and functionality of each zone. Any improperly placed or malfunctioning equipment shall be noted. Upon repair of discrepancies, system shall be walk-tested again, until no further problems exist. The PROJECT INSPECTOR will keep a record of problems noted, and the date they were repaired. A copy of this log shall be supplied to OWNER and ITD Project Manager upon successful resolution of discrepancies.
 - 3. Provide minor necessary adjustments to system in presence of the PROJECT INSPECTOR.
 - 4. Upon completion of a successful walk test and prior to time testing, provide the programming sheets included within this specification and AutoCAD files, showing all areas of coverage and the corresponding hardware zones as delineated in section 3.04 of this specification. Time testing will not begin until these files have been delivered to the OWNER and the accuracy of the files has been ascertained.



5. Upon completion of the walk test and delivery of zone maps, a time test shall be performed by connection to the alarm test bed of the OWNER. During the test, the OWNER shall remotely monitor the system for a period of not less than one week. At the conclusion of the test, correct unexplained errors or false notifications. Upon completion of the test and any required adjustments, OWNER shall provide a statement of acceptance based on Substantial Completion.

2.05 BURGLARY CONTROL

- A. Burglary Standards: The Burglary system shall be listed as a Power Limited Device and be listed under the standards below. Each system shall be supplied with complete details on all installation criteria necessary to meet the following listings:
 1. ANSI/UL 1076; ANSI/UL 1610
 2. SIA CP-01-2010 False Alarm Reduction
 3. UCL-S304 Standard for Central and Monitoring Station Burglar Alarm Units
- B. Area System Mode
 1. The system user shall be capable of selectively arming and disarming any one or more of 32 areas within the intrusion detection system based on the user PIN code and/or keypad used.
 2. The system user shall be capable of assigning an opening and closing schedule to all areas or to each area separately. Each area shall be able to arm or disarm automatically by a schedule. The system shall have the capacity for common areas that automatically disarm when any other area disarms and that automatically arm when all others areas arm.
- C. All/Perimeter Mode: The system shall be capable of being configured into the All/Perimeter configuration to enable the selective arming of both the interior and perimeter when armed "All" or arming just the perimeter devices if arming "Perimeter".

PART 3 - EXECUTION

3.01 INSTALLATION

- A. System Component Installation: Materials shall be installed in strict compliance with all local, state, county, province, district, federal and other applicable building, safety, and fire standards, laws, codes, regulations, and guidelines including, but not limited to, all appendices and amendments and the requirements of the local authority having



jurisdiction (AHJ). Installation shall be in accordance with manufacturers' instructions and best practices.

1. Motion Detectors:

- a. End of Line resistors shall be installed on the motion detectors.
- b. Motion Detectors shall be "ON" at all times, unless noted otherwise. Main security keypad turns zone alarms Partitions on and off and reports to OWNER School Police. Alarms are annunciated at all times in the Project site annunciator when the system is either in the "Armed" or "Disarmed" condition, but will not report to the OWNER School Police when the system is in the "Disarmed" condition.
- c. A 90-degree motion detector shall be installed in the corner of a room, facing away from sunlight, heating elements, HVAC outlets and any turbulent air movements. All 360-degree motion detectors shall be installed in the center of the room. The PROJECT INSPECTOR shall confirm these locations on site. All motion detectors shall be field adjusted for sensitivity and correct aim per manufacturer's specifications.

2. Glass Break Detectors:

- a. End of Line resistors shall be installed on the glass break detectors.
- b. Glass Break Detectors shall be "ON" at all times, unless noted otherwise. Main security keypad shall turn zone alarms partitions on and off and report to OWNER School Police. Alarms shall be annunciated at all times in the Project site annunciator when the system is either in the "Armed" or "Disarmed" condition, but will not report to the OWNER School Police when the system is in the "Disarmed" condition.
- c. Install glass break detectors in ceilings at a distance of fifteen (15) feet away from windows or glass store fronts.

3. Door Switches:

- a. End of Line resistors shall be installed on the door switch.
- b. Perimeter Doors: Install J-Box (es) six inches above door switch facing inside of a room. Door switches shall be installed at top of door, opposite the hinge side, 12 inches from outer edge of door.
- c. Café refrigerators and Freezers: A J-box shall be installed six inches above each door switch facing inside of a room. Door switches to be



installed at top of door, opposite the hinge side, 12 inches from outer edge of door. Special surface-mounted, watertight aluminum boxes shall be provided to accommodate surface mounted magnetic door switch on outside of walk-in freezer and refrigerator.

4. Main Security Controller:
 - a. Controller shall be powered by a dedicated, unswitched 120 VAC power source. The circuit number shall be clearly identified and noted on both Electrical panel directory, record drawings, and on alarm panel.
5. LCD Keypad:
 - a. The Main display keypad for each controller shall be installed in the Main Office as shown on drawings. An additional service keypad shall be installed immediately adjacent to each Controller if the controller is not located in the Main Office.
 - b. The location and distance from the main system panel along with the total quantity of keypads must be considered in the wiring capacitance calculations. LCD display keypad locations may be placed in some or all of the following locations, as specified in the project design drawings.
 - 1) Main office.
 - 2) Kitchen.
6. Provide lock-on device on all circuit breakers serving security equipment. Switch panel locations shall be as indicated on Drawings.
7. Main and remote security panels shall be placed only in telecommunications equipment rooms unless otherwise indicated on Drawings.
8. Graphic Annunciator:
 - a. The system should support a Graphic Annunciator panel, using a computer generated map overlay shall display an outline of coverage areas, with a single LED indicating each zone. Map overlay shall be produced using a method that will not fade or wash out, on a media that will not yellow or degrade from natural light exposure. Laser printing, Silkscreen, or Archival Ink, on UV stabile Vellum or other translucent material shall be used to create the map overlay. Where there are large quantities of zones on a single map, it is permissible to combine two or more zones onto a single indicator, provided these zones cover the same localized area of the map. As an example, two separate zones that provide adjacent coverage to the same entrance area of a building, or



cover areas of large room, may display status on a single LED of the annunciator to represent the general area of coverage.

- b. On small zone systems (12 or fewer zones), provide a durable, written zone description mounted on the face of the GA in lieu of a map overlay.

9. Batteries:

- a. Calculations shall be made and submitted to guarantee that the batteries in each panel location are sized for a minimum of eight (8) hours back-up protection for all modules powered at that location.
- b. Battery installation date shall be clearly marked on each battery in a location easily read upon opening cabinet.
- c. Battery shall be located in the same cabinet housing the control module or in a NEMA box adjacent to the control module cabinet.

3.02 RELATED SYSTEMS INSTALLATION

A. Wiring Installation: Provide 120V wiring in conduit, as required, for all equipment. 120V outlets shall be located in a separate NEMA enclosure adjacent to required device cabinets. This NEMA enclosure shall be sized to allow any required power adapters. Low voltage wiring from power adapter to controller shall be in raceway or conduit. Wiring from sensor to controller or terminal cabinet shall be in raceway, cable tray or conduit. Wiring shall conform to the California Electrical Code.

B. Labeling and Marking:

1. Mark all panels, devices and cables with laser printer generated labels.
2. Each system panel shall have a comprehensive index placed in a plastic envelope secured to the inside of the panel door. Final system test and acceptance shall not commence until all completed index cards are installed.
3. At the Main Security Panel, the index shall indicate zones that are covered by the MSP, cross-referenced to cable labels, Remote Security Panels connected, and LX/Keypad cable identifiers for cables entering and leaving the cabinet. This identification shall include all cable references including those to telecommunication or networking connections.
4. At Remote Security Panels, the index shall indicate zones that are covered by the respective RSP, cross-referenced to cable level, the cable connecting to MSP, and the LX/Keypad cable identifiers for cables entering and leaving the cabinet. This identification shall include all cable references including the telecommunication or networking connection.



5. Each cable shall be labeled with the same identifier on the cable at the terminal device, on the cable at the alarm panel, and at all other cable and device termination points. Cable markers shall be located within two inches of the end of the cable jacket and shall be directly readable. All labels shall be printed by a laser printer.
6. Each device shall be labeled to indicate the associated zone. Labels shall be TBD

C. Wire Terminating:

1. Conductors shall be terminated on Terminal blocks that shall be solderless push-on (#20 to 22 gage solid) with integral fanning strip. Solderless push-on type blocks shall be Siemon Company 66-Series or equivalent. Terminals for connections to external circuits shall be properly labeled. 66B blocks shall be mounted directly to terminal location without use of mounting legs. 66M blocks shall be mounted on 89B mounting spacers. Install the required terminal blocks as necessary within a NEMA 3R with hinged cover, wooden backboard, and flush type lock, Corbin or equivalent, keyed for CCL Cat. 60 key.
2. Terminal blocks shall be installed on back of cabinets only, not on sides. Incoming cables shall be terminated on outside pins of terminal blocks and outgoing cables shall be terminated on second pin from buttside edge. This method shall be provided at satellite terminal locations.
3. Wires shall be consistently color-coded. Wire nuts, shall not be installed.
 - a. Wires shall be provided with code marker tags and be indexed to equipment and noted on as-built Drawings, and on index sheet or cards placed in all equipment cabinets and in as-built data folder.
 - b. Provide wire termination index sheets or cards in all terminals and equipment cabinets and include a Project site zone plot plan in relay cabinets.
4. Provide all terminal boxes with screw type terminals allowing sufficient terminals for all conductor termination.

3.03 PROTECTION

Protect the Work of this section until Substantial Completion. Material or work damaged during the planning, installation, testing, and clean-up of this project must be replaced or repaired, at no expense to the OWNER, to meet Project specifications before final acceptance of work.

3.04 CLEANUP



CONTRACTORS work for each school installation shall be considered complete when all of the aforementioned requirements specified in this document have been met. This includes (but is not limited to) the following:

1. Ceiling panels previously removed have been put back in place.
2. System labels have been put in place.
3. Construction and installation debris and scrap materials have been removed and legally disposed of from project site.
4. System testing has been completed, CONTRACTOR certifies that entire system is in working order, and Test Forms and Project Record Documents have been submitted and approved by the OWNER.
5. Marked up, project record documents have been returned to the OWNER.
6. Unused customer material has been returned to the OWNER.
7. The OWNER has successfully completed acceptance testing of the network installation.
8. The PROJECT INSPECTOR has inspected and accepted the installation.
9. Documentation, to include as-builts, Zone Maps and Programming sheets along with required soft copies has been turned over to the OWNER.

END OF SECTION



SECTION 28 31 00
FIRE DETECTION AND ALARM SYSTEM

PART 1 – GENERAL

1.01 SECTION INCLUDES

- A. Fire alarm control unit (FACU).
- B. Manual fire alarm stations.
- C. Automatic smoke detectors.
- D. Automatic heat detectors.
- E. Waterflow and valve position supervisory switches.
- F. Fire alarm occupant notification appliances.
- G. Auxiliary fire alarm equipment and initiating devices.
- H. Fire alarm wiring and cables.
- I. Enclosures for FACU panels.
- J. Power supply 120V.
- K. Fire alarm system installation.
- L. Training sessions.
- M. Training manuals and training aids.

1.02 RELATED SECTIONS

- A. Section 07 84 13, Penetration Firestopping
- B. Section 09 91 00, Painting

1.03 REFERENCES



- A. National Fire Protection Association (NFPA):
 - 1. NFPA 70 National Electrical Code
 - 2. NFPA 72 National Fire Alarm and Signaling Code
 - 3. NFPA 101 Life Safety Code
 - 4. NFPA 130 Standard for Fixed Guideway Transit and Passenger Rail Systems
- B. Americans with Disabilities Act (ADA)
- C. Underwriters Laboratories, Inc. (UL):
 - 1. UL 268 Smoke Detectors for Fire Protective Signaling Systems
- D. Factory Mutual System (FM)
- E. National Electrical Manufacturers Association (NEMA)

1.04 REGULATORY REQUIREMENTS

- A. California Code of Regulations (CCR):
 - 1. Title 8, Cal OSHA
 - 2. Title 19, Public Safety
 - 3. Title 24, Part 2, California Building Code
 - 4. Title 24, Part 3, California Electrical Code
 - 5. Title 24, Part 9, California Fire Code

1.05 SUBMITTALS

- A. General: Refer to Section 01 33 00, Submittal Procedures; Section 01 33 23, Shop Drawings, Product Data and Samples; and Section 01 78 23, Operation and Maintenance Data Manual for submittal requirements and procedures.
- B. Shop Drawings: Submit Shop Drawings including but not limited to the following:
 - 1. Complete descriptive data indicating UL listing for system components.
 - 2. Complete sequence of operation of the system (system logic).



3. Control unit general arrangement, and connection wiring with individual wire numbers, and color code. Module legends shall show the module type and the input and output connections.
 4. Layout plan view showing location of initiating devices and notification appliances with zone and device numbers. Conduit size, and routing with wire fill must be shown on the same drawing.
 5. Connection details typical for each device to be installed.
 6. Nameplate schedules indicating text for annunciation and labeling.
 7. Area coverage drawings with spacing requirements for the initiating and indicating/notification appliances in accordance with the requirements and criteria specified in the applicable Codes and Standards.
 8. Standby Battery size calculations.
 9. Provide California State Fire Marshall (CSFM) Listing numbers for system components.
- C. Product Data: Provide electrical characteristics and connection requirements.
- D. Spare Parts List: The Supplier shall provide a recommended spare parts list for one-year operation, and pricing good for 90 Days from date of equipment delivery.
- E. Reports: A certificate of compliance and other documentation, as required by latest NFPA 72, shall be provided at the times indicated therein. Complete and submit for acceptance the applicable and required information in the System Record of Completion as required by NFPA 72, Section 7.5.6.
- F. FACU program and software for maintaining the fire alarm system and for making modifications to the system for the addition or removal of devices, control function changes, etc.
- G. Testing Plan: Provide a testing plan for quarterly, semiannual, and annual maintenance with detailed instructions in accordance with NFPA 72, Chapter 14.
- H. Record Documents: Submit Record Documents in accordance with Contract Specifications Section 01 78 39, Record Documents.

1.06 QUALITY ASSURANCE



- A. General: Refer to Section 01 43 00 for Quality Assurance requirements and procedures.
- B. Items of the fire alarm system shall be listed as a product of a single fire alarm system manufacturer under the appropriate category by the Underwriters Laboratories Inc. (UL), and shall bear the “UL” label. Control equipment shall be listed under UL category UOJZ as a single control unit. Partial listing will not be acceptable.
- C. In addition to the UL-UOJZ requirement specified above, the system controls shall be UL listed for Power Limited Applications in accordance with California Electrical Code, Article 760. Circuits shall be marked in accordance with California Electrical Code, Article 760-22.
- D. Components of the fire alarm system shall be listed by the California Department of Forestry and Fire Protection Office of the State Fire Marshal (CSFM).
- E. When more restrictive requirements have been adopted by the local authority having jurisdiction (AHJ), the system shall comply with the local requirements.

1.07 INSTALLER AND MANUFACTURER QUALIFICATIONS

- A. A company licensed by State of California as a fire alarm installer with a C-10 Contractor's license and specializing in installing the products specified in this Contract Specification with a minimum of five years documented experience.
- B. Principal installation personnel shall have completed the system manufacturer's training courses on the equipment to be installed.
- C. The fire alarm system supplier (FASS) shall be a specialty contractor or a manufacturer regularly engaged in the design and the installation of fire alarm systems and their related subsystems. For the purposes of this Section, a specialty contractor shall be interpreted to mean an organization that complies with the following criteria:
 - 1. Employs personnel on this project who have successfully completed NFPA, National Institute for Certification in Engineering Technologies (NICET), or manufacturer’s training courses on general fire protection principles and practices.
 - 2. Has performed work (including design, installation, startup, testing and maintenance) of similar or greater complexity on at least five previous projects.
 - 3. Has been actively engaged in the type of work specified in this section for



a minimum of five years.

D. For the purposes of this section, a manufacturer shall be interpreted to mean an organization that complies with the following criteria:

1. Manufactures at least 75 percent (as measured by equipment cost) of the hardware specified in this section and which is furnished for this project.

E. Complies with the preceding criteria established for a specialty contractor. The FASS shall maintain a permanent, fully staffed and equipped service facility within 100 miles of the Jobsite. The service facility shall have full-time, NICET-certified employees qualified in the design, installation, testing, and servicing of the equipment and systems specified herein.

F. The FASS as a minimum shall be responsible for the technical supervision of the installation by providing on site supervision to the installers of the system.

1.08 MANUFACTURER’S FIELD SERVICES

A. Include services of factory or NICET (National Institute for Certification in Engineering Technologies) certified technician to supervise installation, adjustments, final connections, and system testing.

1.10 SPARE PARTS LIST

A. Provide the following spare parts list. Percentages will be taken from the total quantity installed for that device. The list will include but is not limited to the following:

	Part	Quantity
1	Automatic smoke detector	15 percent
2	Automatic heat detector	15 percent
3	Automatic smoke and heat detector base	15 percent
4	Automatic smoke detector tamper cover	10 units
5	Manual fire alarm pull station	15 percent
6	Manual pull station tamper resistant cover	10 units
7	Ceiling mounted speaker/strobe notification appliance	10 percent
8	Ceiling mounted speaker notification appliance	10 percent
9	Wall mounted speaker/strobe notification appliance	10 percent



10	Wall mounted strobe notification appliance	10 percent
11	Occupant notification tamper resistant cover	10 units
12	Monitor module	15 percent
13	Control module	15 percent
14	Six relay control module	3 units
15	Fire Alarm Control Unit with programming	1 unit
16	Keys of each type	12 units each

PART 2 – PRODUCTS

2.01 GENERAL REQUIREMENTS AND OPERATION

- A. Provide an addressable, electrically supervised, manual and automatic, fire alarm and detection system, including proprietary and local alarm units, and occupant notification appliances.
- B. Power supplies: Adequate to serve control unit modules, remote detectors, remote annunciators, smoke dampers, relays, alarm notification appliances, and other appurtenances as specified. Battery-operated emergency power supplies shall be furnished and sized with minimum 25 percent over the capacity required for the operating system in standby mode for minimum of 24 hours followed by alarm notification mode for 15 minutes per NFPA 72.
- C. Performance and capacities of signaling line circuits shall be in accordance with NFPA 72, Class A; printer circuit in accordance with NFPA 72, Class E; initiating device circuits shall be in accordance with NFPA 72, Class A; and occupant notification circuits shall be in accordance with NFPA 72, Class A.
- D. System Supervision: Alarm, trouble, and supervisory signals from intelligent reporting devices shall be encoded onto NFPA Class A Signaling Line Circuit (SLC). Alarm signals arriving at the fire alarm control unit shall not be lost following a power failure (or outage) until the alarm signal is processed and recorded.
- E. Initiating Device Circuits (IDC): Supervised zone module with alarm and trouble indication; occurrence of an open condition shall place the circuit in trouble mode but shall not disable that circuit from initiating an alarm. Initiating device circuits shall be provided with Class A wiring.
- F. Sprinkler system supervision circuits shall connect to the proprietary system transmitter via supervisory module for the tamper switches and valve position



supervision switches with Class A wiring.

- G. Occupant Notification Appliance Circuits: Supervised signal modules, sufficient for the indication/notification appliances connected to system; occurrence of an open or ground fault condition shall place the circuit in trouble mode but shall not disable any device on that circuit from signaling an alarm. Indicating appliance circuits shall be Class A wiring.
- H. Auxiliary Relays: Provide sufficient double throw auxiliary relay contacts for each accessory function as indicated.
- I. Trouble Sequence of Operation: System or circuit trouble shall place the system in the trouble mode, which shall cause the following system operations:
 - 1. Visual and audible trouble alarm indicated by address at fire alarm control unit.
 - 2. Manual acknowledge function at the fire alarm control unit shall silence the audible trouble alarm; visual alarm shall continue to be displayed and notification shall be maintained until initiating device failure or circuit trouble is cleared.
- J. Alarm Sequence of Operation: Actuation of initiating device shall place the circuit in alarm mode, which shall cause the following system operations:
 - 1. Sound and display local fire alarm notification appliances.
 - 2. Transmit address alarm signal to control unit.
 - 3. Indicate location of alarm address and type of device on fire alarm control unit.
 - 4. Transmit signal by function to building mechanical systems as necessary and required for elevator control, escalator control, and other identified functions.
 - 5. Alarm silence function at the fire alarm control unit shall silence audible alarm signaling devices; visual alarm shall continue to be displayed at the local fire alarm control unit, and notification via the network shall be maintained until alarm reset occurs. Actuation of a second initiating device shall cause the alarm to re-activate in accordance with this section.
- K. Alarm Reset: System shall remain in the alarm mode until manually reset with key-accessible reset switch; system shall reset only if initiating circuits are out of alarm mode.
- L. Lamp Test: Manual lamp test function shall cause alarm indication at each zone at



fire alarm control unit.

- M. Addressing: Actual room numbers and/or names will be assigned by the District and shall be shown on the Drawings. Control unit addressing shall include the address, room number or room/space name, type of address, and functions associated with the address.
- N. Each fire alarm control unit shall have a minimum of 20 percent additional space for future expansion.
- O. Each system shall be electrically supervised against open wire, shorts and ground faults in the initiating, and indication/notification circuits.

2.02 MANUFACTURERS

- A. Acceptable Manufacturers:
 - 1. Products described below and identified by product name, model number, or other manufacturer designation, are Basis of Design Products. Basis of Design Products establish the standards of type, function, dimension, in-service performance, physical properties, appearance, warranty, cost, and other characteristics required by the Contract.
 - 2. Products of manufacturers not listed may be proposed for substitution, provided they are comparable to the products specified.
 - a. If “No substitutions” is indicated next to the product name, provide only products of listed manufacturers.
 - b. The burden of proof of equality of proposed products is on the Contractor.

2.03 CONTROL UNITS

- A. The main FACU and associated sub-assemblies shall be Notifier NFS2-3030 or equal, complete with power supply and the necessary components as shown below:
 - 1. Central Processing Unit and Display.
 - 2. Digital Voice Command.
 - 3. Loop Control Module.
 - 4. Loop Expander Module.
 - 5. 75 Watt Amplifier.



6. Control Unit Power Supply.
 7. Power Supply.
 8. Batteries.
 9. Enclosure.
 10. Battery Box.
 11. Seismic Mounting Kit.
- B. The sub-fire alarm control unit (sub-FACU) and associated sub-assemblies shall be Notifier NFS-320 or equal. The sub-FACU shall be capable of being networked to the main FACU. The sub-FACU shall be addressable, capable of Class A SLC and NAC configuration, and have an 80-character display. The sub-FACU shall be equipped with a power supply and the required components to perform the functions specified and shown in the design, including but not limited to:
1. Control unit complete with backbox and power supply
 2. Batteries
 3. Seismic Mounting Kit
- C. The FACU shall communicate with and control the intelligent detectors, intelligent manual pull stations, addressable modules, and other system controlled devices. The FACU shall perform the following functions:
1. Supervise and monitor the appropriate intelligent addressable detectors and addressable modules connected to the system for normal, trouble and alarm conditions.
 2. Supervise the appropriate signaling and notification circuits.
 3. Detect the activation of any initiating device and the location of the alarm condition for devices on the circuit. Operate notification appliances and auxiliary devices as programmed.
 4. Visually and audibly annunciate any trouble, supervisory, or alarm condition on the unit display. Communicate such alarms via the fire alarm communication network.
 5. Cause the signals, annunciation, and control of HVAC fans, elevators,



escalators, and other equipment, as indicated in the Drawings.

D. System Capacity and General Operation

1. The FACU shall provide or be capable of expansion to 3,180 intelligent addressable devices, with up to 318 intelligent/addressable devices per loop. Each addressable loop shall have a minimum of 15 percent spare capacity and the FACU shall have a total of 30 percent spare capacity.
2. The FACU shall communicate with, monitor, and control other modules within the FACU. Removal, disconnection, or failure of any control unit module shall be detected and reported to the system display.
3. The FACU shall contain and execute control-by-event programs for specific action to be taken if an alarm condition is detected by the system. Such control-by-event programs shall be held in non-volatile programmable memory and shall not be lost with system primary and secondary power failure.
4. Each peripheral device connected to the FACU shall be continuously scanned for proper operation. Data transmissions between the FACU and peripheral devices shall be reliable and error free. The transmission scheme used should employ dual transmission or other equivalent error checking techniques. Failure of any peripheral device to respond to an interrogation shall be annunciated as a trouble condition.

E. Display

1. The complete system display shall provide the controls and indicators used by the system operator and may also be used to program system operational parameters.
2. The display shall be minimum 16 line, 640 character LCD backlit with a minimum of 11 LED indicators for system status and alarm conditions.
3. The display assembly shall contain, and display as required, custom alphanumeric labels for intelligent detectors, and addressable modules.

F. Signaling Line Circuit (SLC) Interface

1. Notifier Loop Control and Expander Modules: LCM-320 and LEM-320, or equal. The FACU SLC interface shall monitor and control intelligent addressable devices, including intelligent detectors and monitor or control modules.



2. The SLC interface shall not require any jumper cuts or address switch settings to initialize operations.
3. The SLC interface shall provide power and communicate with intelligent addressable detectors and modules on a single pair of wires. This SLC Loop shall be Class A wiring.
4. The SLC interface shall receive information from intelligent detectors and shall process this information to determine whether normal, alarm, or trouble conditions exist for that particular detector. The FACU/SLC interface shall include software to automatically maintain the detector's desired sensitivity level by adjusting for the effects of environmental factors, including the accumulation of dust in each detector. The analog information may also be used for automatic detector testing and for the automatic determination of detector maintenance requirements.
5. The SLC interface board shall communicate with each intelligent addressable detector and addressable module on its SLC loop and verify proper device function and status. Communication with intelligent devices shall be performed at time intervals consistent with the FACU Listing/Approval.

G. FACU/AMP Enclosure:

1. Notifier CAB-4 or equal. The control unit shall be housed in a UL listed cabinet. Enclosure and front shall be corrosion protected, given a rust-resistant prime coat, and manufacturer's standard finish.
2. The back box and door shall be constructed of steel with provisions for electrical conduit connections into the sides, top, and bottom.
3. The door shall provide a key lock and shall include a glass or other transparent opening for viewing of all indicators.
4. The control unit shall be modular in structure for ease of installation, maintenance, and future expansion.
5. The FACU and associated equipment shall be protected from the effects of voltage surges or line transients in accordance with UL 864 standards.
6. Each peripheral device connected to the FACU shall be continuously scanned for proper operation. Data transmissions between the FACU and peripheral devices shall be reliable and error free. The transmission scheme used shall employ dual transmission or other equivalent error checking techniques.



7. Provide seismic certification from manufacturers for equipment and enclosures. (Refer to ASCE7-10 section 13.2.2 2.)
 8. Provide anchorage calculations and design details for enclosures and panels. (Refer to ASCE7-10 section 13)
- H. FACU Power Supply
1. Notifier AMPS-24 or equal. The main power supply shall operate on 120 VAC, 60 Hz, and shall provide necessary power for the FACU.
 2. It shall provide power necessary for proper operation of the occupant notification appliances. External power supplies shall be used to power the occupant notification appliances (strobes) as necessary.
 3. It shall provide a battery charger and batteries for 24 hours of standby using dual-rate charging techniques for fast battery recharge.
 4. It shall provide a very low frequency sweep earth detect circuit, capable of detecting earth faults on sensitive addressable modules.
 5. It shall be power-limited per current UL 864 requirements.
 6. It shall provide meters to indicate battery voltage and charging current.
 7. A separate power supply shall be provided for externally controlled devices such as smoke dampers, remote relays, door holders, etc.
- I. FACU Digital Voice Command
1. Notifier DVC-EM or equal. The digital voice command center located with the control unit, shall contain equipment required for audio control, emergency microphone system control, signaling, and supervisory functions. This shall include speaker zone indication and control, telephone circuit indication and control, digital voice units, microphone and main telephone handset.
 2. The voice command center equipment shall perform the following functions:
 - a. Operate as a supervised multi-channel emergency voice communication system. Audibly and visually annunciate the active or trouble condition of every speaker circuit.
 - b. Audibly and visually annunciate any trouble condition for digital tone and voice units required for normal operation of the system.
 - c. Provide all-call emergency paging activities through activation of a



single control switch.

- d. Provide a factory recorded library of voice messages and tones in standard WAV. File format, which may be edited and saved on a PC running a current Windows® operating system.
- e. The digital voice command shall be modular in construction and shall be capable of being field programmable without requiring the return of any components to the manufacturer and without requiring use of any external computers or other programming equipment.
- f. The digital voice command and associated equipment shall be protected against unusually high voltage surges or line transients.

J. System Circuit Supervision

1. The FACU shall supervise circuits to intelligent devices, modules, horns, strobes, horn/strobes, speakers, speaker strobes, and any remote power supplies and shall annunciate loss of communications with these devices/appliances. The FACU shall continuously scan the devices for proper system operation. Upon loss of response from a device, an audible trouble shall sound.
2. Fire protection system valves shall be supervised for off-normal position.

K. Field Wiring Terminal Blocks

1. For ease of service, wiring terminal blocks shall be the plug-in type and have sufficient capacity for 16 to 12 AWG wire. Terminal blocks permanently fixed are not acceptable. The number of wires at each terminal shall not exceed two.

L. FACU Programming Features

1. The Contractor shall retain the services of factory certified technician for programming the FACU.
2. The system shall be programmable, configurable, and expandable in the field without the need for special tools or electronic equipment and shall not require field replacement of electronic integrated circuits.
3. Programming or editing of the program in the system shall be achieved without special equipment and without interrupting the alarm monitoring functions of the FACU.
4. Programming shall be accomplished through the standard FACU keyboard or through the video terminal.
5. Field defined programs shall be stored in non-volatile memory. The control



unit shall maintain a history file of the last 4000 events, each with a time and date stamp. History events shall include all alarms, troubles, operator actions, and programming entries. The control panels shall maintain a 1000 event alarm history buffer, which consists of the 1000 most recent alarm events from the 4000-event history file.

6. The programming function shall be enabled with a password that may be defined specifically for the system when it is installed. Two levels of password protection shall be provided in addition to a key-lock cabinet. One level shall be used for status level changes such as zone disable or manual on/off commands. A second (higher-level) shall be used for actual change of program information.

System programming shall be capable of being backed-up on approved removable digital media (i.e. USB flash drive). This system back-up shall be capable of being downloaded to a replacement FACU system should the system be damaged due to fire or other event.

7. The Contractor shall turn over FACU passwords at the completion of programming or editing.

2.04 POWER SUPPLY FOR SPEAKERS

- A. Notifier DAA2-7525 or equal. The digital amplifiers shall provide a minimum of 75 watts total output power at 25 VTMS and support two Class A high-level outputs.
- B. Multiple audio amplifiers may be mounted in a single enclosure, either to supply incremental audio power, or to function as an automatically switched backup amplifier(s).
- C. The audio amplifier shall include an integral power supply and shall provide built-in LED indicators to signal all required status, faults, operation, and alarm conditions.

2.05 POWER SUPPLY FOR STROBES

- A. Notifier ACPS-610 or equal. The notification appliance power supply shall operate on 120 VAC, 60 Hz, and shall provide necessary power for the power supply.
- B. It shall provide power necessary for proper operation of the occupant notification appliances (strobes). The power supply shall have a minimum of four (4) Class A, individually addressable outputs, each with a minimum output of 1.5 amps per circuit/output.
- C. It shall provide a battery charger and batteries for 24 hours of standby using



dual-rate charging techniques for fast battery recharge.

- D. It shall provide supervision of the power supply and the associated circuits and communicate with the FACU via monitoring modules or similar devices.
- E. It shall be power-limited per current UL 864 requirements.

2.06 ANNUNCIATOR

- A. Notifier LCD-160 or equal. The annunciator shall be equipped with one (1) Notifier Annunciator Control Module ACM-24AT and with one (1) Notifier Annunciator Expander Module AEM-24AT, or equal.
- B. The annunciator (including ACM and AEM modules) shall be housed in a secure, lockable enclosure with the screen and indicators visible without opening the door, Notifier ABS-4D(C), or equal.
- C. The annunciator shall have a 640-character liquid crystal display with backlit control; be capable of remote control of the FACU; be capable of providing events and preprogrammed custom messages as displayed on the FACU; and a full screen with soft key functions.

2.07 SYSTEM COMPONENTS

- A. Addressable Devices (General)
 - 1. Addressable devices shall provide an address-setting means.
 - 2. Alarm initiating devices shall be intelligent and addressable, shall be compatible with the FACU, and shall connect to the FACU signaling line circuits.
 - 3. Addressable devices shall provide an address setting means.
 - 4. Detectors shall be intelligent and addressable, shall be compatible with the FACU, and shall connect to the FACU signaling line circuits.
 - 5. Smoke detector sensitivity shall be set through the FACU and shall be adjustable in the field through the field programming of the system.
 - 6. Detectors shall automatically compensate for dust accumulation and other slow environmental changes that may affect their performance. The detectors shall be listed by UL as meeting the calibrated sensitivity test requirements of NFPA 72.
 - 7. The detectors shall be ceiling-mounted and shall include a separate twist-lock



base that includes a tamper proof feature.

8. The detectors shall provide a test means whereby they will simulate an alarm condition and report that condition to the FACU. Such a test may be initiated at the detector itself or initiated remotely on command from the control unit.
9. Detectors shall store an internal identifying type code that the control unit shall use to identify the type of device.

B. Addressable Manual Pull Station

1. Manual pull stations shall be Notifier NB-12LX, Notifier N-MPS, or equal, compatible with the FACU. Manual pull stations shall, on command from the FACU, send data to the control unit representing the state of the manual switch and the addressable communication status. They shall use a manually operated test-reset keylock and shall be designed so that after actual emergency operation, they cannot be restored to normal use except by the use of a hex key wrench or similar tool. Manual pull stations shall be provided with a non-alarming anti-tampering assembly, Safety Technology International (STI) Stopper II, or equal.
2. Manual stations shall be constructed of cast metal or plastic with clearly visible operating instructions provided on the cover. The word FIRE shall appear on the front of the stations in raised letters.
3. Stations shall be suitable for flush or semi-flush mounting as shown on the plans and shall be installed such that the operable part is 42 inches to 48 inches on center above the finished floor.
4. A permanent label identifying the pull station address shall be provided on each pull station.

C. Addressable Photoelectric Smoke Detector

1. Photoelectric detectors shall be Notifier FSP-851 or equal, compatible with the FACU. The detectors shall use the photoelectric principal to measure smoke density and shall, on command from the control unit, send data to the control unit representing the analog level of smoke density. Smoke detectors installed in public restrooms shall be provided with an anti-tampering and protective assembly, Safety Technology International (STI) Smoke Detector Damage Stopper-Steel, Steel Web Stopper for Smoke Detectors, or equal.
2. The smoke detectors shall be profiled for office or duct (as necessary and appropriate).
3. A permanent label, legible from the floor level, identifying the detector



address shall be provided on each detector base.

D. Addressable Heat Detector

1. Heat detectors shall be Notifier FST-851 or equal, compatible with the FACU. The detectors shall use the rate-of-rise and fixed temperature principals to measure heat.

EXCEPTION: Heat detectors installed in escalator machinery spaces accessed from the exterior of the Station shall be Notifier 302-AW-135 Rate Anticipation, all weather vertical mounting 135 degrees Fahrenheit, or equal, mounted in a NEMA 4 box. The device shall be capable of immediate response; self-restoring; hermitically sealed, shock resistant, corrosion resistant, and tamper-proof.

2. The heat detectors shall be fixed temperature of 135 degrees Fahrenheit and 15 degrees Fahrenheit per minute rate-of-rise.

EXCEPTION: Heat detectors installed in escalator machinery spaces accessed from the exterior of the station.

3. A permanent label, legible from the floor level, identifying the detector address shall be provided on each detector base.

E. SUB-FACU Photoelectric Smoke Detectors

1. Photoelectric detectors shall be System Sensor i3 2W-B, or equal, compatible with the FACU. The detectors shall use the photoelectric principal to measure smoke density.
2. A permanent label, legible from the floor level, identifying the detector zone and device number shall be provided on each detector base.
3. Photoelectric smoke detectors shall be arranged in a cross-zone fashion using two alarm initiating device circuits.

F. Sprinkler Waterflow and Valve Position Supervisory Switches

1. Existing waterflow and valve position supervisory switches for the sprinkler system shall be connected to the FACU using compatible monitor modules.
2. When operated, an alarm signal shall be initiated at the FACU.
3. A permanent label, legible from the floor level, identifying the address shall be provided on each device as shown on the Drawings.



G. Monitor Modules

1. Monitor modules shall be Notifier FMM-1, FDM-1, or equal, compatible with the FACU. Modules shall, on command, from the FACU, send data to the control unit representing the state of the module and the addressable communication status.
2. Monitor modules shall be mounted on the wall, adjacent to the monitored device.
3. A permanent label, legible from the floor level, identifying the address shall be provided on each device as shown on the Drawings.

H. Control Modules

1. Control Modules shall be Notifier FRM-1, FCM-1, FDRM-1, XP6-R, or equal, compatible with the FACU. Modules shall, on command, from the FACU, send data to the control unit representing the state of the module and the addressable communication status and perform the intended function.
2. Control modules shall be located no greater than 3 feet from the component controlling the device.
3. A permanent label, legible from the floor level, identifying the address shall be provided on each device.

I. Occupant Notification Appliances

1. Occupant notification appliances shall be System Sensor, L-Series, or equal, compatible with the FACU. Strobes shall have a plug-in design; protective cover to reduce ground faults; mounting plate with onboard shorting spring for testing wiring continuity; and field selectable candela settings of 15, 30, 75, 95, 110, 135, and 185 candelas. Speakers shall have a plug-in design; protective cover to reduce ground faults; mounting plate with onboard shorting spring for testing wiring continuity; and a rotary switch to control speaker power with settings of 1/4, 1/2, 1, and 2 watts.
2. Strobes: ADA and NFPA 72, compatible with the FACU, field selectable candela values, strobe light with red lettered "FIRE" on white cover plate, System Sensor L-Series, SCWL, SWL, or equal.
 1. Combination horn/strobes: ADA and NFPA 72, compatible with the FACU, field selectable candela values, strobe light with red lettered "FIRE" on white cover plate, System Sensor L-Series, P2WL, PC2WL, or equal.
 2. Speakers: ADA and NFPA 72, compatible with the FACU, field selectable candela values, strobe light with red lettered "FIRE" on white cover plate, System



Sensor L-Series, SPCW8, SPWL, or equal.

3. Combination speaker/strobes: ADA and NFPA 72, compatible with the FACU, field selectable candela values, strobe light with red lettered "FIRE" on white cover plate, System Sensor L-Series, SPSCWL, SPSWL, or equal.
4. A permanent label, legible from the floor level, identifying the address shall be provided on each appliance.
5. Notification appliances installed in public restrooms shall be provided with an anti-tampering and protective assembly, Safety Technology International (STI) Smoke Horn/Strobe/Speaker Damage Stopper, Stopper Dome, or equal.

2.08 BATTERIES AND POWER SUPPLY

A. Battery

1. Notifier BAT-12550 or equal. Batteries shall be 12V.
2. Battery shall have sufficient capacity to power the fire alarm system for not less than twenty-four hours plus 15 minutes of alarm upon a normal AC power failure.

B. Power Supply

1. Provide Power Supplies as specified in Articles, 2.02H, 2.03, and 2.04.
2. Shall be completely automatic, with constant potential charger maintaining the battery fully charged under all service conditions. Charger shall operate from a 120V 60Hz source.
3. Shall be rated for fully charging a completely discharged battery within 48 hours while simultaneously supplying any loads connected to the battery.
4. Shall have protection to prevent discharge through the charger.
5. Shall have protection for overloads and short circuits on both AC and DC.

2.09 FIRE ALARM WIRE AND CABLE

- A. Wiring shall be installed in a continuous galvanized rigid steel (GRS) conduit system. Conduits shall be concealed, to the extent practical and feasible. Conduit and wire shall be in accordance with the California Electrical Code (CEC), NFPA 72, and NFPA 130, Chapter 12.



1. Cable and wiring meeting the requirements of NFPA 72, Chapter 12 of NFPA 130, and the California Electrical Code may be installed in concealed spaces (e.g. above ceilings). Cable and wire shall not be installed in ventilation ducts. Fire alarm cabling and wiring shall be in GRS conduit.
2. Conductors shall be fire/smoke rated in accordance with the requirements of Chapter 12 of NFPA 130.
3. Conductors shall be labeled at each end.

B. Conduit/Raceway:

1. Wiring shall be installed in conduit or raceway. Raceway fill shall not exceed 40 percent of interior cross-sectional area where three or more cables are contained within a single conduit.
2. A fire alarm riser diagram indicating type and quantity of devices and size and quantity of conductors and conduits, shall be submitted for approval.
3. Cable must be separated from any open conductors of Power, or Class 1 circuits, and shall not be placed in any conduit, junction box or raceway containing these conductors, as per NEC Article 760-29.
4. Wiring for 24V control, alarm notification, emergency communication, and similar power limited auxiliary functions may be run in the same conduit as initiating and signaling line circuits. Circuits shall be provided with transient suppression devices and the system shall be designed to permit simultaneous operation of circuits without interference or loss of signals.
5. Conduit shall not enter the fire alarm control unit, or any other remotely mounted control unit equipment or back boxes, except where conduit entry is specified by the manufacturer.
6. New conduit shall be 3/4 inch minimum.
7. No conductor or cable splices shall be permitted.
8. Provide type and spacing of the fasteners specified/designed for installation of fire alarm devices and conduit installation so that it is within the exception limit of seismic requirements. (Refer to ASCE7-10 section 13.4.5.)

C. Wire

1. Fire alarm system wiring shall be new.



2. Wiring shall be in accordance with the California Electrical Code, Article 760, NFPA 72, Chapter 12 of NFPA 130, and as recommended by the manufacturer. Number and size of conductors shall be as recommended by the fire alarm system manufacturer.
 3. Wire and cable shall be CSFM listed for use with a protective signaling system. Wire and cable not installed in conduit shall have the fire resistance rating suitable for the installation as indicated in the California Electrical Code and shall be supported and protected in accordance with the California Electrical Code and the manufacturer's requirements.
 4. Field wiring shall be supervised. In the event of a primary power failure, disconnected standby battery, removal of any internal modules, or any open circuits in the field wiring; a trouble signal will be activated until the system and its associated field wiring are restored to normal condition.
- D. Terminal Boxes, Junction Boxes, and Cabinets
1. Boxes and cabinets shall be UL listed for their use and purpose.
 2. Fire alarm boxes, conduit body covers, and cabinets shall be painted red.
- E. The FACU shall be connected to a separate dedicated branch circuit with a maximum 20 amperes. This circuit shall be labeled at the main power distribution panel as FIRE ALARM. Fire alarm control unit primary power wiring shall be 12 AWG.

2.10 SCADA INTERFACE, DRY CONTACTS, AND REMOTE MONITORING

- A. **SCADA Points to Operation Control Center (OCC).** Provide an interposing relay cabinet (IRC) with 3 six-relay modules XP6-C next to CAB44. The relays shall be programmed to send the following signals to OCC:
1. Fire Alarm Summary
 2. Fire Alarm System Malfunction
 3. Manual Pull Station
 4. Waterflow
 5. Water Valve Closed
 6. 480V Switchgear Room



7. Train Control Room
8. Concourse Level
9. Upper Platform Level or Platform if only one level
10. Lower Platform Level (If applicable)
11. Substation (If applicable)
12. Public Address (PA) Preemption

The public address preemption relay shall suppress all automatic messages, but continue to allow manually operated messages through the PA system.

- B. **Dry Contact to Station Agent Booth (SAB).** Provide 1-relay module next to the Supervisory Cabinet in the SAB. The relay shall be programmed to activate on a fire alarm for fare gate and emergency barrier release.
- C. **Remote Monitoring System (RMS).** Provide all infrastructure for remote monitoring of the fire alarm system between the FACU and the train control room. Provide an ethernet connection when the distance is less than 250 feet or else provide 6 strands multimode fiber connected to the fiber entry cabinet. Coordinate with the District for connection to CAB100.

2.11 ENCLOSURES FOR FACU/AMP PANELS

Additional enclosures for main fire alarm panels and control equipment are required due to the dusty environment conditions within the control rooms.

- A. Additional Enclosures for FA Control Units and Relay boxes:
 1. Standard wall-mounted electrical enclosures from sheet metal shall be provided for additional protection.
 2. For locations with size restrictions the internal battery enclosures can be mounted outside next to the main enclosure for the FA control units and the main enclosure can be reduced in size to utilize the space only needed for the main FA control units.
 3. NEMA Rating shall be at minimum NEMA 4. (Due to the very dusty environment enclosures with gasket sealing and tight doors are required.)
 4. Viewing Windows: Each door of the main control unit enclosures shall be



equipped with a window big enough to view the main control panels annunciators and status monitors and to show the general content of the enclosures. (Relay boxes and Interposing Relay Cabinet (IRC) enclosures do not require additional windows)

5. Color: FA enclosures shall be painted red.
6. Provide seismic certification from manufacturers for equipment and enclosures. (Refer to ASCE7-10 section 13.2.2 2.)
7. Provide anchorage calculations and design details for enclosures and panels. (Refer to ASCE7-10 section 13)

2.12 POWER SOURCE

A. Distribution Panel Boards:

1. Power supply shall be 120V single phase out of existing nearby panel boards.
2. Connect to 3-phase 208/120V or 1-phase 240/120V power source.

B. Power Supply Circuit and Breaker:

1. Each FACU and AMP panel must be labeled with the dedicated electrical panel board and circuit breaker.
2. A dedicated circuit branch shall be only used for the fire alarm system.
3. Breaker shall be new even if the existing breaker space for the FA system is utilized.
4. Breaker shall be 120V single phase, 20A, and must match the panel manufacturer's specification.
5. Each breaker for the FA system shall be equipped with a breaker locking device (according NFPA 72, Section 10.6.5.4).
6. Contractor shall verify exact breaker space depending on panel condition and spare availability.
7. Each circuit must be labeled with red placard "FIRE ALARM SYSTEM" (according NFPA 72, Section 10.6.5.2.2).
8. Conduit shall be minimum 3/4 inch.



9. Provide type and spacing of the fasteners specified/designed for installation of fire alarm devices and conduit installation so that it is within the exception limit of seismic requirements (Refer to ASCE7-10 section 13.4.5.).

2.13 FACTORY TEST

- A. Perform final checkouts and test. Ship panels only after required factory tests are performed and required modifications or corrections are made. A factory certificate of inspection is required before shipment and shall accompany the shipping documents.

PART 3 – EXECUTION

3.01 INSTALLATION

- A. Install initiating devices, control units, audible signals, connections to equipment provided under other sections and related work following equipment manufacturers' requirements for a complete and properly functioning system that will perform specified functions.
- B. Interface and Coordination: Indicated diagrams and details show the general location and arrangement of equipment, conduit, wiring, and devices. Provide outlets, control and detection devices, and equipment properly located and readily accessible. Control and detection devices, equipment, and outlets shall be located to avoid interference with mechanical, architectural, and structural features.
- C. Control and other panels shall be mounted with sufficient clearance for observation and testing. Fire alarm junction boxes shall be clearly marked for distinct identification.
- D. Wiring Methods:
 1. Wiring shall be installed in a continuous GRS conduit system. Conduits shall be concealed.
 2. Prepare and submit a fire alarm riser diagram indicating type and quantity of devices and size and quantity of conductors and conduits.
 3. No wiring other than that directly associated with fire alarm detection, alarm, or auxiliary functions shall be permitted in fire alarm conduits. Wiring splices shall be avoided to the extent possible and if needed, they shall be made only in junction boxes and shall be connected with crimp-type connectors. Wire nut type connections are not acceptable.



4. Transposing or changing color-coding of wires will not be permitted. Conductors in conduit containing more than one wire shall be labeled on each end with wire markers conforming to the requirements of Specifications Section 26 05 24, Low Voltage Wires and Cables. Conductors in cabinets shall be carefully formed and harnessed so that each drops off directly opposite to its terminal. Cabinet terminals shall be numbered and coded. Controls and function switches shall be clearly labeled on equipment panels.
 5. Wiring shall be checked and tested to ensure that there are no grounds, opens, or shorts. The minimum allowable resistance between any two conductors or between conductors and ground is 10 Megaohm as checked by a Megger after conduit, conductors, and detector bases have been installed, but before the detector devices are plugged into the bases or end-of-line devices installed.
 6. Conduits entering or leaving the terminal cabinets and junction boxes shall be numbered in a logical and consecutive manner. A number shall be used only once.
 7. Conductors shall be tagged, labeled, and color-coded. Color-coding shall be by wire insulation, not taping or banding. The numbering and color-coding shall be continuous for each circuit wire.
 8. Wire shall be numbered at each connection, termination, and junction point. Wire numbering tags shall be professionally manufactured wire-markers. Each group of wires shall be tagged with its destination at each panel, terminal box, or junction box.
- E. Fire alarm circuits in conduit shall be installed in dedicated raceways and shall not be mixed with any other raceway systems of any Class wiring.
- F. Provide conduit and properly looped wiring necessary for the total operational system. Conduit size and wire quantity, size, and type shall be suitable for the equipment supplied and conform to equipment Suppliers' requirements. No wiring other than fire alarm circuits shall be permitted in the fire alarm system conduits; 120V circuits shall be in separate fire alarm conduits.
- G. End-of-line devices, for either initiating or indicating/notification appliance circuits, shall be mounted in accordance with the manufacturer's requirements.
- H. Automatic detector and occupant notification appliance installations shall conform to NFPA 72.
- I. Make conduit and wiring connections to initiating devices, indicating/notification appliances, door release devices, sprinkler flow



switches, sprinkler valve tamper switches, and duct smoke detectors.

- J. Solid conductors terminated at screwed connections of any type shall be formed about the screw shank in a clockwise direction. Stranded conductors shall be terminated with a pressure-applied lug connector, applied with a tool approved for the use by the lug connector manufacturer and the Engineer.
- K. Wiring shall be checked and tested to ensure that there are no grounds, opens, or shorts.
- L. Install wiring in accordance with the California Electrical Code, NFPA 72, and Chapter 12 of NFPA 130. Pull conductors to necessary and appropriate devices and appliances.
- M. Provide necessary connections and terminations. Field and FACU wiring shall be terminated in terminal cabinets or on field devices/appliances. Connections shall be made on terminals.
- N. Provide initial system addressing. Use the District's room numbers or names for annunciation.
- O. The FACU shall be programmed to identify the specific initiating device address or number; location or room number; brief description of room or area; device type; floor level; and status for initiating devices and must match the label on the device.
- P. Notify the Engineer at least 30 Days prior to the cutover period when the existing fire alarm system is taken offline, and the new fire alarm system is made operational.
- Q. The existing fire alarm system shall remain in operation for the duration of the Work. If any portion of the existing fire alarm system is taken offline, then the Contractor must notify the District and fire watch must be provided until full operation of the fire alarm system is restored.
- R. During the cutover period, if the District is unable to provide fire watch, the Contractor shall ensure that public safety is maintained by providing one or more fire watch personnel, as required and approved by the Engineer. Fire watches shall be provided with not less than one approved means for notification of the fire department and their only duty shall be to perform constant patrols of the protected premises and keep watch for fires. Fire watch personnel shall comply with the following:
 - 1. Fire watch personnel shall remain on duty while places requiring a fire watch are open to the public, or when an activity requiring a fire watch is being



conducted.

2. On-duty fire watch personnel shall have the following responsibilities:
 - a. Identifying and controlling fire hazards, detecting early signs of unwanted fire, raising an alarm of fire and notifying the fire department.
 - b. Keep diligent watch for fires, obstructions to means of egress and other hazards.
 - c. Take prompt measures for remediation of hazards and extinguishment of fires that occur.
 - d. Take prompt measures to assist in the evacuation of the public from the structures.

3.02 FIELD QUALITY CONTROL

- A. Provide the testing program, qualified technical personnel, tools, test equipment, and other items required to perform the tests.
- B. Furnish written notice as to when installed equipment will be tested so that the Engineer and AHJ can be present to witness the tests. A minimum of 30 Days prior notice of a proposed test shall be provided.
- C. At the Contractor's option, a representative of the equipment manufacturer may be present to witness the tests and verify the results.
- D. Tests shall not alter the Contractor's guaranty of the equipment. Replace and retest work and materials found to be not in compliance with Specification requirements.
- E. Maintain test data sheets showing the results of tests performed. Provide data sheets listing the acceptable or specified test limits and the values actually measured. Furnish one set to the Engineer. Retain one set.
- E. Provide data sheets showing the test set-up, the equipment used, the names of persons performing the test, the names of witnesses, the date, the location, and the serial number of the equipment under test. The test data sheets will be reviewed by the Engineer and accepted as submitted, or additional tests may be required. If additional tests are required because initial test results do not comply with these Specifications, the retesting shall be documented and submitted as before.
- F. Perform inspection of control panel as follows:
 1. The inspection shall first cover a physical check of panels in reference to the following items:



- a. Proper model numbers.
 - b. Arrangement of instruments per Shop Drawings on panel front.
 - c. Arrangement of back-mounted accessories for proper clearance, operation, and maintenance.
 - d. Finish of panel.
 - e. Tagging of wiring.
2. A test as per Article 3.09 and checkout report shall be prepared by the technician and submitted in triplicate, one copy of that shall be registered with the equipment manufacturer. Report shall include, but not be limited to:
- a. A complete list of equipment installed and wired.
 - b. Indication that equipment is properly installed and functions and conforms with this Contract Specification.
 - c. Tests of individual zones as applicable.
 - d. Serial numbers, locations by zone, and model number for each installed detector.
 - e. Voltage (sensitivity) settings for each detector as measured in place with air conditioning system operating.
 - f. Response time on thermostats, flow switches, and flame detectors (if used).
 - g. Technician's name, certificate number, and date.
 - h. Perform sequence of operations tests as shown in Attachment A.
3. After completion of the physical inspection, perform circuit checkouts as required to verify the correct operation of the system.

G. Field Tests

1. The Contractor shall perform electrical and mechanical tests required by NFPA 72, and the equipment manufacturer's installation procedures. A sample functional test procedure is shown in Attachment B.
2. Pre-testing: The system shall be pre-tested prior to final Acceptance testing. All points shall be tested from point of initiation to the final point or points of annunciation. Circuits shall be tested for continuity and ability to transmit the required signal correctly to the FACP. Problems due to wrong wire type, wire twist, impedance, mismatches, noise filtering, or shielding shall be corrected during pre-testing and prior to any final Acceptance tests. Pre-testing shall include every device in the system. Coordinate with other trades as necessary for testing. Provide the following tests and procedures:
 - a. Sprinkler Flow Switches: Record time delay from water flow to alarm and adjust as necessary for 30 to 50 seconds delay.
 - b. Valve Tamper Switches: Verify "trouble" signal is received on closing of each valve.
 - c. Smoke Detectors: Test with actual or approved artificial smoke. Verify that reset does not occur when devices are cleared of smoke. Verify



- supervisory circuit function.
- d. Elevator Recall: Verify that elevators recall to designated floor.
 - e. Escalator: Verify that power to the driving machine motor is interrupted and brakes apply upon station fire alarm signal.
 - f. Central Notification: Verify that one set of conductors in the terminal cabinet becomes a short circuit on any “trouble” condition and that the other set becomes a short circuit on any alarm condition. Verify that the conductor groups are labeled properly.
3. The Contractor shall measure and adjust each of the detectors to the maximum stable sensitivity setting. This shall be performed at the operational location of the unit and under normal operational environmental conditions in the area. Bench settings are not acceptable.
 4. Test splice points back to previous splice or terminal points before encapsulant is placed around the splice point.
 5. Check electrical instruments and each electrical circuit for continuity either by checking entire “loops” if within panel or by simulating field conditions or operations. This test shall include instruments, alarms, relays, and pressure switches that are part of the panel circuits. When full simulation is not possible or practicable, wires shall be given a point-to-point continuity check.

3.03 FIRE ALARM NAMEPLATES

- A. Identify fire alarm equipment devices so that the address may be visible from the floor.

3.04 PROGRAMMING

- A. The Contractor shall use a factory certified technician for all programming.
- B. The District’s room numbers or names provided by the Engineer for annunciation shall be used. The Contractor shall update the Construction Drawings to reflect the addresses used.

3.05 JOB CONDITIONS

- A. Coordinate Work schedule and material deliveries with the Engineer.
- B. Minimize impairments of existing fire protection system and coordinate any proposed shutdown with the Engineer. Restore existing fire protection systems removed from service as part of this Work at the end of each working day.
- C. The Work performed occurs within existing buildings. Equipment and material



furnished and installed from the Work shall be coordinated with existing space constraints. Fabricate equipment and material such that complete systems may be broken down into sections suitable for passage through existing passageways without modification to the building unless other arrangements are made with the Engineer to provide access.

3.06 PENETRATIONS

- A. The Contractor shall be responsible for openings and penetrations required.
- B. Provide penetrations of rated assemblies with through penetration fire stop systems with T ratings equal to those of the assembly penetrated.

3.07 PAINTING

- A. Exposed conduit shall be painted to match the surrounding wall or ceiling surface. Clean exposed surfaces of oil, dirt, and other debris to the satisfaction of the Engineer prior to painting. Paint samples shall be approved by the Engineer prior to application.

3.08 DEMONSTRATION AND TRAINING

- A. General:
 - 1. Prior to Final Inspection and Acceptance, instruct and train the District's designated operating and maintenance (O&M) personnel in the operation, start-up and shut-down, adjustment, troubleshooting, servicing, and preventive maintenance of equipment and systems.
 - 2. Explain to the District's O&M personnel, in full and to their complete understanding, procedures necessary to operate and maintain equipment and systems on a continuing basis.
 - 3. Provide training manuals and other instructional materials and teaching aids as required to properly perform the required instruction and training.
 - 4. Review the contents of O&M manuals specified in Section 01 78 23, Operation and Maintenance Data, with the District's O&M personnel in full detail to explain all aspects of the manuals and the operation and maintenance of equipment and systems.
 - 5. Provide classroom and on-site instruction as most appropriate for the equipment or system.
 - 6. Training programs shall be provided by manufacturer certified personnel.



7. Operation and maintenance manuals are specified in Section 01 78 23, Operation and Maintenance Data, and may be used for student training manuals upon approval.
8. Various specific and detailed requirements for instruction and training of the District personnel are specified in this Section, and in Sections 01 35 14, Operating System Interface and 01 35 24, Construction Safety.

B. Target Audience:

1. Station Agents: Must be able to reset alarms. Training to be conducted via train-the-trainer sessions.
2. Electricians: Training shall include basic familiarization and preventive maintenance procedures: removing, cleaning, replacing and testing components, disabling and enabling components through programming and interpreting the signaling output.
3. Fire Alarm Technicians/Engineers: Must be factory certified. Training shall include how to install, operate, start-up and shut-down, adjust, maintain, inspect, troubleshoot, test and modify equipment and systems. Training must include procedures necessary for preventive maintenance on the equipment and systems on a continuing basis. Must be able to program the Fire Alarm Control Unit (FACU). Programming tasks include, but are not limited to, deleting a device or zone, recognizing a substitute or replacement device.
4. Number of participants to train are as follows:
 - a. Station Agent Trainers: 2
 - b. Electricians: 20
 - c. Fire Alarm Technicians/Engineers: 6

C. Classroom Sessions:

1. The Contractor shall provide instruction and training sessions in the operation and maintenance of equipment and systems for the District O&M personnel prior to Acceptance by the Engineer of the affected work.
2. Minimum class lengths are as follows:
 - a. Station Agent Train the Trainer: 4 hours
 - b. Electricians: 4 hours
 - c. Fire Alarm Technicians/Engineers: 40 hours
3. Contractor shall provide a detailed instructor guide for the Station Agent and Electrician courses. The instructor guide is a written record of the facts and



details taught in the training course. Instructor guide shall include a course outline broken down by topics with a description of key points covered in each topic, the method of delivery, details for conducting hands-on activities and any actions required to configure and prepare training equipment/training aids.

4. Training sessions shall be conducted by representatives of the various equipment and product manufacturers and the Subcontractors who are involved in the installation and acceptance testing of the affected equipment and systems. Training sessions shall enable a qualified service technician to troubleshoot and sustain the equipment and systems.
5. The Engineer will provide a classroom facility for such instruction and training sessions as required for Station Agent Train the Trainer and Electricians.
6. For the electrician course, a demonstration class shall be conducted to demonstrate compliance with this technical specification section and for approval of the Engineer.
 - a. The approved instructor guides, training materials and training aids shall be used in the demonstration class.
 - b. The demonstration shall be presented to an evaluation team composed for the District personnel from the group to be trained, including Employee Development Specialists, Supervisors, and Foreworkers.
 - c. The evaluation team shall prepare a list of nonconformances, and recommend either acceptance, acceptance with changes, or rejection of the training demonstration.
 - d. The evaluation team may recommend that all (when rejected) or a portion (when accepted with changes) of the training demonstration be repeated.
7. The Contractor shall schedule the training sessions through the Engineer at a time convenient to the District.
 - a. Training classes for Electricians required on shifts as follows:
 - 1) 2 classes on day shift
 - 2) 2 classes on swing shift
 - 3) 1 class on graveyard shift
 - b. The Contractor shall notify the Engineer of the proposed Station Agent and Electrician training sessions at least 30 Days before the dates the training will be held
 - c. The Contractor shall notify the Engineer of the proposed training session dates for the Fire Alarm Technician/Engineer course at least six weeks prior to those dates.



D. On-Site and Hands-on Sessions:

1. Provide on-site, hands-on training sessions as required to demonstrate actual operating and maintenance procedures on the equipment. Hands-on training shall provide District personnel with actual operating and maintenance experience. Hands on sessions will enable each student to practice on the equipment. Demonstration by the instructor is not adequate.
2. Provide equipment and training aids to enable hands-on training in a location other than where the equipment is installed.
3. Installed equipment must be sufficiently tested to confirm it operates as expected before training is conducted and to enable completion of all hands-on activities and maintenance procedures.
4. Maximum class size for hands-on training is four (4).

E. Train the Trainer

1. Contractor shall deliver two (2) classes as designed for the EDS (trainers) responsible for training Station Agents.
2. Contractor shall review the instructor guide with the EDS after delivery of the course.
3. Contractor shall walk through how to configure training equipment/training aids in accordance with the instructor guide.
4. Contactor shall observe a minimum of one delivery per EDS trained via Train the Trainer session to confirm course is delivered as designed and accurate information provided.
5. Contractor shall be available to answer questions until all staff are trained. Questions shall be answered within 48 hours (two calendar days) of submission.

F. Videotaping Rights: The Engineer shall have the right to videotape of all training sessions presented by the Contractor. The Engineer shall also have the right to use these videotapes for future District conducted training courses

3.09 TRAINING MANUALS AND TRAINING AIDS

A. The Contractor shall provide instructor guides, student training manuals and any other materials or training aids to supplement the O&M Manuals specified in



Section 01 78 23, Operation and Maintenance Data, and submit them to the Engineer for review and approval at least 60 Days before the scheduled start of training sessions. Student training manuals shall be prepared specifically for use as training aids. All materials must be approved before the start of training, including applicable demonstration class.

- B. Operation and Maintenance Manuals are specified in Section 01 78 23, Operation and Maintenance Data. O&M manuals may be used for student training manuals with approval.
- C. Provide each training-session participant with one copy of pertinent training manuals at the start of training sessions. Provide the Engineer with electronic copies of all instructor guides, student training manuals, and any other materials.
- D. Upon completion of each training session or course of instruction, instructor's manuals, O&M manuals, training manuals, training aids and special tools shall become the property of the District. Provide the Engineer with all revisions to the training manuals throughout the Contract and Guaranty periods.
- E. The District reserves the right to copy all training manuals and training aids for use in District-conducted training courses.
- F. The Contractor shall be responsible in providing all tools, equipment, training aids, and other materials required for the training of District personnel. The number of special tools and other training equipment shall be adequate for the number of participants attending the training sessions.
- G. The Contractor shall provide copies of the program user software and licenses for each individual participating in the Fire Alarm Technicians/Engineers training.

3.10 SYSTEM ACCEPTANCE

- A. Procedure for the Acceptance tests shall be submitted for the Engineer's approval. Tests shall be performed in the presence of the Engineer.
- B. The completed system shall be tested to ensure that it is operating properly. The testing shall consist of exposing the installed detection units to the standard test per requirements of NFPA 72.
- C. Acceptance of the system shall require a demonstration of the operation and stability performance of the system. This shall be adequately demonstrated if the system operates for a ninety (90) day period without any unwarranted alarms. Should an unwarranted alarm(s) occur, the Contractor shall readjust or replace the



detector(s) and begin another ninety (90) day test period.

- D. As required by the Engineer, the Contractor shall recheck the detectors using the installation standard test after each readjustment or replacement of detectors. This test shall not start until the Engineer has obtained beneficial use of the building under test.
- E. If the requirements of the above paragraphs are not completed within one (1) year after commencing the tests described therein, the Contractor shall replace the system, and the process shall be repeated until acceptance of the equipment.
- F. Perform Sequence of Operation test procedures as shown in Attachment A.

END OF SECTION



SECTION 28 31 49

CARBON MONOXIDE DETECTION AND ALARM SYSTEMS

PART 1 – GENERAL

1.01 SUMMARY

- A. Section Includes: Toxic gas detection system, including a main control panel, sensors, and audible and visual alarm devices that can be linked to a Controller or a Building Automation System (BAS).
- B. The system shall include, but not be limited to, the following:
 - 1. Future expandability.
 - 2. Display of toxic gas concentration.
 - 3. Ability to modify alarm set points.
 - 4. Automatic and manual fan start/stop.
 - 5. Display of alarm status.
- C. Related Requirements:
 - 1. Division 01: General Requirements.
 - 2. Division 26: Electrical.

1.02 SUBMITTALS

- A. Provide in accordance with Division 01 and Section 23 0500: Common Work Results for HVAC.
- B. Materials to be furnished including copies of descriptive data for products.
- C. Wiring diagram Shop Drawings.
- D. Start-Up Reports.

1.03 WARRANTY

- A. Manufacturer shall provide a two year material warranty.

1.04 QUALITY ASSURANCE



- A. Perform submittals in accordance with Section 23 0500: Common Work Results for HVAC.

PART 2 – PRODUCTS

2.01 DETECTORS

- A. Detectors shall be surface mounted or duct mounted, as indicated in the drawings.
- B. Transmitter shall be powered by the control panel power supply rated at 24 Vac. Fully addressable gas transmitter shall be capable of communicating digitally with controller through an RS-485 communication port. Gas transmitters shall be installed in a true daisy chain with an end of the line resistor on the last transmitter. The gas transmitter shall incorporate an electrochemical cell for toxic gas monitoring and catalytic bead sensor for combustible gases. Unit sensing cell shall compensate for variations in relative humidity and temperature to maintain high levels of accuracy.
- C. When placed in a network configuration the transmitter shall be capable of transmitting gas concentrations through the controller. For local activation of fans, louvers, or other equipment, an on-board DPDT relay 5 A, 30 Vdc or 250 Vac (resistive load) shall be activated at programmable set points and programmable time delays through the control panel. An LCD display shall provide gas concentration readings.
- D. Transmitter shall be capable of operating within relative humidity ranges of 5-95 percent and temperature ranges of -4 degrees F to 104 degrees F (-20 degrees C to 40 degrees C).
- E. Unit shall be certified to ANSI/UL 61010-1 label and CAN/CSA-C22.2 No. 61010-1-04. Transmitter shall be manufactured in an ISO 9001 production environment.
- F. The transmitter shall have a plug-in capability for a gas cartridge with a smart sensor capable of self-testing.
- G. For local activation of audible alarms, the transmitter shall have an on-board device able to generate an audible output of 85 dBA at 10 feet.
- H. Detector alarm levels are to be activated and the unit is to be installed in accordance with the following parameters:

TOXIC GASES	1st ALARM SET POINT (TLV-TWA)	2nd ALARM SET POINT (TLV-STEL)	3rd ALARM SET POINT	MOUNTING HEIGHT	COVERAGE RADIUS
Carbon Monoxide (CO)	25 PPM	200 PPM	225 PPM	5 feet above finished floor	50 feet



Nitrogen Dioxide (NO ₂)	0.72 PPM	2.0 PPM	9.0 PPM	1 foot from ceiling	50 feet
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2.02 CONTROLLER

- A. The control panel shall be capable of communicating digitally with the networked transmitters and relay modules through three RS-485 communication buses. Each communication bus shall be capable of accepting a combination of up to 32 addressable transmitters, relay modules, or annunciator panels at a maximum distance of 2,000 feet. The power supply shall be of either 24 Vac or 24 Vdc.
- B. The controller shall manage four internal DPDT relays at fully programmable alarm levels (and within programmable time delays) and be capable of activating multiple relay modules of eight relays each. The relay rating shall be no lower than 5 A, 30 Vdc or 250 Vac (resistive load).
- C. The controller shall include a self-test function that allows for the activation/deactivation of all the programmed outputs by simulating a continuous five percent increase/decrease value until the maximum/minimum value is reached.
- D. The controller shall include a real-time clock that enables operation of the outputs for a specific timeframe.
- E. The controller shall also include an energy saving feature that allows for output operation on alarms set at the maximum, minimum or average value of a specific group of transmitters. This feature shall also allow for the activation of outputs upon a certain number of a specific group (3/4, 1/2, 1/3 and 1/4) of transmitters reaching their alarm levels. A total of 128 groups can be assigned.
- F. The controller shall be capable of communicating with an annunciator panel that can serve as a remote display panel in a secondary control room.
- G. The controller shall indicate the exact concentration of gas, the gas detected, and the location of the sensor by sweeping through the network and displaying the detected levels at each point on a graphic LCD display.

EDIT NOTE: DELETE PARAGRAPHS 2.02.H AND 2.02.I BELOW IF NOT APPLICABLE FOR SPECIFIC PROJECT; EDIT ACCORDINGLY.

- H. BACnet option: The controller shall enable BACnet communication through its optional BACnet output using BACnet/IP protocol over twisted-pair Ethernet or BACnet MS/TP protocol.
- I. Data logging option: An optional data logging capability shall provide long-term data logging to determine trends. The controller must collect data automatically and shall store it on a digital Flash media card.



2.03 ACCESSORIES

- A. Strobe and Horn combo unit shall be capable of operating within relative humidity ranges of 0 to 100 percent and temperature ranges of -30 degrees F to 150 degrees F (-35 degrees C to 66 degrees C). Rating of horn shall be no less than 72dB at 10 feet. Intensity of light shall be no less than 40W and shall flash at a frequency of 1 per second. Provide Gentex GEH24-R or GEC3-24WR, Edwards Technology EST 757 Series, Simplex-Grinnell 4906-9127 or GEC3-24WR, or equal.
- B. Power Transformer type T100VA, T200VA, or T300VA or Class 2 devices type T100VAC2, T200VAC2 or T300VAC2. Transformer shall have an input voltage of 120 V AC and an output voltage of 24 V AC with a VA range of 50-300. Operating frequency shall be 60 Hz. Unit will provide insulation systems up to 130 degrees C (50-1300 VA). Unit to operate at sound levels of less than 40 dB. Transformers shall be of fused type.
- C. Relay Modules shall be powered by the control panel's power output or by power transformer rated at 24 Volts AC or DC. Module shall be capable of communicating digitally with the controller through an RS-485 communication port. Relay module shall have eight relays rated at no lower than 5A, 30 Vdc or 250 Vac (resistive load).
- D. Detector Guards: The grid shall be made of a 9-gage steel wire or larger. The guard shall be designed to allow calibration without removing the guards.

PART 3 – EXECUTION

3.01 INSTALLATION

- A. Install hazardous gas monitoring equipment including sensors, audible alarms, control panels as shown on Contract Drawings, and as recommended by manufacturer of equipment, and as required by authorities having jurisdiction.
- B. Install conduit and wiring from sensors to control panel and to the fan starters/HVAC control panel as recommended by manufacturer of equipment.

3.02 SEQUENCE OF OPERATION

- A. If any NO₂ sensor detects 0.72 PPM gas, the exhaust fans operate and motorized dampers open. Low Alarm indicators light for point in alarm. If hazardous gas not cleared after 30 minutes or 2 PPM is reached, High Alarm indicator lights on the main panel and remote strobe and horn activate, and Audible Alarm sounds and operates the exhaust fans.
- B. If any of the CO sensors detects 25 PPM gas, all fans operate and damper opens. Low Alarm LED lights for point in alarm. If any sensor detects 200 PPM gas, the Audible



Alarm sounds and High Alarm indicator lights on the main panel and remote strobe and horn activate.

3.03 START-UP TESTING

- A. Test and calibrate equipment to demonstrate operation of functions described above under sequence of operation by manufactures certified service technician. Submit report of test to OAR.
- B. Provide two new testing kits (including gas bottles) to Owner for testing and calibration.

3.04 TRAINING

- A. Provide four hours training on programming and overview of system.
- B. Provide eight hours of calibration training for all gas detection sensors. Supply all required calibration gases and equipments.

3.05 CLEANUP

- A. Remove rubbish, debris and waste materials and legally dispose of off the Project site.

3.06 PROTECTION

- A. Protect the Work of this Section until Substantial Completion.

END OF SECTION



SECTION 28 41 29
CLOSED CIRCUIT TELEVISION SYSTEM

PART 1 – GENERAL

1.01 SECTION INCLUDES

- A. Functional requirements.
- B. Equipment

1.02 RELATED SECTIONS

- A. Section 01 33 00, Submittal Procedures, and Contract Specifications
- B. Section 01 45 23, Testing and Inspection

1.03 REFERENCES

- A. California Occupational Safety and Health Standards (OSHA)
- B. Electronic Industries Association (EIA)/Telecommunications Industry Association (TIA):
 - 1. Bulletin #1 CCTV Definitions
 - 2. EIA-310D 19-inch Rack Standard
 - 3. EIA/TIA-568 Commercial Building Telecommunications Cabling Standard
 - 4. EIA-632 Electronics Industries Alliance (EIA) Standard: Processes for Engineering a System
 - 5. EIA-649 Standard for Configuration Management
 - 6. EIA-836 Configuration Management Data Exchange and Interoperability
- C. Institute of Electrical and Electronics Engineers (IEEE):
 - 1. IEEE Std. 1220-1998: IEEE Standard for Application and Management of the Systems Engineering Process
- D. International Electrotechnical Commission (IEC) or International Organization for



Standardization (ISO):

1. IEC/ISO 13818: Information Technology – Generic Coding of Moving Pictures and Associated Audio Information

E. Manufacturing Method (MM):

1. MM-33A Process Control Specification for Paint Application
2. MM-42 Process Control Specification of Chromate Conversion Coating

F. National Fire Protection Association (NFPA):

1. NFPA 70 National Electrical Code

G. Underwriters Laboratories (UL):

1. UL 2044 Standard for Commercial Closed Circuit Television Equipment
2. UL 2391 Equipment with Remote Feeding Telecommunication circuits Intended for Backwards Compatibility in Legacy Telecommunication Equipment
3. UL 3044 Standard for Surveillance Closed Circuit Television Equipment

1.04 SUBMITTALS

- A. Refer to Section 01 33 00, Submittal Procedures, and Section 01 33 23, Shop Drawings, Product Data, and Samples, for submittal requirements and procedures.

B. Submit the following:

1. Systems design presented in functional block diagrams and system electrical/electronic signal flow diagrams indicating signal levels and impedance values
2. Product verification list with pictorial view and full performance specifications.
3. Detailed installation drawings to include installation configuration and methods of installation.
4. List of proposed lenses for camera installations. Calculations of coverage shall be provided for all cameras.
5. Operation and maintenance data to include operation instruction, detailed parts



list, cable and wire lists, circuit diagrams, maintenance, alignment, and troubleshooting procedures.

1.05 QUALITY CONTROL

- A. Products shall be manufactured by firms regularly engaged in manufacturing products described in this section.
- B. Field testing shall be performed by persons having five or more years of relevant testing experience.

1.06 SYSTEM DESCRIPTION

- A. Furnish a CCTV system in the passenger stations for video surveillance of areas in the station, and adjoining parking structure, pocket track, tail tracks, trans-bay tube, and vent structures as applicable, and as indicated.
- B. Provide all interfaces with other systems in the station and in the BART network operating system, as specified and indicated, to provide a completely integrated operating system.

1.07 FUNCTIONAL REQUIREMENTS

- A. General:
 - 1. An average of 100 IP-based digital cameras shall be required per station, excluding parking structures.
 - 2. Video shall be available in IEC-13818 encoding formats of Advanced Video coding (H.264), High Efficiency Video Coding (H.265), and MJPEG.
 - 3. There shall be no recording or storing of images at any stations.
 - 4. The BART video recovery unit shall have supervisory control of the video management system (VMS) and be the primary location for displaying and exporting video. Police Integrated Security Response Center (ISRC), also known as the BART Police Dispatch Center (PDC), shall have video clients for viewing and controlling cameras. The Operations Control Center (OCC) shall have two computer workstations and one large display in order to access and view video from the CCTV network.
 - 5. Video shall be stored in a storage area network (SAN) at the Lake Merritt facility. Stored video shall be limited to the most recent seven days.
- B. The CCTV system shall provide for video surveillance of areas in passenger stations, parking structures, pocket track, and end-of-line tail tracks as applicable.



1. Passenger Station Areas:
 - a. Platform and Mezzanine Areas. Cameras shall be furnished for viewing platform and mezzanine areas including rescue assistance areas and elevator entrances, as indicated. Cameras focused on elevator entrances shall be equipped with lenses having adequate coverage to allow viewing from the Station Agents Booth of patrons using the elevators. Cameras on platforms shall be oriented to allow viewing from the Station Agents Booth of the platform edges for the length of the platforms.
 2. Automatic Fare Collection Equipment:
 - a. Pan, tilt, zoom (PTZ) cameras shall be furnished to monitor automatic fare collection (AFC) equipment including the ticket vending machines, add fare machines, and bill-to-bill changers. “Door open” alarms provided with the fare collection equipment shall cause cameras to move to a position to monitor the alarmed machine. Automatic recording shall be initiated upon activation of the “door open” indication.
 - b. AFC equipment with “door-open” indications shall be monitored in order of priority.
 - c. When an AFC door is reclosed, the associated camera shall return to the normal preset position.
 3. Pocket Track and End-of-Line Tail Tracks:
 - a. PTZ cameras shall be furnished for viewing areas in the pocket and end-of-line tracks, as indicated.
 4. Parking Structures. Cameras shall be provided for viewing internal area and entry area of elevators and stairwell areas. Fixed cameras shall be furnished for viewing as directed by BART Police and BART Engineering.
- C. Interfaces of the CCTV system with other communication subsystems shall be as follows:
1. “Door open” indications of ticket vending machines, add fare machines, bill-to-bill changers, and parking machines for automatic positioning of video cameras shall be monitored by the supervisory control and data acquisition (SCADA) system. The SCADA system shall retransmit a contact closure to the associated PTZ camera to set the camera to a preset viewing position.
 2. Method of connection to the IP-based network designated for transmission of video images shall be determined by BART Engineering.

PART 2 – PRODUCTS



2.01 EQUIPMENT REQUIREMENTS

A. General:

1. CCTV equipment providing the same functions shall be uniform and have the same type and model supplied by a single manufacturer.
2. All necessary accessories, devices, wires, and cables shall be furnished for proper interconnection of the equipment specified herein to provide a completely integrated and operational CCTV system.
3. CCTV monitoring and control equipment, as indicated, herein shall be furnished to allow monitoring of selected video images in the Station Agent's Booth, Emergency Management Panel Room, and the Supervisor's Booth at end-of-line stations.
4. CCTV equipment in the Train Control Room shall be designed for mounting in standard 19-inch rack per EIA RS-310D.
5. CCTV network and storage shall support all installed IP-based cameras per station streaming data at 5Mbps/sec for 1080p cameras and 12Mbps/sec for 4K cameras.

B. Cameras:

1. Cameras shall be Designated Matching Products; refer to the Designated Matching Products (DMP) List.

C. Camera Lenses:

1. Lenses shall be auto-iris lenses directly interchangeable without electrical or mechanical modifications or adaptations. Each lens shall have a neutral density spot filter. Lenses shall be capable of mounting in a sealed environmental housing.
2. PTZ cameras shall have a minimum of 20X optical zoom and 10X digital zoom.

D. Camera Housings:

1. Cameras shall meet the Ingress Protection (IP) rating of IP66 and International Electrotechnical Commission (IEC) Standard 62262 for Impact Protection (IK) Code IK10.
2. Cameras installed outdoors shall be furnished with environmental housings. The housings shall be equipped with heater kit, blower kit, and power supply. Housings exposed to direct sunlight at any time of day shall be equipped with a sun shield.
3. Cameras monitoring AFC equipment and those installed in elevators shall use a



security housing with the following characteristics:

- a. High security, vandal resistant, and corner mount type. The enclosure shall be tamper-proof with tamper-proof design subject to District approval.
- b. The housing shall be compatible with the camera in the elevator.
- c. Security enclosures shall be domed housings suitable for outdoor service. The housings exterior surface shall be tinted to conceal the interior camera from view.
- d. The view from the housing shall encompass a 360-degree horizontal view and 45-degree vertical view. The vertical view shall extend from five degrees above the horizontal to 40 degrees below the horizontal.
- e. Security enclosures shall be tamper-proof to prevent the general public from accessing the interior of the enclosure.
- f. Tamper-proof designs shall be subject to District approval.

E. Camera Mountings:

1. Wall or Ceiling Mount: The camera mount unit shall be designed to support loads of up to 125 lbs. at the point of the camera attachment at an attitude of 90 degrees perpendicular to a wall surface. Each mount assembly shall be equipped with an adjustable head adapter that shall allow 360 degree horizontal and ± 90 degree vertical plane adjustment.
2. Pole Mount: Adapters shall be provided for placing standard wall or ceiling mount units on camera equipped poles. All parts shall be protected from corrosion.
3. The housing mounts for the elevator cab cameras shall be tamper-proof with tamper-proof design subject to District approval. The mounts shall be heavy duty that shall safely support a load of 120 pounds minimum.

F. Monitors:

1. Monitors shall be as specified in the Contract.

G. Video Servers:

1. Video servers shall meet the minimum specified hardware requirements of the VMS software manufacturer.

H. Video Storage:

1. Video shall be stored at centralized storage area network (SAN) storage facility designated by the District.
2. Systems shall utilize open application programming interfaces (APIs) and open software development kits (SDKs).



3. Storage capacity shall be sufficient for 7 days at full frame rate.
- I. Control Panel: Cameras shall be controlled through the video manager software that is furnished by the District.
- J. PTZ cameras shall have a minimum of 16 user-defined presets with a repeatable accuracy of +/- 0.2 degrees. This shall include PTZ positioning, and camera focus.
- K. A contact closure from the SCADA system signifying a “door open” indication of a vending or add fare machine shall cause the appropriate camera to point and focus to the front of the pre-designated alarmed machine.
- L. Wires and cables between equipment assemblies and termination points within each equipment enclosure shall be furnished. Wires and cables shall be listed as being resistant to the spread of fire in accordance with the National Electric Code (NEC), and shall be rated at 300 volts, minimum. Wires and cables servicing remote camera units shall be waterproof.
 1. Video Cables: Video cables shall be as specified in Section 20 70 23, Electronic Circuits, Wires, and Cables.
 2. Control Cables: Control cables shall be multi-conductor AWG No. 18 stranded copper conductors with braided shields.
 3. Power Cables: Minimum conductor size for power circuits shall be AWG No. 14.
- M. Fiber-optic transceivers for transmission of video signals from tail-track cameras shall be the small form-factor-pluggable (SFP) type. Fiber availability will be determined by BART Engineering.
 1. Where there is sufficient fiber:
 - a. Two fibers, one for transmit and one for receive, will be allocated per transceiver.
 - b. SFP style transceivers shall be used.
 - c. LC connectors shall be used.
 - d. SFP type (SX, LX, or ZX) will be designated on all drawings and documentation.
 2. Where there is not sufficient fiber:
 - a. One fiber shall be used for both transmit and receive.
 - b. The transceivers shall meet the following characteristics:
 - 1) Compatible with 50/125 low loss multi-mode glass fiber.
 - 2) Nominal operating wavelength of 850/1300 nm.
 - 3) Range up to three miles.



- 4) Category 6 UTP to fiber optic converters.
3. Multimode fiber-optic cables for the tail-track cameras shall be as specified in Section 20 70 23, Electronic Circuits, Wires, and Cables. LC type connectors with strain relief and breakout kits shall be furnished.

N. All equipment shall be mountable in a standard 19-inch rack per EIA RS-310D.

PART 3 – EXECUTION

3.01 INSTALLATION

- A. Cameras shall be mounted in locations shown on the Contract drawings.
- B. Cameras accessible to the public shall be concealed or placed in protective, tamper-proof environmental enclosures and surface mounted beyond a person's normal reach plus an additional three feet.
- C. Cameras shall be located so that their FOV is not restricted by other station installations such as walls, ceilings, columns, signs, and luminaries. Plans demonstrating the unobstructed FOV of each camera shall be submitted for District review.
- D. Cameras shall be located so that they never directly view the sun. The FOV of cameras shall be adequately illuminated either by natural light or by luminaries. Within the FOV, particular care shall be taken to avoid extremes of light and shadow.
- E. Cameras and other video surveillance equipment installed in locations accessible to the public shall be mounted using tamper-proof mounting hardware.
- F. Camera video signal cables between each camera and the associated field concentrator shall be routed as shown without any splices. All cables shall be installed complying with the requirements of Contract Specification Section 26 05 13, Basic Electrical Materials and Methods for Electrical Systems.
- G. Field concentrators and their associated power distribution and PTZ camera power supply panels shall be installed as shown in Contract drawings.
- H. Fiber optic cables between the field concentrators and the fiber distribution cabinet in each Train Control Room (TCR) shall be installed and terminated as shown in Contract drawings.

3.02 TESTING

- A. Factory and field testing shall be performed in accordance with Contract Specification Section 01 45 23, Testing Program requirements.



- B. Factory Tests: Perform a factory test consisting of one field concentrator, and one PTZ camera power supply be performed to demonstrate correct operation as shown in Contract Drawings and Specifications.
- C. Field Tests: Complete the following:
1. Perform the following camera cable tests as indicated following the approved test plan. Furnish all equipment, appliances, and labor necessary to test the installed camera cable between the camera assembly and the field concentrator. Perform the following tests before any connections are made:
 - a. Perform testing in accordance with the latest EIA/TIA-568 standard for all Category-type cables installed. Camera cable shall not exhibit any discontinuities such as opens, shorts, crimps, or defects.
 - b. Perform continuity tests on the camera cables using a meter having a minimum input resistance of 20,000 ohms per volt. Show that each conductor has a resistance of not more than 16 ohms per 1000 feet of conductor run.
 - c. Measure the insulation resistance between the conductors and between each conductor, ground, and shielding using a megger meter. Perform all resistance testing after final termination and cable installation, but prior to connection of any electronics or field devices.
 - d. Replace any cable that fails to meet these parameters, or if any testing reveals defects in the cable. Retest new cable as specified above.
 - e. Furnish all test equipment.
 2. Perform the following local field operations tests on site in accordance with the approved field test plan. Demonstrate the following after the camera controller assemblies, other camera hardware, field concentrators, power supplies and connecting cabling have been installed:
 - a. Verify physical construction has been completed in accordance with the plans and specifications.
 - b. Inspect quality and tightness of ground and surge protector connections.
 - c. Check power supply voltages and output.
 - d. Connect devices to power source.
 - e. Verify installation of specified cables and connections between camera, pan/tilt unit, and camera control receiver.

END OF SECTION



SECTION 31 10 00

SITE CLEARING

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

1. Removal of vegetation, grass, grass roots, shrubs, tree stumps, trees, upturned stumps, weed growth, tree roots, brush, masonry, concrete, rubbish, debris and other materials.
2. Removal of concrete and bituminous surfaces.
3. Removal of existing fences and gates.

B. Related Requirements:

1. Division 01 - General Requirements.
2. Section 31 22 00 - Grading.
3. Section 31 23 00 - Earthwork.
4. Section 31 23 16 – Trenching Backfill and Compaction.
7. Section 32 11 16 – Aggregate Base
8. Section 32 31 13 - Chain Link Fencing.
9. Section 32 90 00 - Planting.

1.02 SUBMITTALS

- ###### A. Shop Drawings: Submit site plan indicating extent of site clearing.

1.03 QUALITY ASSURANCE

- ###### A. Comply with Standard Specifications for Public Works Construction, current edition, as a minimum requirement.

PART 2 - PRODUCTS - NOT USED



PART 3 - EXECUTION

3.01 TREE AND STUMP REMOVAL

- A. Remove trees and stumps indicated or required to be removed. Remove trees, together with bulk of roots, to a minimum depth of 4 feet below required grade, and within a radius of approximately 7 feet beyond perimeter of trunk at grade.
- B. Fill and compact excavation from tree and stump removal. Fill in 6 inch layers, each compacted to 90 percent of maximum density in accordance with ASTM D1557.
 - 1. Back filling shall not commence until the excavation is inspected and tested.

3.02 CONCRETE AND BITUMINOUS SURFACING REMOVAL

- A. Break up and completely remove existing concrete surfacing, curbs, gutters, walks and bituminous surfacing to indicated limits. Cutting shall be performed to a neat and even line with proper tools or a concrete cutting saw. Minimum depth of cut shall be 1 1/2-inch, unless otherwise indicated. Remove concrete broken beyond the indicated limits to the nearest joint or score line and replace with new concrete to match existing.

3.03 FENCING

- A. Existing fences scheduled to remain may be removed to facilitate the Work, provided they are installed to their original condition in accordance with requirements of Section 32 31 13 - Chain Link Fencing.
- B. Fencing indicated to be removed and not reinstalled shall be completely removed, including footings. Fill and compact excavations.
- C. Install chain link fencing indicated to be relocated or reset in accordance with applicable requirements specified under Section 32 31 13 - Chain Link Fencing.

3.04 CLEANUP

- A. Remove rubbish, debris and waste materials and legally dispose of off the Project site.

END OF SECTION



SECTION 31 22 00

GRADING

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

1. General exterior grading, cutting and filling, including grading for building area, paving, planting areas, banks and hillsides.

B. Related Requirements:

1. Division 01 - General Requirements.
2. Section 31 10 00 - Site Clearing.
3. Section 31 23 00 - Earthwork.
4. Section 31 23 16 – Trenching Backfill and Compaction
5. Section 32 11 16 – Aggregate Base.
6. Section 32 90 00 - Planting.

1.02 PROJECT REQUIREMENTS

A. General:

1. Fees: Pay as required by authorities having jurisdiction over the area.
2. Bonds: Post as required by authorities having jurisdiction over the area.
3. Haul Routes and Restrictions: Comply with requirements of authorities having jurisdiction over the area.
4. Before grading, contact Underground Service Alert of Southern California (USASC) for information on public buried utilities and pipelines. Retain the services of an underground utility locator for on-site utilities.

PART 2 - PRODUCTS

2.01 MATERIALS

- ###### A. Materials shall conform to requirements specified in this and related sections.



PART 3 - EXECUTION

3.01 PREPARATION

- A. Protect and maintain installed stakes until their removal is required for the Work. Provide replacement grade or location stakes lost or disturbed.
- B. Install grade stakes and compare to indicated grades. If discrepancies are found between existing grades and grades indicated on Drawings, do not proceed until discrepancies are resolved.

3.02 ROUGH AND FINE GRADING

- A. Rough grade area sufficiently high to require cutting by fine grading:
 - 1. Grade area for bituminous surfacing and other paving to the indicated grades, equal to the section of the indicated base and pavement.
 - 2. Slope banks to required finish grades as cut progresses or leave cuts full and finish grade by mechanical equipment to provide grades and soil densities indicated on the Drawings.
 - 3. Rough grade, fill and compact banks beyond indicated finish grades. Finish grade banks and slopes to indicated grades and specified soil densities.
 - 4. Grade Only Areas: In areas not indicated to receive pavement, rough grade to approximate finish grades and then scarify, moisten and roll to obtain required density and indicated finish grades.
 - 5. Tolerances: Finish grades shall be within a tolerance of 0.05 inch per foot above or below grades indicated. Provide an average grade as indicated.
- B. Base or Subgrade:
 - 1. After subgrade has been constructed to approximate required grades, scarify to a depth of at least 6 inches:
 - a. After scarifying, process loosened material to a finely divided condition and adjust moisture content to optimum condition by addition of water, addition and blending of dry suitable material, or by drying of existing material.
 - b. Subgrade material shall be compacted by tamping, sheepsfoot rollers or pneumatic tire rollers. Required relative compaction shall be [90] percent minimum for the top 6 inches below subgrade.
 - c. Install base course in accordance with Section 31 2326 - Base Course.
 - 2. Tolerance of completed grades of base or subgrade shall not vary more than 0.03 inch per foot from grades indicated. Provide an average grade as indicated.



3.03 SHORING

- A. Provide shoring as necessary to properly and safely support earth sides of excavations, and existing curbs, sidewalks, gutter, drives and stairs, against movement and collapse.
- B. Design and Calculations: Provide in accordance with requirement of CalOHSA.
- C. Remove shoring upon completion of the Work of this section or when no longer needed unless required otherwise by authorities having jurisdiction.

3.04 EXCESS MATERIAL DISPOSAL

- A. Remove rubbish, debris, and waste materials and legally dispose of off the Project site.

3.05 PROTECTION

- A. Protect the Work of this section until Substantial Completion.

END OF SECTION



SECTION 31 23 00

EARTHWORK

PART 1 – GENERAL

1.01 DESCRIPTION OF WORK

- A. Earthwork shall conform to the provisions in Section 19, “Earthwork,” of the Caltrans Standards and the Technical Specifications.
- B. Valve boxes, manhole covers, and drainage structures within the limits of any grading operation shall be adjusted to proposed finish grade.
- C. Embankment materials shall be free from organic and otherwise deleterious materials and as provided in Section 19, “Earthwork,” of the Caltrans Standards.
- D. Surplus excavated material shall become the property of the Contractor and shall be disposed of outside the right-of-way in conformance with Federal, State, and local regulations.

PART 2 – PRODUCT

2.01 IMPORTED SOIL

- A. Import materials shall have a liquid limit of 25 or less, a plasticity index of 12 or less, and be well graded with no greater than 30 percent of the particles passing the No. 200 sieve and no particles greater than 6 inches in maximum dimension. Import materials shall be non-corrosive in accordance with the following corrosive limits as provided in Section 8.1 of the Caltrans Corrosion Guidelines, Version 2.0, 2012:
 - Minimum resistivity must be greater than 2000 ohm-cm, CT 643
 - Chloride concentration must be less than 250 ppm, CT 422
 - Sulfate concentration must be less than 500 ppm, CT 417
 - pH must be between 5.5 and 10.0, CT 643

PART 3 – EXECUTION

3.01 HAZARDOUS WASTE IN EXCAVATION

- A. If the Contractor encounters hazardous waste in excavation, as defined by Section 25117 of the Health and Safety Code, the Contractor shall immediately notify the Engineer in writing. Excavation in and around the suspected hazardous material shall be suspended until the Engineer authorizes it to be resumed. The limits of excavation shall be as directed by the Engineer. If such suspension delays the current controlling



operation, the Contractor will be granted an extension of time as provided the Special Provisions.

- B. If such suspension delays the current controlling operation more than 2 working days, the delay will be considered a right-of-way delay and the Contractor will be compensated for each such delay as provided in the Special Provisions.
- C. The City of Goleta reserves the right to use other forces for exploratory work to identify and determine the extent of such material and for removing hazardous material from such area.
- D. If hazardous material is encountered the contractor shall mobilize employees with the herein designated safety and remediation training within 24 hours of the Contractor, the City or third party determining a hazardous or contaminated soils condition exists in an excavation. The contractor shall have the trained employees available prior to the start of any hazardous material excavation and at the direction of the Engineer, the Contractor shall include a hazmat training as a scheduled task in the Contract Schedule. No additional working days shall be granted for the contractor's inability to provide and mobilize trained workers within the 24 hour time limit.
- E. The employees shall be trained through an OSHA approved Hazardous Waste Operations and Emergency Response Standard (Hazwoper) 40 Hour Training class or have a Hazwoper refresher course within one year prior to the date the work is to be performed; and possess a certificate showing successful completion of the Hazwoper training. OSHA accepted Hazwoper training shall conform to all Federal, State, and Local requirements (including those specified in 29 CFR 1910.120. In addition, workers shall have additional hands-on training in use of the Personal Protective Equipment (PPE) required for their jobsite(s) in accordance with 29 CFR 1910.120.
- F. Voids resulting from excavation of hazardous material shall be backfilled in accordance with Section 19-3, "Structure Excavation and Backfill," of the Caltrans Standards and as specified in the Technical Specifications. Backfill material shall comply with Section 2.01, "Imported Soil," above.
- G. Measurement and payment for removal of hazardous waste in excavation, including training, obtaining any necessary permits, testing and analysis, disposal, and relevant disposal fees will be made in accordance with the Special Provisions.

3.02 STRUCTURE EXCAVATION AND BACKFILL

- A. Structure excavation and backfill shall conform to the provisions in Section 19-3, "Structure Excavation and Backfill," of the Caltrans Standards and as specified in the Technical Specifications.
- B. All structural backfill shall be of the type indicated and placed to the limits shown on the plans. For all subgrade of structural backfill a relative compaction of not less than 95 percent shall be obtained for a minimum depth of 6 inches below the bottom of excavation.



- C. Placement of structural backfill shall comply with Section 19-3.02C, “Structure Backfill,” of the Caltrans Standards except that compaction shall not be performed by ponding or jetting.
- D. Excavating by blasting will not be allowed.
- E. Shoring, lagging, or other bracing shall be designed, furnished, and placed by the contractor to adequately support the excavation.
- F. Steel shoring, steel and timber lagging, and other steel bracing may remain in place, subject to the following requirements:
 - 1. The amount of bracing remaining in place shall not exceed the practical minimum that is necessary to safely support the sides of the excavation.
 - 2. Bracing shall be placed in an open type arrangement with ample clearance between adjacent braces to permit the ready flow of concrete around the bracing and provide proper clearance to the reinforcement.

3.03 TRENCH EXCAVATION AND BACKFILL

- A. Excavating and backfilling for trenches shall conform to the provisions in Section 87-1.03B(3), "Conduit Installation Underground," of the Caltrans Standards.
- B. Open trenches and excavations shall be covered or barricaded to protect pedestrians and vehicles in accordance with Section 01 55 26, “Traffic Control and Access,” of the Technical Specifications. Following excavation Contractor shall minimize exposure of public to open trenches.
- C. All surplus excavation, from whatever source, shall be disposed of outside the right of way in conformance with Federal, State, and local regulations.

3.04 TESTING EXCAVATED MATERIAL

- A. Excavated soil may be tested for potential use as fill material in compliance with Section 2.01, “Imported Soil,” above. Contractor shall submit test results prior to placement. Where excavated soil is compliant Contractor shall stockpile or place excavated soil as required. Stockpiling of compliant excavated soil shall remain within limits of work or designated offsite area.

3.05 IMPORTED SOIL AS BACKFILL

- A. Where excavated soil is insufficient or does not meet soil requirements for backfill Contractor shall import suitable backfill material complying with Section 2.01, “Imported Soil,” above.

PART 4 – MEASUREMENT AND PAYMENT



4.01 MEASUREMENT

- A. No separate measurement will be made for the requirements of this section, unless otherwise stated.

4.02 PAYMENT

- A. Unless otherwise stated full compensation for complying with the requirements of this section shall be considered as included in the contract prices paid for the various items of work involved, unless otherwise stated, and no additional compensation will be allowed therefore.

END OF SECTION



SECTION 31 23 16 TRENCHING, BACKFILL AND COMPACTION

PART 1 – GENERAL

1.01 REQUIREMENTS

- A. The Contractor shall perform all earthwork and trenching operations indicated and required for construction of the work, provide advance notification of the affected residents, perform preparation work. The Contractor shall secure all necessary permits to complete the requirements of this Section of the Specifications.

1.02 RELATED WORK SPECIFIED ELSEWHERE

Section 01 55 26 – Traffic Control & Access

1.03 CONTRACTOR SUBMITTALS

- A. Where shoring is required the Contractor's attention is directed to the provisions for "Shoring and Bracing Drawings" in Section 6705 of the California Labor Code. The Contractor, prior to beginning any trench or structure excavation 5 feet deep or over shall submit to the City and shall be in receipt of the City's written acceptance of the Contractor's detailed plan showing design of all shoring, bracing, sloping of the sides of excavation, or other provisions for worker protection against the hazard of caving ground during the excavation of such trenches or structure excavation. If such plan varies from the shoring system standards established in the Construction Safety Orders of the State of California, such alternative systems plans shall be prepared by a civil or structural engineer licensed in the State of California.
- B. The Contractor shall submit a copy of the excavation permit issued by the California Department of Industrial Safety.
- C. The Contractor shall submit samples of all materials to be used in the work in accordance with the requirements in Section 01 33 00.
- D. Submit CLSM mix designs which show the proportions and gradations of all materials proposed for each type of CLSM indicated. Each mix design shall be accompanied by independent laboratory test results of the indicated properties.

1.04 CONTRACTOR SUBMITTALS



- A. It shall be the sole responsibility of the Contractor to control the rate and effect of the dewatering in such a manner as to avoid all objectionable settlement and subsidence. All dewatering operations shall be adequate to assure the integrity of the finished project and shall be the responsibility of the Contractor.
- B. Where critical structures or facilities exist immediately adjacent to areas of proposed dewatering, reference points shall be established and observed at frequent intervals to detect any settlement which may develop. The responsibility for conducting the dewatering operation in a manner that will protect adjacent structures and facilities rests solely with the Contractor. The cost of repairing any damage to adjacent structures and restoration of facilities shall be the responsibility of the Contractor.
- C. At the option of the City inspector, asphalt mix, subgrade, aggregate base course, and asphalt pavement may be tested by the City's testing laboratory and paid for by the City in accordance with Section 014200 – Reference Standards. Sample sizes shall be as determined by the testing laboratory.

PART 2 – PRODUCTS

2.01 SUITABLE FILL AND BACKFILL MATERIAL REQUIREMENTS

- A. **General:** Fill, backfill, and embankment materials shall be suitable selected or processed clean, fine earth, rock, or sand, free from grass, roots, brush, or other vegetation.
- B. Fill and backfill materials to be placed within 6 inches of any structure or pipe shall be free of rocks or unbroken masses of earth materials having a maximum dimension larger than 3 inches.
- C. **Suitable Materials:** Materials not defined as unsuitable in Section 2.3 shall be reviewed by the City and may be used in fills, backfilling, and embankment construction subject to the indicated limitations and at the City's discretion. In addition, when acceptable to the City, some of the material listed as unsuitable may be used when thoroughly mixed with suitable material to form a stable composite.
- D. Suitable materials may be obtained from on-site excavations (if applicable), may be processed on-site materials, or may be imported. If imported materials are required by this Section or to meet the quantity requirements of the project, the Contractor shall provide the imported materials at no additional expense to the City, unless a unit price item is included for imported materials in the bidding schedule.
- E. The following types of suitable materials are defined:
 - 1. **Type A (three-quarters inch minus granular backfill):** Crushed rock or gravel, and sand with the gradation requirements below. The material shall have a minimum



sand equivalent value of 28 and a minimum R-value of 78. If the sand equivalent value exceeds 35 the R-value requirement is waived.

Sieve Size	Percentage Passing
3/4-inch	100
No. 4	30 - 50
No. 200	0 - 5

- Type B (Class I crushed stone):** Manufactured angular, crushed stone, crushed rock, or crushed slag with the following gradation requirements. The material shall have a minimum sand equivalent value of 75.

Sieve Size	Percentage Passing
3/4-inch	100
No. 4	30 - 50
No. 200	0 - 5

- Type C (sand backfill):** Sand with the following gradation requirements, and with a sand equivalent value not less than 30.

Sieve Size	Percentage Passing
1/2-inch	100
No. 4	85 - 100
No. 8	70 - 95
No. 200	0 - 10

- Type F (coarse drainrock):** Crushed rock or gravel with the size gradation for Size Number 4 in ASTM C 33.
- Type G (aggregate base):** See also Section 32 11 16 for Aggregate Base Specifications.

Crushed rock aggregate base material of such nature that it can be compacted readily by watering and rolling to form a firm, stable base for pavements. At the option of the Contractor, the grading for either the 1-1/2-inch maximum size or 3/4-inch maximum size gradation shall be used. The sand equivalent value shall be not less than 22, and the material shall meet the following gradation requirements:

Percentage Passing



<u>Sieve Size</u>	<u>1-1/2-inch Max</u> <u>Gradation</u>	<u>3/4-inch Max.</u> <u>Gradation</u>
2-inch	100	-
1-1/2-inch	90 - 100	-
1-inch	-	100
3/4-inch	50 - 85	90 - 100
No. 4	25 - 45	35 - 55
No. 30	10 - 25	10 - 30
No. 200	2 - 9	2 - 9

6. **Type H (graded drainrock):** Drainrock shall be crushed rock or gravel, durable and free from slaking or decomposition under the action of alternate wetting or drying. The material shall be uniformly graded and shall meet the gradation requirements for Size Number 57 in ASTM C 33. The drainrock shall have a sand equivalent value not less than 75. The finish graded surface of the drainrock immediately beneath hydraulic structures shall be stabilized to provide a firm, smooth surface upon which to construct reinforced concrete floor slabs.
7. **Type I:** Not Used.
8. **Type K (topsoil):** Stockpiled topsoil material which has been obtained at the site by removing soil to a depth not exceeding 1 foot. Removal of the topsoil shall be done after the area has been stripped of vegetation and debris.

2.02 UNSUITABLE FILL MATERIAL

A. Unsuitable materials include the materials listed below.

1. Soils which, when classified under ASTM D 2487 - Standard Classification of Soils for engineering Purposes (Unified Soil Classification System), fall in the classifications of Pt, OH, CH, MH, or OL.
2. Soils which cannot be compacted sufficiently to achieve the density specified for the intended use.
3. Materials that contain hazardous or designated waste materials including petroleum hydrocarbons, pesticides, heavy metals, and any material which may be classified as hazardous or toxic according to applicable regulations.



4. Soils that contain greater concentrations of chloride or sulfate ions, or have a soil resistivity or pH less than the existing on-site soils.
5. Topsoil, except as allowed by Section 2.4.

2.03 USE OF FILL, BACKFILL, AND EMBANKMENT MATERIAL TYPES

- A. The Contractor shall use the types of materials as designated herein for all required fill, backfill, and embankment construction hereunder.
- B. Where these Specifications conflict with the requirements of any local agency having jurisdiction or with the requirements of a pipe material manufacturer, the City shall be immediately notified. In case of conflict between types of pipe zone bedding, the Contractor shall use the agency-specified bedding material if that material provides a greater degree of structural support to the pipe, as determined by the City. In case of conflict between types of trench or final backfill types, the Contractor shall use the agency-specified backfill material if that material provides the greater in-place density after compaction.
- C. Fill and backfill types shall be used in accordance with the following provisions:
 1. Embankment fills shall be constructed of Type I material, as defined herein, or any mixture of Type I and Type A through Type H materials.
 2. Pipe zone bedding for mortar coated steel pipe, ductile iron pipe, and PVC pipe shall be Type C backfill (pipe bedding) material. Pipe zone bedding for PVC pipe, coal tar enamel coated or tape wrapped steel pipe, and polyethylene encased ductile iron pipe shall be Type C backfill (pipe bedding) material.
 3. Trench zone and final backfill for pipelines under paved areas, as defined under "Pipe and Utility Trench Backfill," shall be Type L backfill material unless otherwise shown or specified. Trench zone and final backfill under areas not paved shall be select native material free of rocks larger than 3 inches and free of deleterious material, or Types A, C or G, backfill materials or any mixture thereof. In agricultural or landscaped areas Type K material shall be used for final backfill unless otherwise indicated.
 4. Trench backfill and final backfill for pipelines under structures shall be the same material as used in the pipe zone, except where concrete encasement is required by the Contract Documents.
 5. Backfill around structures shall be Type A through Type H materials, or any mixture thereof, except as shown.



6. Backfill materials beneath structures shall be as follows:
 - a. Drain rock materials under hydraulic structures or other water retaining structures with underdrain systems shall be Type H material.
 - b. Under concrete hydraulic structures or other water retaining structures without underdrain systems, Types G or H materials shall be used.
 - c. Under structures where groundwater must be removed to allow placement of concrete, Type F material shall be used. Before the Type F material is placed, filter fabric shall be placed over the exposed foundation.
 - d. Under all other structures, Type G or H material shall be used.
7. Backfill used to replace pipeline trench over-excavation shall be a layer of Type F material with a top layer of filter fabric to prevent migration of fines for wet trench conditions or the same material as used for the pipe zone bedding if the trench conditions are not wet.
8. The top 6 inches of embankment fills around hydraulic structures, and all other embankment fills shall consist of Type K material, topsoil.
9. Filter fabric shall be per City or agency direction.

2.04 SOIL MATERIALS TESTING

- A. All soils testing of samples submitted by the Contractor will be done by a testing laboratory of the City's choice and at the City's expense. At its discretion, the City may request that the Contractor supply samples for testing of any material used in the work.
- B. Particle size analysis of soils and aggregates will be performed using ASTM D 422 - Standard Test Method for Particle-Size Analysis of Soils.
- C. Determination of sand equivalent value will be performed using ASTM D 2419 - Standard Test Method for Sand Equivalent Value of Soils and Fine Aggregate.
- D. **Unified Soil Classification System:** References in this Section to soil classification types and standards shall have the meanings and definitions indicated in ASTM D 2487. The Contractor shall be bound by all applicable provisions of said ASTM D 2487 in the interpretation of soil classifications.
- E. The testing for chloride, sulfate, resistivity, and pH will be done in accordance with California Test Methods 417, 422 and 643 of the California Department of Transportation.



2.05 ASPHALT CONCRETE PAVING MATERIALS

- A. See Section 32 12 16 for Asphalt Paving Specifications.
- B. All materials required for asphalt concrete pavement construction as specified herein shall conform to the Caltrans Standard Specifications:
- C. Asphalt concrete for roadway pavement shall be Type B, Grade AR-4000 as specified in Section 39 with ½” mix, unless specified otherwise. Asphalt concrete for construction of sidewalks, berms, dikes, or curbs shall be Type B, Grade AR-4000 as specified in Section 39 with 3/8” mix, unless specified otherwise. Paint binder shall be SS-1h emulsified asphalt conforming requirements of Section 94. Base course shall be treated Class 2 aggregate base material. Paint for traffic stripes and pavement markings shall conform to Section 84.

PART 3 – EXECUTION

3.01 EXCAVATION - GENERAL

- A. **General:** Except when specifically provided to the contrary, excavation shall include the removal of all materials of whatever nature encountered, including all obstructions of any nature that would interfere with the proper execution and completion of the work. The removal of said materials shall conform to the lines and grades indicated or ordered.
- B. **Sheeting, Shoring and Bracing:** The Contractor shall furnish, place, and maintain all supports and shoring that may be required for the sides of the excavations and trenches. Excavations and trenches shall be sloped or otherwise supported in a safe manner in accordance with applicable CAL/OSHA requirements and the requirements of OSHA Safety and Health Standards for Construction (29CFR1926). As a minimum, lateral pressures for design of trench sheeting, shoring, and bracing shall be based on type of soil exposed in the trench, groundwater conditions, surcharge loads adjacent to the trench, and type of shoring that will be used in the trench.

3.02 PROTECTION OF EXISTING UTILITIES AND FACILITIES

- A. **General:** The Contractor shall be responsible for the care and protection of all existing sewer pipelines, water pipelines, gas mains, electrical and communications conduits, cables, storm drains, culverts, or other facilities and structures that may be encountered in or near the area of work.
- B. **Notification:** It shall be the duty of the Contractor to notify each agency having jurisdiction and make arrangements for locating each agency's facilities prior to beginning construction.



- C. **Damage:** In the event of damage to any existing facilities during the progress of the work due to the failure of the Contractor to exercise the proper precautions, the Contractor shall be responsible for the cost of all repairs and protection to said facilities. The Contractor's work may be stopped until repair operations are complete.
- D. **Storage and Disposal of Excavated Material:** During trench excavation, store excavated material only within the work area. Do not obstruct roadways, streets, bike paths, or sidewalks. Contractor shall remove and dispose of excess excavated soil material off the Project site at no additional cost to the City, in accordance with local regulations.

3.03 STRUCTURE, ROADWAY, AND EMBANKMENT EXCAVATION

- A. **Excavation Beneath Structures and Embankments:** Except where otherwise indicated for a particular structure or ordered by the City, excavation shall be carried to the grade of the bottom of the footing or slab. Where indicated or ordered, areas beneath structures or fills shall be over-excavated. The subgrade areas beneath embankments shall be excavated to remove not less than the top 6 inches of native material and where such subgrade is sloped, the native material shall be benched. When such over-excavation is indicated, both over-excavation and subsequent backfill to the required grade shall be performed by the Contractor. When such over-excavation is not indicated but is ordered by the City, such overexcavation and any resulting backfill will be paid for under a separate unit price bid item if such bid item has been established; otherwise payment will be made in accordance with a negotiated price. After the required excavation or over-excavation has been completed, the exposed surface shall be scarified to a depth of 6 inches, brought to optimum moisture content, and rolled with heavy compaction equipment to obtain 95 percent of maximum density.
- B. **Excavation Beneath Paved Areas:** Excavation under areas to be paved shall extend to the bottom of the aggregate base or subbase, if such base is called for; otherwise it shall extend to 1 inch below the existing paving thickness. After the required excavation has been completed, the top 6 inches of exposed surface shall be scarified, brought to optimum moisture content, and rolled with heavy compaction equipment to obtain 95 percent of maximum density. The finished subgrade shall be even, self-draining, and in conformance with the slope of the finished pavement. Areas that could accumulate standing water shall be regraded to provide a self-draining subgrade.
- C. **Notification of City:** The Contractor shall notify the City at least 3 days in advance of completion of any structure excavation and shall allow the City a review period of at least one day before the exposed foundation is scarified and compacted or is covered with backfill or with any construction materials



3.04 PIPELINE AND UTILITY TRENCH EXCAVATION

- A. **General:** Unless otherwise indicated or ordered, excavation for pipelines and utilities shall be open cut trenches with widths as indicated. Trenches shall be excavated to line and grade as shown on the Plans (Construction Drawings). Excavation for water lines shall be made only after pipe and other necessary materials are delivered to the project site and inspected by the Goleta Water District's inspector. Where trenching occurs in paved areas, the pavement shall be saw cut ahead of the trenching operations. The proper tools and equipment shall be used in marking and breaking so that the pavement will be cut accurately and on neat lines parallel to the trench. Material excavated from trenches shall be placed in such a way as not to endanger the health of the workers or the public. Excavated material shall not be stockpiled within the public right-of-way, or placed in areas where it could be hazardous to traffic, or block access to roads or driveways. Excavation within the public right-of-way shall be performed in compliance with the requirements of the County of Santa Barbara Department of Public Works.
- B. **Trench Geometry:** Trenches shall be constructed to allow for safe installation of pipe and structures. Trench width shall be in accordance with GWD Standard Details except when stated otherwise on the Plans and Specifications. The bottom of the trench shall be excavated uniformly to the grade of the bottom of the pipe bedding. Trench bottom shall consist of firm native soil or imported compacted soil able to evenly support pipe bedding for the full length of the pipe. Excavations for pipe bells and welding shall be made as required.
- C. **Abrasive Materials:** When rocks, concrete, or other hard and abrasive materials are encountered during excavation, it may be required that all or a portion of the material be removed to provide a minimum clearance of 12 inches below and on each side of pipe, valves and fittings. If in the opinion of the Goleta Water District damage to other systems or structures will occur by the removal of material, Contractor shall not proceed until receiving further instructions from the District.
- D. **Unsuitable Foundation:** If soft, spongy, unstable, or other similar material is encountered upon which the pipe bedding material is to be placed, an additional 12 inches in depth of this unsuitable material shall be removed and replaced with bedding material placed in the manner specified for pipe bedding material. Tree roots are to be removed.
- E. **Protection of Property:** Tree, shrubs, fences and all other property and surface structures shall be protected during construction unless the Plans and Specifications call for their removal.
- F. **Temporary Supports:** When other structures, pipes, conduits, cables, wires or any underground improvements are encountered during excavation they shall be temporarily supported as necessary to prevent damage to or disturbance of said improvements.



G. Exploratory Excavation

1. The Contractor shall excavate and expose buried points of connection to existing utilities where indicated on the Drawings. Excavation shall be performed prior to preparation of Shop Drawings for connections and before fabrication of pipe, and the data obtained shall be used in preparing Shop Drawings.
2. Data, including dates, locations excavated, and sketches, shall be submitted to the City within one week of excavation.
3. Damage to utilities from excavation activities shall be repaired by the Contractor.

H. **Open Trench:** The maximum amount of open trench permitted in any one location shall be 300 feet, or a length equivalent to the amount of pipe able to be installed in a single day, whichever is less. Trenches shall not remain open overnight. All trenches shall be fully backfilled at the end of each workday, or shall be properly shored and covered by heavy steel plates adequately braced and capable of supporting vehicular traffic in those locations where it is impractical to backfill at the end of each day. The above requirements for backfilling or use of steel plates may be waived at the discretion of the INSPECTOR in cases where the trench is located further than 100 feet from any traveled roadway or occupied structure. In such cases, however, barricades and warning lights meeting safety requirements shall be provided and maintained.

I. **Over Excavation:** Any over-excavation carried below the grade ordered or indicated, shall be backfilled and compacted to the required grade with the indicated material

3.06 EXCAVATION IN LAWN AND LANDSCAPED AREAS

- A. Where excavation occurs in landscaped areas, Contractor shall protect all trees, shrubs, sidewalk, walls, fences, and other landscape items adjacent to or within the work area unless directed otherwise by the Contract Documents. In the event of damage to landscape items, Contractor shall replace the damaged items in a manner satisfactory to the City at no cost to the City.
- B. Where excavation occurs in lawn areas, the sod shall be carefully removed, dampened, and stockpiled to preserve it for replacement. Excavated material may be placed on the lawn; provided, that a drop cloth or other suitable method is employed to protect the lawn from damage. The lawn shall not remain covered for more than 72 hours. Immediately after completion of backfilling [and testing of the pipeline], the sod shall be replaced and lightly rolled in a manner so as to restore the lawn as near as possible to its original condition. Contractor shall provide new sod if stockpiled sod has not been replaced within 72 hours.



- C. Except where trees are indicated to be removed, trees shall be protected from injury during construction operations. No tree roots over 2 inches in diameter shall be cut without express permission of the City. Trees shall be supported during excavation by any means previously reviewed by the City.

3.07 BACKFILL - GENERAL

- A. Backfill shall not be dropped directly upon any structure or pipe. Backfill shall not be placed around or upon any structure until the concrete has attained sufficient strength to withstand the loads imposed. Backfill around water retaining structures shall not be placed until the structures have been tested, and the structures shall be full of water while backfill is being placed.
- B. Except for drain rock materials being placed in over-excavated areas or trenches, backfill shall be placed after all water is removed from the excavation, and the trench sidewalls and bottom have been dried to a moisture content suitable for compaction.
- C. Immediately prior to placement of backfill materials, the bottoms and sidewalls of trenches and structure excavations shall have all loose sloughing, or caving soil and rock materials removed. Trench sidewalls shall consist of excavated surfaces that are in a relatively undisturbed condition before placement of backfill materials.

3.08 PLACING AND SPREADING OF BACKFILL MATERIALS

- A. Backfill materials shall be placed and spread evenly in layers. When compaction is achieved using mechanical equipment, the layers shall be evenly spread so that when compacted each layer shall not exceed 6 inches in thickness.
- B. During spreading, each layer shall be thoroughly mixed as necessary to promote uniformity of material in each layer. Pipe zone bedding materials shall be manually spread around the pipe so that when compacted the pipe bedding will provide uniform bearing and side support.
- C. Where the backfill material moisture content is below the optimum moisture content, water shall be added before or during spreading until the proper moisture content is achieved. Where the backfill material moisture content is too high to permit the specified degree of compaction the material shall be dried until the moisture content is satisfactory.

3.09 PLACING AND SPREADING OF BACKFILL MATERIALS

- A. Each layer of Types A, B, C, G, H, I, and K backfill materials as defined herein, where the material is graded such that 10 percent or more passes a No. 4 sieve, shall be mechanically compacted to the indicated percentage of density. Equipment that is



consistently capable of achieving the required degree of compaction shall be used and each layer shall be compacted over its entire area while the material is at the required moisture content.

- B. Each layer of Type F backfill materials shall be compacted by means of at least 2 passes from a flat plate vibratory compactor. When such materials are used for pipe zone backfill, vibratory compaction shall be used at the top of the pipe zone or at vertical intervals of 24 inches, whichever is the least distance from the subgrade.
- C. Flooding, ponding, or jetting shall not be used for backfill around structures, for final backfill materials, or aggregate base materials.
- D. Equipment weighing more than 10,000 pounds shall not be used closer to walls than a horizontal distance equal to the depth of the fill at that time. Hand operated power compaction equipment shall be used where use of heavier equipment is impractical or restricted due to weight limitations.
- E. Backfill around and over pipelines that is mechanically compacted shall be compacted using light, hand operated, vibratory compactors and rollers. After completion of at least two feet of compacted backfill over the top of pipeline, compaction equipment weighing no more than 8,000 pounds may be used to complete the trench backfill.

3.10 PLACING AND SPREADING OF BACKFILL MATERIALS

- A. **Methods:** Classification of pipe bedding and trench backfill materials shall be determined in accordance with ASTM D 2487. The density of soil in place shall be determined by the sand cone method, ASTM D 1556, or by the nuclear method, ASTM D 2922 or D 3017. When ASTM D 2922 is used and a one-sack slurry is not used to backfill the trench, the calibration curves shall be checked and adjusted using the sand cone method. ASTM D 2922 results in a wet unit weight of soil and when using this method, ASTM D 3017 (Nuclear Gauge Method for Water Content) shall be used to determine the moisture content of the soil. The calibration curves furnished with the moisture gauges shall be checked along with density calibration checks, as described in ASTM D 3017. The calibration checks of both the density and moisture curves shall be made at the beginning of the job and on each different type of material used. Copies of calibration curves, results of calibration tests, and results of laboratory tests shall be furnished to the City prior to performing any field tests. Field test results shall be furnished to the City within 48 hours of the testing. Trenches improperly compacted shall be reopened to the depth directed by the City, then filled and compacted to the density specified at no additional cost to the City.
- B. **Soil Moisture-Density Relationship:** Laboratory moisture-density relations of soils shall be determined per ASTM D 1557.



- C. **Cohesionless Materials:** Relative density of cohesionless materials by ASTM D 4253 and D 4254.
- D. **Sampling:** Sample backfill materials per ASTM D 75.
- E. **Relative Compaction:** "Relative compaction" shall be defined as the ratio, expressed as a percentage, of the in place dry density to the laboratory maximum dry density.
- F. **Compaction Compliance:** Compaction shall be deemed to comply with the specifications when none of the tests falls below the specified relative compaction. Notify the City 24-hours in advance of when backfill lifts are ready for testing to allow inspection by the City. The Contractor shall pay the costs of any re-testing of work not conforming to the Specifications.
- G. **Testing Frequency:** Testing shall be performed by a certified soils testing service. All tests shall be performed at locations specified by the City. A minimum of one soil classification and one moisture-density relation test shall be performed for each different type of soil material used for pipe bedding and trench backfill. These tests shall also be performed for every 1500 cubic yards of material placed. A minimum of one field density test shall be performed for each soil type, and at least one test for each 24" compacted thickness. These test requirements shall be repeated for every 300 feet of trench length.
- H. **Compaction Requirements:** The following compaction test requirements shall be in accordance with ASTM D 1557 - Test Method for Laboratory Compaction Characteristics of Soils Using Modified Effort (56,000 ft - lbf/ft³) (2,700 kN-m/m³) for Type A, B, C, G, H, I, K, M, and N materials and in accordance with ASTM D 4253 - Standard Test Method for Maximum Index Density and Unit Weight of Soils Using a Vibratory Table, and D 4254 - Standard Test Method for Minimum Index Density and Unit Weight of Soils and Calculation of Relative Density, for Type B, E, F, and J materials. Where agency or utility company requirements govern, the highest compaction standards shall apply.

<u>Location or Use of Fill</u>	<u>Percentage of Maximum Density</u>	<u>Percentage of Relative Density</u>
Pipe bedding and over-excavated zones under bedding for flexible pipe, including trench plugs.	95	70
Pipe bedding and over-excavated zones under bedding		



for rigid pipe.	90	55
Final backfill, beneath paved areas or structures.	95	70
Final backfill, not beneath paved areas or structures.	90	55
Trench zone backfill, beneath paved areas and structures.	95	70
Trench zone backfill, not beneath paved areas or structures.	90	55
Embankments and fills.	90	55
Embankments and fills beneath paved areas or structures.	95	70
Backfill beneath structures and hydraulic structures.	95	70
Topsoil (Type K material)	80	N.A.
Aggregate base or sub-base (Type G or M material)	95	N.A.

3.11 PIPE AND UTILITY TRENCH BACKFILL

A. Pipe Zone Bedding

1. The pipe zone is defined as that portion of the vertical trench cross-section lying between the trench bottom and a plane 12-inches above the top surface of the pipe as indicated. The pipe bedding is defined as backfill material within the pipe zone. Bedding shall be placed across the entire trench extending from a minimum of four inches below the bottom of the pipe to 12 inches above the top of pipe. Bedding shall be placed in layers not exceeding six inches loose thickness for compaction by



hydraulic or hand operated mechanical compactors, and eight inches loose thickness when compacted by other mechanical compactors. Bedding shall be compacted to at least 90% of its maximum dry density as determined by ASTM D 1557. Bell holes in bedding shall be provided for each joint, but shall be no larger than necessary to allow joint assembly and to ensure that pipe will lie flat on the bedding. Contractor shall ensure that pipe is not being supported by the bell portion of the pipe at any joint and shall ensure that no less than 2 inches of bedding is provided for yokes, restraints, bells and all other extensions of fittings and joints.

2. The pipe zone shall be backfilled with the indicated backfill material. The Contractor shall exercise care to prevent damage to the pipeline coating, cathodic bonds, and the pipe itself during the installation and backfill operations
- B. Trench Zone Backfill: After the pipe zone backfill has been placed, backfilling of the trench zone may proceed. The trench zone is defined as that portion of the vertical trench cross-section from 12 inches above the top of the pipe to the bottom of the pavement zone if the trench is under pavement, or to within 12 inches of finished grade if the trench is in an unpaved area. Where slurry backfill is not used, material shall be compacted to at least 95% of maximum dry density as determined by ASTM D 1557. Trench shall be backfilled in lifts not exceeding eight inches, uncompacted depth, and then compacted by mechanical means prior to placement of succeeding lifts. Where the pipeline is located within an existing paved street within the public right of way, trench shall be backfilled with Type L backfill material as described above.
- C. Pavement Zone Backfill and Final Backfill: The pavement zone includes the asphalt concrete and aggregate base pavement section. Final backfill applies to trenches not beneath paved areas and is all backfill in the trench cross-sectional area within 12 inches of finished grade.
- D. Identification Tape: Install identification tape as indicated.

3.12 FILL AND EMBANKMENT CONSTRUCTION

- A. The area where a fill or embankment is to be constructed shall be cleared of all vegetation, roots, and foreign material. Following this, the surface shall be moistened, scarified to a depth of six inches, and rolled or otherwise mechanically compacted. Embankment and fill material shall be placed and spread evenly in approximately horizontal layers. Each layer shall be moistened or aerated, as necessary. Unless otherwise approved by the City, each layer shall not exceed 6 inches of compacted thickness. The embankment, fill, and the scarified layer of underlying ground shall be compacted to 95 percent of maximum density under structures and paved areas, and 90 percent of maximum density elsewhere.
- B. When an embankment or fill is to be made and compacted against hillsides or fill slopes steeper than 4:1, the slopes of hillsides or fills shall be horizontally benched to key the



embankment or fill to the underlying ground. A minimum of 12 inches normal to the slope of the hillside or fill shall be removed and re-compacted as the embankment or fill is brought up in layers. Material thus cut shall be re-compacted along with the new material. Hillside or fill slopes 4:1 or flatter shall be prepared in accordance with Paragraph A, above.

- C. Where embankment or structure fills are constructed over pipelines, the first 4 feet of fill over the pipe shall be constructed using light placement and compaction equipment that does not damage the pipe. Heavy construction equipment shall maintain a minimum distance from the edge of the trench equal to the depth of the trench until at least 4 feet of fill over the pipe has been completed.

3.13 FIELD TESTING

- A. **General:** All field soils testing will be done by a testing laboratory of the City's choice at the City's expense except as indicated below.
- B. Where soil material is required to be compacted to a percentage of maximum density, the maximum density at optimum moisture content will be determined in accordance with Method C of ASTM D 1557. Where cohesionless, free draining soil material is required to be compacted to a percentage of relative density, the calculation of relative density will be determined in accordance with ASTM D 4253 and D 4254. Field density in-place tests will be performed in accordance with ASTM D 1556 - Standard Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method, ASTM D 2922 - Standard Test Methods for Density of Soil and Soil-Aggregate in Place By Nuclear Methods (Shallow Depth), or by such other means acceptable to the City.
- C. In case the test of the fill or backfill show non-compliance with the required density, the Contractor shall accomplish such remedy as may be required to ensure compliance. Subsequent testing to show compliance shall be by a testing laboratory selected by the City and paid by the Contractor.
- D. The Contractor shall provide test trenches and excavations including excavation, and trench support for the City's field soils testing operations. The trenches and excavations shall be provided at the locations and to the depths required by the City.

3.14 ASPHALT CONCRETE

- A. **General:** Furnishing, placing, shaping, rolling, and finishing asphalt concrete for resurfacing of pavement after trenching shall be performed in accordance with local jurisdiction's Standards and Section 39 of the Caltrans Standard Specifications.



- B. Wherever required by the governing agency, the Contractor shall place temporary surfacing promptly after backfilling and shall maintain such surfacing for the period of time fixed by said agency before proceeding with the final restoration of improvements.
- C. All paved areas, including curbs and berms, cut or damaged during construction shall be replaced with similar materials and of equal thickness to match the existing adjacent undisturbed areas, except where specific resurfacing requirements have been called for in the Contract Documents or in the permit of the governing agency. All temporary and permanent pavement shall conform to the requirements of the governing agency.
- D. In order to obtain a satisfactory junction with adjacent surfaces, the Contractor shall saw cut back and trim the edge so as to provide a clean, sound, vertical joint before permanent resurfacing of an excavated or damaged portion of pavement. Damaged edges of pavement along excavations and elsewhere shall be trimmed back by saw cutting in straight lines.
- E. Pavement and base shall be constructed to the line, grade and thickness shown on the Construction Drawings. All pavement restoration and other facilities restoration shall be constructed to finish grades compatible with adjacent undisturbed pavement.

3.15 BASE AND SUBGRADE BELOW ASPHALT CONCRETE

- A. The preparation of the subgrade to receive aggregate base course, and preparation and construction of aggregate base for construction of asphalt concrete paving shall conform to the requirements of the applicable sections of the Caltrans Standard Specifications.
- B. Spreading and compacting of base material shall conform to the requirements of Section 26 of the Caltrans Standard Specifications.
- C. Base course shall be maintained until asphalt pavement is placed. Areas of base course which are damaged or do not conform to the requirements herein shall be conditioned, reshaped, and recompacted in accordance with the requirements herein.
- D. Compaction tests will be performed by the City, in accordance with the requirements of the applicable sections of the Caltrans Standard Specifications

3.16 TACK COAT

- A. An asphalt tack coat shall be applied to all existing asphalt concrete or concrete surfaces upon or against which asphalt concrete is to be placed. Application of tack coat shall conform to the requirements of Section 39 of the Caltrans Standard Specifications.

3.17 ASPHALT CONCRETE PAVING



- A. Asphalt concrete paving shall be constructed in accordance with the requirements of Section 39 of the Caltrans Standard Specifications.

3.18 ASPHALT CONCRETE PAVEMENT MARKING AND STRIPING

- A. Asphalt concrete pavement shall be marked and striped to replace all markings and striping disturbed by the paving operation in accordance with Section 84 of the Caltrans Standard Specifications.

END OF SECTION



SECTION 32 01 13
ROLLED SLURRY SEAL, EXISTING PAVEMENT

PART 1 - GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Asphalt emulsion slurry seal as indicated.
- B. Related Requirements:
 - 1. Division 01 - General Requirements.
 - 2. Section 32 01 17 – Asphalt Pavement Repair.

1.02 SUBMITTALS

- A. Shop Drawings: Submit plan indicating extent of areas to be sealed.
- B. Product Data: Submit mix design.

1.03 QUALITY ASSURANCE

- A. Comply with the following as a minimum requirement: Standard Specifications for Public Works Construction, current edition.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Slurry Seal: Provide the following material grades in accordance with Section 203 - Bituminous Materials of the Standard Specification for Public Works Construction, current edition.
 - 1. Emulsified asphalt shall be slow set type grade CSS-1h.
 - 2. Grading of the combined aggregate and percentage of emulsified asphalt shall conform to Type I slurry requirements.
 - 3. Installed slurry seal shall be sufficiently cured to permit vehicle traffic within one day after application.

PART 3 - EXECUTION

3.01 REPAIRING AND ROLLED SLURRY SEAL EXISTING SURFACES

- A. Preparation of Surfaces:



1. Before starting slurry seal operations, existing bituminous surfacing shall be cleaned of loose material, oil spots, vegetation, and other objectionable material.
 2. Dampen surface to receive slurry seal with a light application of water to ensure coverage and proper bond.
 3. Provide adequate protection over manholes, yard boxes, utility vaults and other improvements adjacent to the areas to receive slurry seal. Project Inspector shall inspect surfaces before the installation of slurry seal.
- B. Repair of Existing Surfacing: Cracks more than ½ inch wide, low areas, holes or depressions in existing surfacing shall be repaired as specified in Section 32 01 17: Asphalt Pavement Repair, prior to the installation of slurry seal.
- C. Rolled Slurry Seal: Work shall be performed in accordance to Sub-section 302-4, Slurry, of the Standard Specifications for Public Works Construction, current edition.
1. Roll slurry surfacing with a 10-ton pneumatic roller with a tire pressure of 50 psi and equipped with a water spray system. Roll as soon as the surfacing is sufficiently cured and will not pick up on tires of roller. Surfaced areas shall receive a minimum of two coverage passes by roller. Provide a smooth surface free from ridges or surface variations.
 2. Depressions occurring in cracks after initial slurry seal installation shall be filled with sand slurry before rolling and seal coat installation.

3.02 CLEAN UP

- A. Remove rubbish, debris and waste materials and legally dispose of off the Project site.

3.03 PROTECTION

- A. Protect the Work of this section until Substantial Completion.

END OF SECTION



SECTION 32 01 17

ASPHALT PAVEMENT REPAIR

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

1. Bituminous Surfacing Repair: Areas removed for utility trenches, heaved by tree roots, cracked areas, protruding areas where pavement meets hard surfaces, depressed areas, holes and areas around new structures, and raveled bituminous pavement.
2. Areas heaved by tree roots, cracked areas, holes and trenches, and areas around new structures.

B. Related Sections:

1. Division 01 - General Requirements.
2. Section 01 35 93 - Off-site Improvement Procedures.
3. Section 31 22 00 - Grading.
4. Section 31 23 00 - Earthwork.
5. Section 31 23 16 – Trenching Backfill and Compaction.
6. Section 32 11 16 – Aggregate Base
7. Section 32 01 13 - Rolled Slurry Seal, Existing Pavement.
8. Section 32 12 16 - Asphalt Paving.
9. Section 32 13 13 - Site Concrete Work.

1.02 SUBMITTALS

- A. Shop Drawings: Submit Shop Drawings indicating areas to be repaired.
- B. Product Data: Submit manufacturer's technical data for materials and products.

1.03 QUALITY ASSURANCE

- A. Comply with Standard Specifications for Public Works Construction, current edition.



PART 2 - PRODUCTS

2.01 MATERIALS

- A. Base course materials: Section 32 11 16 – Aggregate Base.
- B. Asphalt paving materials: Section 32 12 16 - Asphalt Paving.
- C. Headers: Section 32 12 16 - Asphalt Paving.

2.02 BITUMINOUS MATERIALS

- A. Provide materials and products of the class, grade or type indicated, conforming to relevant provisions of Section 203 - Bituminous Materials of the latest Standard Specifications for Public Works Construction.

PART 3 - EXECUTION

3.01 PAVEMENT REMOVAL

- A. Remove bituminous and concrete pavement in accordance with applicable provisions of Section 300 - Earthwork of the Standard Specifications for Public Works Construction.
- B. Pavement Heaved By Roots: Remove pavement to limits of distortion and expose roots. Trim roots to provide at least 12-inch clearance to pavement. Coordinate with OWNER's Tree Trimming Department for recommendations and approval prior to trimming roots.
- C. Remove protruding bituminous surfaces flush with the surrounding grade using a suitable tool or equipment so that adjacent finishes are not blackened.
- D. Remove raveled and depressed bituminous pavement to limits indicated or required.
- E. Saw cut existing improvements, trim holes and trenches in bituminous and concrete pavement to permit mechanical hand tampers to compact the fill.
- F. Remove broken concrete by saw cutting. If the required cut line is within 30 inches of a score or joint line or edge, cut and remove to the score, joint line, or edge.

3.02 EXCAVATING, BACKFILLING AND COMPACTING

- A. Conform to requirements in Section 31 23 13 - Excavation and Fill; Section 31 23 16 - Excavation and Fill for Paving; Section 31 23 19 - Excavation and Fill for Structures; or Section 31 23 23 - Excavation and Fill for Utilities, as required.



- B. Where subgrade or base is deemed to be unstable or otherwise unsuitable, excavate such materials to firm earth, and replace with a required material. Install and compact fill materials in accordance with the requirements of Section 31 23 16 Excavation and Fill for Paving.

3.03 HEADERS

- A. Install headers along edge of bituminous surfacing abutting turf, earth, or planting area, unless indicated otherwise.
- B. Install headers so the bottom surface has continuous bearing on solid grade. Where excavation for headers is undercut, thoroughly tamp soil under the header. Compact backfill on both sides of header to the density of the adjacent undisturbed grade.
- C. Fasten headers in place with redwood or Douglas fir stakes of length necessary to extend into solid earth a minimum of 12 inches. Stakes shall be of sound material, neatly pointed, driven vertically, and securely nailed to headers. Space stakes, not to exceed 4 feet on centers with top of stakes set one inch below top of header. Provide a minimum of two 12d galvanized common nails through each stake.
- D. Remove existing headers where new surfacing is installed adjacent to existing surfacing.
- E. Install temporary headers at transverse joints of paving where continuous paving operations are not maintained.
- F. Provide additional stakes and devices as required to fasten headers.

3.04 BASE COURSE

- A. Unless otherwise indicated, base course shall be crushed aggregate base, fine grade, 3 inches thick or equal to thickness of the existing base, whichever is greater.
- B. Fill grade and compact as specified in Section 31 22 00 - Grading.

3.05 RESURFACING

- A. Utility Trenches: Remove loose dirt and backfill with cement-sand slurry allowing for surfacing one inch thicker than existing. Resurface flush with existing adjoining pavement installing the same type of materials and section provided in existing improvements.
- B. Other Areas: Other surface improvements damaged or removed shall be cut to a neat even line and excavated one inch below the bottom of the existing pavement. Resurface by following the original grades and installing the same type of materials provided in existing improvements.



- C. Where bituminous surfacing abuts concrete, masonry, walks or paving, tamp joint smooth, if necessary, as described above to obtain a uniformly even joint, true to line and grade. Tamp and smooth materials before asphalt cools.

3.06 REPAIRING AND RESEALING EXISTING SURFACES

- A. Preparation of Surfaces: Prior to filling cracks, clean existing bituminous surfacing of loose and foreign materials and coat with a film of asphalt emulsion.
- B. Repair of Existing Surfacing:
 - 1. Fill cracks 1/2 inch wide and less with RS-1 emulsion and washed plaster sand or other approved crack filler material. Cracks larger than 1/2 inch wide shall be filled with Type F/Sheet Mix Asphalt Concrete as specified. Cracks shall be filled to the level of adjacent surfacing.
 - 2. Where low areas, holes, or depressions occur in existing surfacing, refer to Section 32 12 16; Asphalt Paving, Article 3.02. Use Type E Mix and feather edge joint flush to the level of adjacent surfacing.
- C. Testing: Flood test entire area in presence of the Project Inspector. Inspect area after waiting one hour. Entire area tested shall be free of standing water or puddles in excess of 0.01 foot. Practical field measurement: 0.01 foot = two quarters stacked.
- D. Surface Seal: After surface has been repaired and tested, install seal coat over entire area indicated. Surface seal shall be as specified in Section 32 12 36 - Seal for Bituminous Surfacing.

3.07 CLEANING

- A. Remove all stains on the Project site and adjacent properties caused by or attributed to the Work of this section.
- B. Remove rubbish, debris, and waste materials and legally dispose of off the Project site.

3.08 PROTECTION

- A. Protect the Work of this section until Substantial Completion.

END OF SECTION



SECTION 32 01 90 OPERATIONS AND MAINTENANCE OF PLANTING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, shall apply to all work in this Section with the same force and effect as though repeated in full herein.

1.2 SUMMARY

- A. After landscape planting and irrigation work have been completed, reviewed and accepted by OAR, furnish materials, labor, transportation, services and equipment necessary to provide landscape maintenance as indicated on Drawings and as specified herein.
- B. Work included in this Section:
 - 1. Continuous maintenance of plant material and irrigation system during specified landscape maintenance period.
- C. Work related in other Sections:
 - 1. Section 32 80 00 & Section 32 84 00 – Planting Irrigation & Planting Irrigation Drip Systems.
 - 2. Section 32 90 00 - Planting.

1.3 LANDSCAPE MAINTENANCE PERIOD

- A. Landscape Maintenance Period: 90 days from Final Acceptance by OAR. Contractor may, at discretion of OAR, be allowed to proceed into landscape maintenance period if planting and irrigation is deemed "substantially complete" by OAR.
- B. Continuously maintain areas involved in this Contract during progress of Work and during landscape maintenance period until Final Acceptance by OAR has been granted.
- C. Improper landscape maintenance or possible poor condition of planting at termination of the scheduled landscape maintenance period may cause landscape maintenance period to be continued at no cost to Owner.
- D. In order to carry out plant establishment work, furnish sufficient labor and adequate equipment to perform Work during landscape maintenance period.



- E. Request an observation of Work by OAR to begin landscape maintenance period after planting and related work has been completed in accordance with Contract Documents. A prime requirement is that groundcover areas be planted and show a consistent and healthy appearance. If such criteria are met to satisfaction of OAR, a field report may be issued to OAR recommending a start date to begin landscape maintenance period.
- F. Any day that Contractor fails to adequately perform landscape maintenance, as determined necessary by OAR, that day will not be credited as one of landscape maintenance working days.
- G. Prior to being placed on landscape maintenance, submit a schedule of activities planned during landscape maintenance period. This schedule needs to be accepted by OAR prior to start of landscape maintenance. Document scheduled changes and obtain acceptance by OAR.

PART 2 - PRODUCTS

2.1 GENERAL

- A. Provide materials used during landscape maintenance work in accordance with requirements of Section 32 90 00 - Planting. Provide fertilizer per soil's test recommendation and following:
 - 1. Shrub and Groundcover Planting Fertilizer:
 - a. Consisting of following minimum percents by weight:
 - 14% Nitrogen
 - 4% Phosphoric Acid
 - 9% Potash
 - 30% Humus
 - 6% Humic Acid
 - 3% Sulfur
 - b. Acceptable Manufacturers:
Gro-Power Hi Nitrogen; Gro-Power (909) 393-3744 or approved equivalent.
- B. Submit a list of materials that are to be used during landscape maintenance that are not specified in Section 32 90 00 in written form to OAR for review and approval.

PART 3 - EXECUTION

3.1 LANDSCAPE MAINTENANCE

- A. Keep landscape areas free of debris.



- B. Keep planted areas weed-free. Cultivate at intervals of not more than 10 days.
- C. Maintain adequate protection of Work area. Repair damaged areas.
- D. Sweep clean paved areas on once a week intervals or less, if deemed necessary.

3.2 TREE AND SHRUB CARE

- A. Watering:
 - 1. Maintain a large enough water basin around trees and shrubs so that enough water can be applied to establish moisture through major root zone.
 - 2. When hand watering, use a water wand to break water force.
 - 3. Replenish wood mulches to reduce evaporation and frequency of watering.
 - 4. Regulate irrigation watering times to minimize erosion and gullyng.
- B. Pruning:
 - 1. Trees:
 - a. Prune Trees To:
 - 1) Select and develop permanent scaffold branches that are smaller in diameter than trunk or branch to which they are attached which have vertical spacing of from 18-inches to 48-inches and radial orientation so as not to overlay one another.
 - 2) To eliminate diseased or damaged growth.
 - 3) To eliminate narrow V-shaped branch forks that lack strength.
 - 4) To reduce toppling and wind damage by thinning out crowns.
 - 5) To maintain growth within space limitations.
 - 6) To maintain a natural appearance and to balance crown with root mass.
 - b. Under no circumstances, will stripping of lower branches "raising-up" of young trees be permitted.
 - c. Retain lower branches in a "tipped-back" or pinched condition with as much foliage as possible to promote caliper trunk growth.
 - d. Cut lower branches flush with trunk only after tree is able to stand erect without staking or other support.
 - e. Remove sucker growth.
 - f. Thin evergreen trees and shape when necessary to prevent wind and storm damage.
 - 2. Shrubs:
 - a. Overall objective of shrub pruning is same as for trees.
 - b. Do not clip shrubs into balled or boxed forms unless approved initially by OAR.
 - c. Make pruning cuts on lateral branches or buds flush with trunk.
 - d. Do not "stub" branches.



- C. Tree Staking and Guying:
 - 1. Restake, tighten and repair damaged ties and guys.
 - 2. Reset to proper grades or upright position, trees that are not in their proper growing position.
 - 3. Inspect stakes and guys to prevent girdling of trunks or branches and to prevent rubbing that may cause bark wounds.

 - D. Weed Control:
 - 1. Keep planted and aggregate areas free of weeds.
 - 2. Use recommended legally approved herbicides.
 - 3. Avoid frequent soil cultivation that destroy shallow surface roots.
 - 4. Replenish lost wood mulch to reduce weed growth.

 - E. Insect and Disease Control:
 - 1. Maintain insect and disease control during landscape maintenance period.

 - F. Fertilization:
 - 1. Fertilize planting areas with application of Gro-Power Hi-Nitrogen 14-4-9, or approved equivalent. Commercial fertilizer at the rate of 7 1/2 pounds per 1,000 square feet 30 days after planting.
 - 2. Repeat fertilizer application at 30-day intervals until end of the landscape maintenance period.

 - G. Replacement of Plants:
 - 1. Replace dead, dying and missing plants of a like size and condition as to those that were originally installed at no cost to Owner.

 - H. Replacement of Soil
 - 1. Replacement of soil to maintain height of 2” below top of planter.
- 3.3 GROUND COVER CARE

- A. Weed Control:
 - 1. Control weeds with chemical systemic spray or by hand so as to cause minimal damage to planted materials.

- B. Watering:
 - 1. Water enough so that moisture penetrates throughout root zone and only as frequently as necessary to maintain healthy growth.

- C. Fertilizing:
 - 1. Fertilize as specified under Tree and Shrub care of this Specification.

- D. Edge groundcover to keep in bounds and trim top growth as necessary to achieve an overall even appearance.



- E. Replace dead, dying and missing plants of a like size and condition as to those that were originally installed.

3.4 IRRIGATION SYSTEM

- A. Provide maintenance of irrigation system consisting of cleaning and adjusting sprinkler nozzles, repairing damaged equipment, servicing valves, programming controllers and other activities required during landscape maintenance period.

3.5 FINAL WALKTHROUGH

- A. At completion of landscape maintenance period, schedule a Final Walkthrough with OAR.
- B. OAR, General Contractor and others deemed necessary by OAR may be present at Final Walkthrough.
- C. If, during Final Walkthrough OAR is of opinion that landscape maintenance has been substantially completed in accordance with this Section, written notice of recommendation to allow Contractor to be released from Project will be submitted to OAR for approval. This report will note any incomplete punch list items from Final Walkthrough and a date on which these items must be completed. Complete remaining punch list items within 5 working days after Final Walkthrough was performed by OAR.

3.6 CLEAN UP

- A. Upon completion of landscape maintenance, remove rubbish, waste and debris resulting from Contractor's operations.
- B. Repair scars, ruts or other marks in landscaped areas caused by Contractor.
- C. Remove equipment, implements of service, and leave Work area in a neat and clean condition. Sweep clean paved areas.

END OF SECTION



SECTION 32 11 16

AGGREGATE BASE

PART 1 – GENERAL

1.01 SUMMARY

- A. This Section specifies the material and work requirements for aggregate base to be furnished and place to the lines, grades, and dimensions in accordance with the Plans, Specifications and as directed by the Engineer.

1.02 RELATED SECTIONS

- A. 31 23 00 – Grading
- B. 31 23 16 – Trenching Backfill and Compaction
- C. 32 12 16 – Asphalt Paving
- D. 32 13 13 – Portland Cement Concrete Paving
- E. 32 14 00 – Unit Paving
- F. 32 16 21 – Concrete Curbs, Gutters, and Walks

1.03 REFERENCES

- A. AASHTO - M147 - Materials for Aggregate and Soil-Aggregate.
- B. ASTM C136 - Method for Sieve Analysis of Fine and Coarse Aggregates.
- C. ASTM D1557 - Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures Using 10 lb. Rammer and 18-nch Drop.
- D. ASTM D2167 - Test Method for Density and Unit Weight of Soil in Place by the Rubber Balloon Method.
- E. ASTM D2487 - Classification of Soils for Engineering Purposes.
- F. ASTM D2922 - Test Methods for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).
- G. ASTM D3017 - Test Method for Moisture Content of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).
- H. ASTM D4318 - Test Method for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.
- I. AASHTO - M-145 Soil Classification Standard Specifications for Public Work construction.



- J. Document Geotechnical Report, dated March 23, 2023 by ENGEO, Inc: Geotechnical Exploration report; bore hole locations and findings of subsurface materials.

1.4 SUBMITTALS

- A. Section 01 33 00 – Submittal Procedures: Procedures for submittals.
- B. Samples: Submit, in air-tight containers, 10 l. sample of each type of fill material to testing laboratory for evaluation.
- C. Submit test reports on each type of imported material.
- D. Materials Source: Submit name of imported materials suppliers and location of material source.

1.5 QUALITY ASSURANCE

- A. Perform Work in accordance with this Section and referenced standards. Maintain one copy of test results on-site.

PART 2 – PRODUCT

2.01 AGGREGATE BASE

- A. Aggregate Base Course: Caltrans Class II Base (Minimum R-Value = 78), ¾” size gradation maximum.

2.02 FIELD QUALITY CONTROL

- A. Section 01410 - Quality Control: Field testing and analysis of aggregate material.
- B. Coarse Aggregate Material - Testing and Analysis: Perform in accordance with ASTM D1557, ASTM D2167, ASTM D2922, ASTM D3017, ASTM D4318 and ASTM C136.
- C. Fine Aggregate Material - Testing and Analysis: Perform in accordance with ASTM D1557, ASTM D2167, ASTM D2922, ASTM D3017, ASTM D4318, and ASTM C136.
- D. If tests indicate materials do not meet specified requirements, excavate existing material, change material or material source, reinstall and retest.
- E. Provide materials of each type from same source throughout Project.

PART 3 – EXECUTION

3.01 AGGREGATE BASE



A. Aggregate base shall be of the type indicated and placed to the limits shown on the plans.

1. $\frac{3}{4}$ " Class 2 Base

The use of reclaimed and recycled material is permitted on this project in accordance with the Standard Specifications. Reclaimed and recycled material shall not be placed at locations where surfacing will not be placed over the aggregate base.

3.1 STOCKPILING

- A. Stockpile materials on site at locations directed by City.
- B. Stockpile in sufficient quantities to meet Project schedule and requirements.
- C. Separate differing materials with dividers or stockpile apart to prevent mixing.
- D. Direct surface water away from stockpile site so as to prevent erosion or deterioration of materials.

3.2 STOCKPILE CLEANUP

- A. Remove stockpile, leave area in a clean and neat condition. Grade site surface to prevent free standing surface water.
- B. If a borrow area is indicated, leave area in a clean and neat condition. Grade site surface to prevent free standing surface water.

PART 4 – MEASUREMENT AND PAYMENT

4.01 MEASUREMENT

A. $\frac{3}{4}$ " Class 2 Base

No separate measurement shall be made for $\frac{3}{4}$ " Class 2 Base.

4.02 PAYMENT

A. $\frac{3}{4}$ " Class 2 Base

Full compensation for $\frac{3}{4}$ " Class 2 Base shall be considered included in the contract prices paid for the various related items of work and no separate payment will be made therefore.



Department of Neighborhood Services and Public Safety
GOLETA TRAIN DEPOT PROJECT

END OF SECTION



SECTION 32 12 16 ASPHALT PAVING

PART 1 – GENERAL

1.01 SUMMARY

- A. This Section specifies the material and work requirements for asphalt paving to be furnished and place to the lines, grades, and dimensions in accordance with the Plans, Specifications and as directed by the Engineer.
- B. Asphalt paving shall include all street paving, and street rehab paving.

1.02 RELATED SECTIONS

- A. 31 23 00 – EARTHWORK
- B. 32 11 16 – AGGREGATE BASE

1.03 REFERENCES

- A. Work shall comply with the rules and regulations of the City of Goleta, Santa Barbara County and the State of California.
- B. Reference to the "Standard Specifications" shall mean the Greenbook.
- C. ASTM Standards.

1.04 PROJECT CONDITIONS

- A. The Contractor shall keep his work area clean, and in a safe and workmanlike condition so that rubbish, waste and debris do not interfere with the work of other trades.
- B. Apply prime and tack coats when ambient temperature is above 50 degrees F and when temperature has not been below 35 degrees F for 12 hours immediately prior to application. Do not apply when base is wet or contains an excess of moisture.
- C. Construct asphalt concrete surface course only when atmospheric temperature is above 40 degrees F and when base is dry. Base course may be placed when air temperature is above 30 degrees F.

1.05 COORDINATION



- A. The Contractor shall notify the General Contractor and all other contractors related to the installation of his Work in ample time, so as to allow sufficient time for those contractors to perform their portion of the Work.

PART 2 – PRODUCTS

2.01 BITUMINOUS MATERIAL

- A. HOT MIX ASPHALT (HMA)

- 1. Base Course:

- Base course shall be Grade B-PG 64-10 and shall conform to Section 203-6, “Asphalt Concrete,” of the Standard Specifications for Public Works Construction (SSPWC, “Greenbook”).

- 2. Wearing (Surface) Course:

- Wearing course shall be Grade D2-PG 64-10 and shall conform to Section 203-6, “Asphalt Concrete,” of the SSPWC.

- B. Coatings

- 1. Prime Coat:

- Prime coat shall be Grade SC-250

- 2. Tact Coat:

- Tact coat shall be Grade PG 64-10

2.02 MIXES

- A. Asphalt concrete for paving shall be in accordance with applicable provisions of the Standard Specifications and related sections and with the requirements contained in this Section.

2.03 PAVEMENT STRIPING PAINT

Provide chlorinated rubber or flat alkyd type traffic marking paint as manufactured by J. D. Bauer, Decratrend, Porter, Dunn-Edward, Sinclair or other approved equal. The color to be selected by Owner will be either yellow or white, except handicap which will be blue and white.

2.04 ASPHALT PAVING MACHINES

- A. Standard, self-propelled, self-contained units having an activated screed or strike-off assembly capable of spreading and finishing courses of bituminous plant mix material in widths compatible to the specified cross-section and thickness required.



PART 3 – EXECUTION

3.01 PROTECTION

- A. The prime coat shall not be applied on a wet surface, when the atmospheric temperature is below 50 degrees F, or when weather conditions are in the opinion of the Owner's Authorized Representative, unsuitable for its application.

3.02 SOIL STERILIZATION

- A. After all fine grading, checking, shaping, and compacting of the subgrade has been completed, and just prior to placing aggregate base course, in truck traffic areas or asphaltic concrete in pedestrian areas, all soil in the area to receive bituminous concrete pavement shall be thoroughly treated with soil sterilant and thoroughly sprinkled to distribute the chemical through the first two or three inches of the subgrade.
- B. The Contractor shall provide all necessary protection to prevent injury to animal, fish, or plant life and property occasioned by the application of the soil sterilant. The Contractor will be held responsible for all application of soil sterilant or the storage of same.
- C. Soil Sterilant shall be applied in accordance with the manufacturer's recommendations.

3.03 SUBGRADE PREPARATION

- A. After demolition and removal of existing paved areas, the ground shall be leveled and proof-rolled to 95 percent compaction. Where 95 percent compaction is not obtained by proof rolling the top 12 inches of the subgrade material shall be scarified and compacted to 95 percent relative compaction. The subgrade shall be graded to the elevations shown on the Plans. Where grade is below plan grade, approved available material selected from excavation shall be added until the appropriate grade is met. Approved material shall comply with 31 23 00, "Earthwork," of the Technical Specifications.
- B. Where the subgrade preparation extends into areas where subgrade material is unsuitable to meet compaction requirements or contains organic material, Contractor shall remove all unsuitable material to a depth of 3 feet below finished grade in accordance with the Section 300-2.2 "Unsuitable Material," of the SSPWC. Imported fill shall be placed where needed and compacted to 90 percent relative compaction. Six inches of Class 2 Base shall be placed above the imported fill and compacted to 95 percent relative compaction. Contractor shall allow time for Engineer to perform quality assurance testing of the imported fill and Class II Base prior to placing finish paving.



3.04 STREET PAVING

- A. Asphalt concrete paving shall be of the type indicated and placed to the limits shown on the plans.
- B. Placement of asphalt concrete shall be in accordance with Section 302-5, "Asphalt Concrete Pavement," of the SSPWC
- C. Should it become necessary to remove and dispose of material from the prepared earthen subgrade and to again prepare the subgrade to accommodate a thicker pavement structure than assumed on the Plans, the volume of such excavation will be measured and paid for be in accordance with Special Provisions.
- D. Should it become necessary to add earthen embankment to the prepared subgrade and to again prepare the subgrade to accommodate a thinner pavement structure than assumed on the plans, the volume for such embankment and prepared subgrade shall be measured and paid for be in accordance with the Special Provisions.

3.05 FINISHING ROADWAY

- A. The work performed in connection with finishing roadway shall conform to the provisions of Section 301, "Treated Soil, Subgrade Preparation, and placement of Base Materials," of the SSPWC and these specification.

3.06 SURFACE REQUIREMENTS

- A. The surface of the paving shall be in accordance with the lines, grades and cross-sections shown on the Drawings, and shall be free from ruts, humps, depressions and irregularities.
- B. For the purpose of testing the finished surface course, a 12-foot straight edge will be used, except that a 10-foot straight edge may be used on vertical curves. The straight edge shall be held in contact with the surface in successive positions parallel to the road centerline. The entire area will be checked from one side to the other, by advancing along the pavement in successive stages of not more than half the length of the straight edge.
- C. Except at intersections or at changes of grade, any irregularities which vary more than 1/4 inch from the lower edge of the straight edge shall be corrected at the Contractor's own expense. The transverse slope of the finished surface shall contain no depressions greater than 1/4 inch below the lower edge of the straight edge when laid transverse to the road centerline.



- D. Irregularities which may develop before the completion of rolling shall be remedied by loosening the surface mix and removing or adding materials as may be required. Should any irregularities or defects remain after the final compaction, the material shall be promptly removed and sufficient new material laid to form a true and even surface.
- E. All minor surface projections, ridges, indentations and minor honeycombed surfaced shall be corrected smooth to grade by rolling or other means as requested by Owner's Representative, at the Contractor's own expense.

3.07 PAVEMENT STRIPING

- A. Symbol striping shall be defined as indicated on the Drawings. Areas to be painted shall be cleaned with compressed air immediately prior to painting. Apply paint in (2) coats. Use mechanical applicators to ensure that lines are straight where required to be. Ensure that finished coats have a total dry film thickness of 2.5 mils. Stripes shall be 4-inches wide and shall have clearly defined edges. Deviations greater than 1/2 inch in 20 feet shall be corrected by obliterating and repainting. Paint directional arrows, traffic directions and handicap markings as indicated on the Drawings.

3.08 INSPECTIONS

- A. Pavement mixtures shall have a minimum stability of 35 per applicable state specifications. Certified laboratory tests shall be furnished to indicate compliance with these requirements.
- B. The Owner reserves the right to have measurements taken of base course and bituminous surfacing as actually installed.

3.09 TESTING FOR DRAINAGE

- A. Before final acceptance of the work, the Contractor shall, in the presence of the Owner's representative, test all paved areas for correct water runoff by flooding with water in such quantity as to prove correct shaping of the paving to the satisfaction of the Owner's representative.
- B. Pavement in areas where water remains standing after testing shall be removed and reconstructed to the correct grade. Feathered pavement edges resulting from patching will not be permitted. All costs for such work shall be borne by the Contractor.

3.10 QUALITY CONTROL

- A. Trucks used for hauling bituminous mixtures shall have tight, clean, smooth beds coated with a minimum amount of paraffin oil, lime solution, or other approved material to prevent the mixture from adhering to the beds.



- B. Should the mixture, at the plant or in place, show an excess or deficiency of bitumens how injury or damage due to burning or overheating, or show an improper combination of aggregates, as determined by Owner's Representative, the mixture shall be rejected and shall be disposed of by the Contractor at his own expense.

3.11 CLEANUP

- A. Upon completion of the work under this Section, the Contractor shall remove all rubbish, waste and debris resulting from his operations offsite or as directed by the Owner. Remove all equipment and implements of service, and leave the entire work area in a neat, clean, and Owner-accepted condition.

PART 4 – MEASUREMENT AND PAYMENT

4.01 MEASUREMENT

- A. Asphalt Paving shall be measured by the ton, determined as provided in Section 302-5.9, “Measurements and Payment,” of the SSPWC. Quantity shall be confirmed by submittal of weigh tickets for all asphalt concrete material used on the project.

4.02 PAYMENT

- A. The contract price paid per ton for Asphalt Paving shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in Asphalt Paving including subgrade preparation, tact coats, mixing, placing, shaping, compacting, and finishing the Asphalt Paving, complete in place, as specified in the SSPWC and these Technical Specifications, and as directed by the Engineer.

END OF SECTION



SECTION 32 13 13 PORTLAND CEMENT CONCRETE PAVING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, shall apply to all work in this Section with the same force and effect as though repeated in full herein.

1.02 DESCRIPTION OF WORK

- A. Furnish materials, labor, transportation, services, and equipment necessary to install portland cement concrete paving as indicated on Drawings and as specified herein.
- B. Work included in this Section:
 - 1. Decorative colored concrete paving.
 - 2. Natural colored concrete paving.
 - 3. Materials and accessories.
 - 4. Preparation of subgrade, subbase, or base.
 - 5. Formwork.
 - 6. Placing concrete reinforcement.
 - 7. Placing concrete.
 - 8. Joints.
 - 9. Finishing.
 - 10. Curing and protection.
 - 11. Installation of joint seals.
 - 12. Field quality control.
- C. Work related in other Sections:
 - 1. Section 32 14 00 – Unit Pavers.
 - 2. Section 32 84 00 – Planting Irrigation.
 - 3. Section 03 31 01 – Landscape Concrete Formwork.
 - 4. Section 03 20 01 – Landscape Concrete Reinforcement.
 - 5. Section 03 30 01 – Landscape Cast-in-Place Concrete.
 - 6. Section 05 70 01 – Landscape Decorative Metal.
 - 7. Section 07 92 01 – Landscape Joint Sealants.
 - 8. Section 32 11 16 – Aggregate Base

1.03 DEFINITIONS

- A. The Owner in this Section will refer to the City of Goleta.



- B. The Owner's Authorized Representative (OAR) in this Section will refer to CM as the Point of Contact, retained by the Owner.

1.02 REFERENCES

- A. ACI 117 - Standard Tolerances for Concrete Construction and Materials.
- B. ACI 318 - Building Code Requirements for Reinforced Concrete.
- C. ACI 211.1 - Standard Practice for Selecting Proportions for Normal, Heavyweight, and Mass Concrete.
- B. ACI 304R - Recommended Practice for Measuring, Mixing, Transporting and Placing Concrete.
- C. ACI 305R - Hot Weather Concreting.
- D. ACI 309R - Guide for Consolidation of Concrete.
- E. ASTM A 615 - Deformed and Plain Billet-Steel for Concrete Reinforcement.
- F. ASTM C 31 - Standard Specification for Making and Curing Concrete Test Specimens in the Field.
- G. ASTM C 33 - Standard Specification for Concrete Aggregates.
- H. ASTM C 39 - Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens.
- I. ASTM C 94 - Standard Specification for Ready Mix Concrete.
- J. ASTM C 143 - Standard Specification for Hydraulic Hydrated Cement Concrete.
- K. ASTM C 150 - Standard Specification for Portland Cement.
- L. ASTM C 172 - Standard Practice for Sampling Freshly Mixed Concrete.
- M. ASTM C 231 - Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method.
- N. ASTM C 260 - Standard Specification for Air-Entraining Admixtures for Concrete.
- O. ASTM C 309 - Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete.
- P. ASTM C 494 - Standard Specification for Chemical Admixtures for Concrete.
- Q. ASTM C 1064 - Standard Test Method for Temperature of Freshly Mixed Portland Cement Concrete.



1.03 SUBMITTALS

- A. In accordance with Section 01340 - Shop Drawings, Samples and Product Data: Procedures for submittals.
- B. Provide Shop Drawings for the Following:
 - 1. Paving Jointing and Pour Sequence Plan - submit six blueprints indicating the following:
 - a. Proposed layout of contraction, construction and isolation joints. Clearly delineate the three different joint types.
 - b. Layout of paving types as indicated on Drawing Paving Schedule. Give overall dimensions of each paving type.
 - c. Concrete pour sequence. Indicated sequence of paving pour installation.
- C. Paving Mix Designs: Provide documentation for each paving type specified on Drawings that will enable Owner to better match replaced concrete:
 - 1. Laboratory and Cement Test Reports: Submit six (6) copies of laboratory test reports for concrete materials and a certificate with each concrete mixer truck, stating mix design, PSI rating, slump, water and cement quantity, cement/water ratio, fine and coarse aggregate and color additives.
 - 2. Cement:
 - a. Manufacturer and plant location.
 - b. Cement type, i.e. Type I, II or V.
 - 3. Admixtures:
 - a. Manufacturer and plant location.
 - 4. Sand:
 - a. Source and type.
 - 5. Aggregates:
 - a. Source and type.
 - 6. Signed certification from a licensed structural engineer.
- D. Submit specification data “Cut Sheets” for integral color, color hardener, release agent, plastic dowel sleeves, chemical stain,

1.04 QUALITY ASSURANCE

- A. Pre-Bid Conference: Prior to submitting bid, attend pre-bid conference with Owner and to review requirements and artistic effect desired.
- B. Mock-Ups:
 - 1. Install a 4-foot wide x 4-foot long mock-up of sample paving indicating all joint types and finishes at location as directed by The OAR.
 - 2. This mock-up will be the standard from which future work will be judged.
 - 3. Remove Mock-up completely prior to Final Payment.



- C. Concrete Manufacturer Qualifications: Manufacturer of ready-mixed concrete products complying with ASTM C 94 requirements for production facilities and equipment.
- D. Installer: Provide evidence to indicate successful experience in providing patterned concrete work similar to that specified herein and can demonstrate successful experience through past project documentation and references.
 - 1. Experience: Minimum 5 years experience in the installation of seeded concrete paving.
 - 2. Demonstration of Experience: 10 projects which have been completed within the past 36 months utilizing similar products, scope, and complexity.
 - 3. Supervision: Perform placement and finishing of concrete work under supervision of a person having a minimum of 5 years of experience in placement and finishing of products specified herein.
 - 4. Submit qualifications to Owner for information purposes. Submit a resume of Project Manager and Superintendent who will be overseeing the Work.
- E. Slip Resistance: Provide a finish surface slip resistance coefficient of friction equal or greater than 0.6 for flat surfaces and 0.8 for ramps, when tested in accordance with ASTM F 489.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. In accordance with Section 01 6000 – “Products, Materials, Equipment & Substitutes ” - Product Handling and Protection: Transport, handle, store, and protect.
- B. Store materials in dry and protected locations and protect from damage.
- C. Do not change brand of cement nor source of aggregate during course of Work.

1.06 SITE CONDITIONS

- A. Do not place concrete when subbase surface temperature is less than 40 degrees F, nor when surface is wet.

1.07 COORDINATION

- A. In accordance with Section 01 3113 - Project Coordination.
- B. Ensure that irrigation sleeves, electrical conduit, outlets and other utility elements are accommodated and as-built located prior to pouring concrete.



1.08 INSPECTION OF SITE

- A. Verify conditions at site that affect Work of this Section, and take field measurements as required. Report major discrepancies between Drawings and field dimensions to Owner prior to commencing work.

PART 2 - PRODUCTS

2.01 FORMS

- A. Form Materials: Plywood, metal, metal-framed plywood, or other acceptable panel-type materials to provide full-depth, continuous, straight, smooth exposed surfaces.
- B. Provide metal forms, weighing not less than 18 pounds per linear foot for pavement 8 inches thick, not less than 20 pounds per linear foot for pavement 9 inches thick, and not less than 22 pounds per linear foot for pavement 10 inches thick, and in no case less than 7/32 inch thick.
- C. Provide side forms having a depth equal to the prescribed edge thickness of the pavement, without horizontal joints.
- D. Provide forms having a base not less than 8 inches wide and a flanged tread or top surface not less than 2 inches wide. For multiple lanes, provide base width at least equal to height.
- E. Use flexible or curved forms for curves of 200-foot or less radius.
- F. Provide forms not less than 10 feet long except where shorter forms are necessary for curves. Use metal keyway forms for the full length of roadway form to which attached. Provide wood bulkheads for the full width of pavement lane equipped with keyway form.
- G. Provide holes for bars and dowel assemblies where required.
- H. Provide at least three stake pockets to accommodate a 1-inch diameter stake in each section of form 10 feet or more in length, and at least two such pockets in each section of form less than 10 feet long.
- I. Provide each section of form with a positive locking device that will secure it tightly to the adjoining section.
- J. Provide forms free from warp and of sufficient strength to resist, without visible springing or settlement, all loads applied in the paving process.



2.02 REINFORCING MATERIAL

- A. Synthetic Fiber Reinforcement: 100% pure synthetic polypropylene fibers, engineered and designed for secondary reinforcement of concrete slabs, complying with ASTM C 1116 - Type III. Maximum length of fibers to be 3/4-inch.
 - 1. Acceptable Manufacturers:
 - a. Fibermesh: Stealth (800)348-9348.
 - b. Forta Fiber: Microfiber (800)245-0306.
 - c. W.R. Grace: Monofiliment (800)433-0020.
 - d. Bomanite; Monofiliment (800)854-2094.
- B. Reinforcing Bars and Tie Bars: ASTM A 615 - Grade 60, deformed.
- C. Plain, Cold-Drawn Steel Wire: ASTM A 82.
- D. Fabricated Bar Mats: Welded or clip-assembled steel bar mats, ASTM A 184. Use ASTM A 615, Grade 60 steel bars.
- E. Construction Joint Dowel Bars: Plain steel bars, ASTM A 615, Grade 60. Cut bars true to length with ends square and free of burrs.
- F. Epoxy-Coated Construction Joint Dowel Bars: ASTM A 775 over ASTM A 615, Grade 60 plain steel bars.
- G. Joint Dowel Alignment Sleeves: Polypropylene plastic sleeve dowel to ensure proper alignment of steel dowels.
- H. Hook Bolts: ASTM A 307, Grade A bolts, internally and externally threaded. Design hook bolt joint assembly to hold coupling against pavement form and in position during concrete operations, and to permit removal without damage to concrete or hook bolt.
- I. Supports for Reinforcement: Chairs, spacers, dowel bar supports and other devices for spacing, supporting, and fastening reinforcing bars in place. Use wire bar-type supports.
 - 1. Benches and Chairs: ACI 318
 - 2. Use supports with sand plates or horizontal runners where base material will not support chair legs.

2.03 CONCRETE MATERIALS

- A. Portland Cement: ASTM C 150 - Type I.
- B. Concrete Aggregate: ASTM C 33 - Class 4, and as follows. Provide aggregates from a single source:



- C. Water: Clean and free from injurious amounts of oils, acids, alkalis, salts, organic materials, or other substances that may be deleterious to concrete or reinforcement.

2.04 ADMIXTURES

- A. Provide concrete admixtures that contain not more than 1 percent chloride ions and no calcium chloride.
- B. Water-Reducing Admixture: ASTM 4 94, Type A.
- C. High-Range Water-Reducing Admixture: ASTM C 494, Type F or Type G.
- D. Water-Reducing and Retarding Admixture: ASTM C 494, Type D or E.
- E. Acceptable Manufacturers:
 - 1. Water-Reducing Admixtures:
 - a. ChemMasters Corp; Chemtard.
 - b. Cormix Construction Chemicals; Type A Series.
 - c. Euclid Chemical Company; Eucon WR-75.
 - 2. High-Range Water-Reducing Admixtures:
 - a. Anti-Hydro Co. Inc.; Super P.
 - b. Cormix Construction Chemicals; Cormix 2000, PSI Super.
 - c. Euclid Chemical Company; Eucon 37.
 - 3. Water-Reducing and Acceleration Admixtures:
 - a. Conspec Marketing & Manufacturing Company; Q-Set.
 - b. Cormix Construction Chemicals; Gilco Accelerator or Lub NCR.
 - c. Euclid Chemical Company; Accelguard 80.
 - 4. Water-Reducing and Retarding Admixtures:
 - a. Cormix Construction Chemicals; Type D Series.
 - b. Euclid Chemical Company; Eucon Retarder 75.
 - c. W.R. Grace Company; Daratard-17.

2.05 CURING MATERIALS

- A. Absorptive Cover: Burlap cloth made from jute or kenaf, weighing approximately 9 oz. per sq. yd., complying with AASHTO M 182, Class 2.
- B. Moisture-Retaining Cover: One of the following complying with ASTM C 171:
 - 1. Waterproof paper.
 - 2. Polyethylene film.
 - 3. White burlap-polyethylene sheeting.
- C. Clear, Waterborne Membrane-Forming Curing Compounds:



1. Provide curing materials that have a maximum volatile organic compound (VOC) rating of 350 g/l.
- D. Evaporation Control: Monomolecular film-forming compound applied to exposed concrete slab surfaces for temporary protection from rapid moisture loss.
1. Clear, Waterborne Membrane-Forming Curing Compounds Acceptable Manufacturers:
 - a. Anti-Hydro Company; Clear Cure Water Base.
 - b. The Burke Company; Spartan Cote WB.
 - c. Cormix Construction Chemicals; Sealco VOC.
 2. Acceptable Evaporation Control Manufacturers:
 - a. Conspec Marketing and MFG. Company; Aquafilm.
 - b. Euclid Chemical Company; Eucobar.
 - c. L&M Construction Chemicals; E-Con.

2.06 RELATED MATERIALS

- A. Integral Color: Integrally color concrete in colors, blending mixtures and application rates necessary to create colors, gradations, and variations to match Owner's mock-up.
- B. Bonding Agent: Acrylic or styrene butadiene.
- C. Epoxy Adhesive: ASTM C 881, two-component material suitable for dry or damp surfaces. Provide material type, grade, and class to suit requirements.
- D. Miscellaneous Materials: Miscellaneous specialty materials, acids, or other materials required to achieve the specialized effects indicated on the mock-up or as required by Owner.
- E. Acceptable Manufacturers: Subject to compliance with requirements, products that may be incorporated in Work include, but are not limited to, the following:
1. Integral Color:
 - a. L.M. Scofield Company; Chromix.
 - b. Davis; Integral Color.
 - c. Colorful; Integral Color.
 2. Clear Penetrating Sealer (water based):
 - a. L.M. Scofield; Cementone Clear Sealer.
 - b. Davis; Clear Sealer.
 - c. Lambert; Clear Sealer.
- F. Concrete Finish Retarder: Spray applied, film forming, water based top surface retarder, calibrated for specific sized aggregate and finish requirements.
1. Acceptable Materials: "Top Cast" by Grace Construction Products. Customer Service Center - 888-336-9303, www.graceconstructionproducts.com or Owner approved equivalent.



- G. Colored Aggregate Toppings: Special topically applied aggregates for all areas indicated as such on Drawings.
 - 1. Provide materials containing specific combinations of specially ground and graded colored stones, glass and aggregates for topical application and embedment on freshly placed concrete.
 - 2. Provide specific mixes and manufacturers as indicated on the Drawings and SCRRA's furnished samples when provided.
- H. Heavy-duty Metallic Aggregate Topping:
 - 1. Anvil-Top 300: by Master Builders.
 - 2. Super Euco-Top: by Euclid Chemical Co.
- I. Slip-Resistant Abrasive Topping:
 - 1. Aluminum oxide or a blend with not less than 58% aluminum oxide and approximately 14/36 mesh grading.
 - a. A-H Emery Emerundum: by AntiHydro International Inc.
 - b. Lithochrome Abrasive: by L.M. Scofield Co.
 - c. Aluminum Oxide Surface Treatment: by The Burke Company.
 - d. FricTex H: by Sonneborn Building Products.

2.07 CONCRETE

- A. Prepare design mixes for each type and strength of normal-weight concrete by either laboratory trial batch or field experience methods as specified under ACI 301.
- B. Proportion mixes according to ACI 211.1 and ACI 301 to provide normal-weight concrete with the following properties:
 - 1. Compressive Strength at 28 days: 3,000 psi.
 - 2. Maximum Water-Cement Ratio at Point of Placement: 0.55.
 - 3. Slump Limit at Point of Placement: 3-inches. Slump limit for concrete containing high-range water-reducing admixture: Not more than 8-inches after adding admixture to site-verified 2 to 3-inch slump concrete.
 - 4. Air Content: 2 1/2 to 4 1/2 percent.
- C. Synthetic Fiber Reinforcement: 1 lb. per cu. yd of mix added only at batch plant.
- D. Adjustment to Concrete Mixes: Mix design adjustments may be requested by Contractor when characteristics of materials, project conditions, weather, test results, or other circumstances warrant.

2.08 CONCRETE MIXING

- A. Ready-Mixed Concrete: Comply with requirements of ASTM C 94.
 - 1. Reduce mixing and delivery time when air temperature is between 85 degrees F and 90 degrees F and reduce mixing and delivery time from 1-1/2 hours to 75 minutes.



2. Reduce mixing and delivery time to 60 minutes when air temperature is above 90 degrees F.

PART 3 - EXECUTION

3.01 SURFACE PREPARATION

- A. Prepare subgrade per geotechnical report.
- B. Verify that paving subgrade extends 1-foot beyond the outside edge of paving or curbing and has a positive outfall for trapped water.
- C. Proof-roll prepared subbase surface to check for unstable areas and verify need for additional compaction. Do not begin paving work until such conditions have been corrected and are ready to receive paving.
- D. Remove loose material from compacted subbase surface immediately before placing concrete.
- E. Provide necessary chairs or supports, and maintain position of reinforcing bars.
- F. Wet a minimum of 2 inches of sand subgrade prior to placing concrete.
- G. Place 1" minimum of washed concrete sand over prepared subgrade.

3.02 EDGE FORMS AND SCREED CONSTRUCTION

- A. Set, brace, and secure edge forms, bulkheads, and intermediate screed guides for paving to required lines, grades, and elevations.
- B. Install forms to allow continuous progress of Work and so that forms can remain in place at least 24 hours after placing concrete.
- C. Check completed formwork and screeds for grade and alignment to following tolerances:
 1. Top of Forms: Not more than 1/8-inch in 10-feet.
 2. Vertical Face on Longitudinal Axis: Not more than 1/4-inch in 10-feet.
- D. Clean forms after each use and coat with form release agent to ensure separation from concrete.



3.03 PLACING REINFORCEMENT

- A. Comply with Concrete Reinforcing Steel Institute’s recommended practice for “Placing Reinforcing Bars” for placing and supporting reinforcement.
- B. Clean reinforcement of loose rust and mill scale, earth, ice, and other bond-reducing materials.
- C. Arrange, space, and securely tie bars and bar supports to hold reinforcement in position during concrete placement. Maintain minimum cover over reinforcement.
- D. Install fabricated bar mats in lengths as long as practicable. Handle units to keep them flat and free of distortions. Straighten bends, kinks, and other irregularities or replace units as required before placement. Set mats for a minimum 2-inch overlap to adjacent mats.

3.04 CONCRETE PLACEMENT

- A. Inspection: Before placing concrete, inspect and complete formwork installation, reinforcing steel, and items to be embedded or cast in. Notify other trades to facilitate installation of their work.
- B. Moisten subbase to provide a uniform dampened condition at the time concrete is placed. Do not place concrete around manholes and other utility structures until they are at the required finish elevation and alignment.
- C. Comply with requirements and with ACI 304R for measuring, mixing, transporting, and placing concrete.
- D. Deposit and spread concrete in a continuous operation between construction joints. Do not push, drag, or use vibrators to move concrete into place.
- E. Consolidate concrete by mechanical vibrating equipment supplemented by hand-spading, rodding, or tamping. Use equipment and procedures to consolidate concrete complying with ACI 309 R.
 - 1. Consolidate concrete along face of forms with an internal vibrator. Keep vibrator away from joint assemblies, reinforcement, or side forms. Use only square-faced shovels for hand-spreading and consolidation. Prevent dislocating reinforcing and dowels.
- F. Screed paved surfaces with a straightedge and strike off. Use bull floats or darbies to form a smooth surface plane before excess moisture or bleed water appears on surface. Do not further disturb concrete surfaces prior to beginning finishing operations.



- G. Hot-Weather Placement: Place concrete complying with ACI 305R when hot weather conditions exist.
1. Cool ingredients before mixing to maintain concrete temperature at time of placement 90 degrees F and below. Mixing water may be chilled or chopped ice may be used to control temperature, provided water equivalent of ice is calculated to total amount of mixing water.
 2. Cover reinforcing steel with water-soaked burlap if it becomes too hot, so that steel temperature will not exceed the ambient air temperature immediately before embedding in concrete.
 3. Fog-spray forms, reinforcing steel, and subgrade just before placing concrete. Keep subgrade moisture uniform without standing water, or soft or dry areas.
- H. Cold Weather Placement: Adhere to ACI 306R - Cold Weather Concreting for installing concrete paving during cold weather.

3.05 CONCRETE FINISHING

- A. General: Wetting of concrete surfaces during screeding, initial floating, or finishing operations is prohibited.
- B. Float Finish: Begin the second floating operation when bleed-water sheen has disappeared and the concrete surface has stiffened sufficiently to permit operations. Float surface with power-driven floats, or by hand floating if area is small or inaccessible to power units. Finish surfaces to true planes. Cut down high spots, and fill low spots. Refloat surface immediately to uniform granular texture.
1. Medium-to-Fine-Textured Broom Finish: Draw a soft bristle broom across float-finished concrete surface perpendicular to line of traffic to provide a uniform, fine-line texture.
 2. Medium-to-Coarse-Textured Broom Finish: Provide a coarse finish by striating float-finished concrete surface 1/16 to 1/8 inch (1.6 to 3 mm) deep with a stiff-bristled broom, perpendicular to line of traffic.
- C. Concrete Retarder Application:
1. Grace Construction Products (888) 336-9303.
 2. Provide for containment of retarder during finishing procedures so as to protect adjacent improvements. Repair damage to adjacent improvements at no cost to Owner.
 3. Perform retardant finish in two separate stages:
 - a. First Stage: Primary wash to take place within 3 days after concrete pour. Apply retarder with a low-pressure sprayer at a rate of 250-350 sq.ft./ gal. per manufacturers' requirements.
 - b. Second stage: Wash with water rinse/light broom or pressure wash with power equipment within 6 – 24 hours after the retarder is applied. Retarder removal intervals depend on strength of mix, exposed



aggregate size and desired washing techniques. Earlier washing for light etch finishes may be necessary.

D. Exposed Aggregate Finish:

1. Water-wash;
 - a. Surface layer of mortar is removed with a light, controlled spray of water and scrubbed with a stiff brush to expose aggregate fines.
2. Retardant;
 - b. Surface layer of mortar is removed by applying an approved retardant to the finished concrete, to effect the setting of the top mortar paste, and then removing it by water-wash and/or brushing to expose aggregate to the desired finish.

E. Seeded Aggregate Finish:

1. An exposed aggregate finish achieved by surface applying a decorative aggregate. Aggregate is to be uniform in size and thoroughly washed prior to installation. Evenly distribute aggregate across the surface and tamp into the concrete with a hand float or darby. Apply immediately after the concrete has been bull-floated and tamp until completely embedded in concrete surface. Expose aggregate by water-wash technique or with retardant finish process.

F. Sand Blast Finish:

1. Blasting Operations and Requirements:
 - a. Apply sandblasted finish to exposed surfaces where indicated.
 - b. Perform sand blasting at least 72 hours after placement of concrete.
2. Coordinate with formwork construction, concrete placement schedule, and formwork removal to ensure that surfaces to be blast finished are blasted at the same age for uniform results.
3. Determine type of nozzle, nozzle pressure, and blasting techniques required to match the SCRRA's control samples.
4. Abrasive-blast corners and edges of patterns carefully, using back-up boards, to maintain uniform corner or edge line.
5. Depths of Cut: Use an abrasive grit of the proper type and gradation to expose aggregate and surrounding matrix surface, to match the SCRRA's control samples as follows:
 - a. Brush Sand Blast Finish: Remove cement matrix to expose face of fine aggregate, no reveal (slab accents - must maintain non-slip coefficient for walking surfaces).
 - b. Light Sand Blast Finish: Expose fine aggregate with occasional exposure of coarse aggregate; max 1/16-inch reveal (wall accents).
 - c. Medium Sand Blast Finish: Generally expose coarse aggregate; 3/16-inch to 1/4-inch reveal.
6. Surface Continuity: Perform sand blast finishing in as continuous an operation as possible, utilizing the same work crew to maintain continuity of finish on



each surface or area of work. Maintain patterns of variances in depths of cuts as indicated.

7. Construction Joints: Use technique acceptable to the SCRRA to achieve uniform treatment of construction joints.
8. Protection and Repair:
 - a. Protect adjacent materials and finishes from dust, dirt, and other surface or physical damage during abrasive-blast finishing operations. Provide protection as required and remove from site at completion of the work.
 - b. Repair or replace other work damaged by finishing operations.
9. Clean-Up: Maintain control of concrete chips, dust, and debris in each work area. Clean up and remove such material at the completion of each day of operation. Prevent migration of airborne materials by use of tarpaulins, wind breaks, and similar containing devices.

G. Finish surface texture to match texture and pattern as indicated in Owner mock-up.

3.06 JOINTING

- A. Construct contraction, construction, and isolation joints to match irregular edge pattern of stamping tools with faces perpendicular to surface plane of concrete.
- B. Contraction Joints: Provide contraction joints as indicated on Drawings (or to not exceed 10-feet in either direction), to minimize random surface cracking and as indicated on approved Paving Jointing and Pour Sequence Plan provided by Contractor. Match irregular pattern of stamping tools, sectioning concrete into areas as indicated on Drawings. Construct contraction joints for a depth equal to at least one fourth of concrete thickness, as follows:
 1. Hand-tooled Joints: Form contraction joints in fresh concrete by grooving and finishing each joint edge with a radiused jointer tool.
 2. Machine-Sawn Joints: Machine-sawn joints are not permitted unless otherwise indicated on Drawings. Provide saw cut joints as soon as concrete has sufficient strength to support sawing equipment.
 3. Do not exceed 1/4-inch in joint width.
- C. Doweled Construction Joints: Construct doweled construction joints at end termination's of paving where paving operations are stopped for more than 1/2 hour, unless paving terminates at an isolation joint and at all edges of different paving types. Locations of doweled construction joints to adhere as closely as possible to Contractor's Paving Jointing and Pour Sequence Plan.
 1. Steel Dowels:
 - a. Provide smooth steel dowels across construction joints to reduce differential movement across the joint. Utilize smooth steel dowels based upon the following:
 - 1) 6-inch Thick Pavement:
 - (i) Diameter: 3/4-inch.



- (ii) Length: 24-inches.
 - (iii) On-center Spacing: 18-inches.
 - 2) 4-inch Thick Pavement:
 - (i) Diameter: 1/2-inch.
 - (ii) Length: 24-inches.
 - (iii) On-center Spacing: 18-inches.
 - b. To assist in correct alignment of steel dowels along construction joints use plastic dowel sleeves:
 - 1) Insure that wood edge forms are true to line and grade prior to installing plastic dowel sleeves.
 - 2) Install plastic dowel sleeves on wood forms at the specified on-center dowel spacing, centered between top and bottom of wood form.
 - 3) Contact plastic dowel sleeve manufacturer for complete installation requirement.
 2. Do not continue tie-reinforcement through sides of strip paving.
 3. Use a bond breaking agent on cured concrete edges that will be joined with fresh concrete.
 4. Immediately before new concrete is placed, wet construction joint and remove standing water.
 5. Tool edges of construction joints to match decorative field jointing.
- D. Isolation Joints: Provide isolation joints to permit horizontal and vertical movement between slab and fixed vertical edges such as building walls, steps, columns, and other vertical restraints. Locations of isolation joints to adhere as closely as possible to Contractor's Paving Jointing and Pour Sequence Plan.
 1. Provide 1/4-inch thick pre-molded asphalt impregnated fiber board, backup, and caulking along edges of isolation joints.
 2. Extend pre-molded asphalt impregnated fiber board to full-width and depth of joint, not less than 1/4-inch or more than 1-inch below finished surface of slab.
 3. Furnish pre-molded asphalt impregnated fiber board in one-piece lengths for full width being placed. Where more than one length is required, lace or clip pre-molded asphalt impregnated fiber board sections together.
 4. Protect top edge of pre-molded asphalt impregnated fiber board during concrete placement with a metal, plastic, or other temporary cap. Remove protective cap after concrete has been placed on both sides of joint to facilitate installation of caulking backup.
 5. Joints for Non-Stamped Special Flooring: Tool to profile and dimensions detailed; fill with specified grout, tool grout to a concave profile.

3.07 CONCRETE PROTECTION AND CURING

- A. Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with the recommendations of ACI 305R for hot weather and ACI 306R for cold weather protection during curing.



- B. Evaporation Control: In hot, dry, and windy weather, protect concrete from rapid moisture loss before and during finishing operations with an evaporation-control material. Apply according to manufacturer's instructions after screeding and bull floating, but before floating.
- C. Begin curing after finishing concrete but not before free water has disappeared from concrete surface.
- D. Curing Methods: Cure concrete by moisture curing, moisture retaining cover curing, curing compound, or a combination of following:
 - 1. Moisture Curing: Keep surfaces continuously moist for not less than 7 days with following materials:
 - a. Water.
 - b. Continuous water fog spray.
 - c. Absorptive cover, water saturated, kept continuously wet.
 - 2. Cover concrete surfaces and edges with a 12-inch lap over adjacent absorptive covers.
 - 3. Curing Compound:
 - a. Apply uniformly in continuous operation by power spray or roller according to manufacturer's directions.
 - b. Recoat areas subjected to heavy rainfall within 3 hours after initial application.
 - c. Maintain continuity of coating and repair damage during curing period.

3.08 REPAIRS AND PROTECTION

- A. Remove and replace concrete paving that is broken, damaged, defective, or does not meet the requirements of this Section.
- B. Protect concrete from damage until Final Payment. Exclude traffic from paving for at least 14 days after placement. When construction traffic is permitted, maintain paving as clean as possible by removing surface stains and spillage of materials as they occur.
- C. Maintain concrete paving free of stains, discoloration, dirt, and other foreign material until Final Payment.

3.09 CLEANUP

- A. At completion of Work, remove concrete stains from adjacent work, including but not limited to dissimilar paving types, walls, columns, railing posts, light fixtures, plant materials, to satisfaction of Owner.



3.10 PAVING FINISH SCHEDULE

- A. Provide paving finishes, as indicated on Paving Schedule on Drawings.

PART 4 MEASUREMENT AND PAYMENT

- 1.01 General: Measurement and payment for portland cement concrete paving will be either by the lump-sum method or by the unit-price method as determined by the listing of the bid item for portland cement concrete paving indicated in the Bid Schedule of the Bid Form.
- 1.02 Lump sum: If the Bid Schedule indicates a lump sum for portland cement concrete paving, the lump-sum method of measurement and payment will be in accordance with Section 01 29 73.
- 1.03 Unit Price: If the Bid Schedule indicates a unit price for portland cement concrete paving, the unit-price method of measurement and payment will be as follows:
 - A. Measurement:
 - 1. Portland cement concrete pavement will be measured for payment by the square yard for each specified class of concrete and thickness.
 - 2. Reinforcing steel, dowels, and tie bars will be measured separately for payment as specified in Section 03 20 00 - Concrete Reinforcing.
 - 3. Subgrade paper, transverse expansion joints, weakened-plane joints, and joints sawed within 5 feet of volunteer cracks, longitudinal and transverse construction joints, and longitudinal weakened-plane joints will not be measured separately for payment, and all costs in connection therewith will be considered included in the measurement of portland cement concrete pavement.
 - B. Payment: Portland cement concrete paving will be paid for at the indicated Contract unit prices for the computed quantities as determined by the measurement Method specified in Article 1.03.C.1.

END OF SECTION



SECTION 32 14 00

UNIT PAVING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, shall apply to all work in this Section with the same force and effect as though repeated in full herein.

1.02 SUMMARY

- A. Furnish materials, labor, transportation, services, and equipment necessary to furnish and install concrete pavers as indicated on Drawings and as specified herein.
- B. Work included in this Section:
 - 1. Sand setting bed.
 - 2. Installation of concrete pavers.
 - 3. Sand jointing.
 - 4. Cement treated base.
- C. Work related in other Sections:
 - 1. Division 1 Section "Sustainable Design Requirements" for additional LEED requirements.
 - 2. Section 32 11 16 – Aggregate Base
 - 3. Section 32 13 14 – Portland Cement Concrete Paving (Pedestrian)
 - 4. Sections 32 80 00 & 32 84 00 - Planting Irrigation & Planting Irrigation - Drip Systems.
 - 5. Section 03 10 00 – Concrete Formwork.
 - 6. Section 03 30 00 – Cast-in-Place Concrete.
 - 7. Section 07 92 00 – Joint Sealants.

1.03 REFERENCES

- A. American Society of Testing Materials (ASTM):
 - 1. C33: Specification for Concrete Aggregates.
 - 2. C67: Method of Sampling and Testing Brick and Structural Clay Tile.
 - 3. C136: Method for Sieve Analysis for Fine and Coarse Aggregates.
 - 4. C140: Method of Sampling and Testing Concrete Masonry Units.
 - 5. C936: Specification for Solid Concrete Paving Units.



1.04 SUBMITTALS

- A. In accordance with Section 01 33 00 - Shop Drawings, Samples and Product Data: Procedures for submittals.
- B. Submit five samples of each concrete paver specified.
- C. Submit sieve analysis for grading of bedding and joint sand.
- D. Submit test results for compliance of concrete pavers to requirements of ASTM C936 from an independent testing laboratory.

1.05 MOCK-UPS

- A. Install a 10-foot wide x 10-foot long mock-up of sample paving at location as directed by OAR.
- B. This mock-up will be the standard from which future work will be judged.
- C. Remove Mock-up completely prior to Final Payment.

1.06 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. In accordance with Division 1.
- B. Packaging: Pavers shall be packaged on pallets in such a way as to minimize damage during transportation, delivery, storage and handling.
- C. Rate of supply: Deliver pavers to the construction site in such quantities and at such times as will assure the continuity of the installation.
- D. Storage: Place packaged pavers on firm, level, and smooth surfaces and at least 6 in. above the ground. Place stored pallets so that identification marks are visible.
- E. Damaged pavers: No paver, on part thereof, used in the permanent works shall exhibit obvious signs of damage on the top surface, including but not limited to chipping, cracking and staining. Such damage shall be grounds for rejection.
- F. Bedding sand: Deliver and stockpile bedding sand in such a way as to minimize contamination and segregation. Stockpiles are to be located on firm, level, and smooth surfaces that do not channel water into the sand.
- G. Jointing sand: Deliver jointing sand in bags and store in such a way as to minimize contamination.
- H. Joint sand stabilizer: Deliver and store in strict accordance with the manufacturer's instructions and maintain a temperature range of 50 degrees to 105 degrees F.



1.07 QUALITY ASSURANCE

- A. Pre-Bid Conference: Prior to submitting bid, attend pre-bid conference with OAR and to review requirements.
- B. Mock-Ups:
 - 1. Contractor Mock-Ups: All concrete paving shall match approved sample mock-up.
- C. Paver Manufacturer Qualifications: Manufacturer of pre-cast concrete products complying with ASTM C 936 requirements for production facilities and equipment.
- D. Installer: Provide evidence to indicate successful experience in providing patterned concrete work similar to that specified herein and can demonstrate successful experience through past project documentation and references.
 - 1. Experience: Minimum 5 years experience in the installation of patterned concrete paving.
 - 2. Demonstration of Experience: 10 projects which have been completed within the past 36 months utilizing similar products, scope, and complexity.
 - 3. Supervision: Perform placement and finishing of concrete work under supervision of a person having a minimum of 5 years of experience in placement and finishing of products specified herein.
 - 4. Submit qualifications to OAR for information purposes. Submit a resume of Project Manager and Superintendent who will be overseeing the Work.
- E. Slip Resistance: Provide a finish surface slip resistance coefficient of friction equal or greater than 0.6 for flat surfaces and 0.8 for ramps, when tested in accordance with ASTM F 489.

1.08 SITE CONDITIONS

- A. Do not install sand or pavers during rain.

1.09 COORDINATION

- A. In accordance with Division 1 - Project Coordination.
- B. Ensure that irrigation sleeves, electrical conduit, outlets and other utility elements are accommodated and as-built located prior to pouring concrete.
- C. Notify contractor's related to installation of his work in ample time, so as to allow sufficient time for those contractors to perform their portion of work.

1.10 INSPECTION OF SITE



- A. Verify conditions at site that affect Work of this Section, and take field measurements as required. Report major discrepancies between Drawings and field dimensions to OAR prior to commencing Work.

PART 2 - PRODUCTS

2.01 CONCRETE PAVERS

- A. Concrete pavers shall be in accordance with patterns as indicated on Drawings.
- B. Supply only concrete pavers that are manufactured and supplied by a member of Concrete Paver Institute.
- C. Acceptable Manufacturers:
 - 1. Belgard – (909) 355-6422
 - 2. Hanover Pavers – (800) 426-4242
 - 3. Wausau Tile – (800) 388-8728
 - 4. Techno-Bloc – (877) 832-4625
 - 5. Acker-Stone – (800) 258-2353
 - 6. Or OAR approved equivalent
- D. Refer to construction schedule on Drawings for concrete paver shape, color and thickness.
- E. Concrete used on this project to meet following requirements set forth in ASTM C936, Standard Specification for Concrete Pavers:
 - 1. Minimum average compression strength: 8,000 psi.

2.02 SAND BEDDING COURSE

- A. Clean, non-plastic, free from deleterious or foreign matter, and be natural or manufactured from crushed rock in accordance with ASTM C136.
- B. Sand particles to be sharp and conform to grading requirements of ASTM C33 as indicated below:

<u>Sieve Size</u>	<u>Percent</u>
3/8 inch	100
No. 4	95 to 100
No. 8	80 to 100
No. 16	54 to 85
No. 30	25 to 60
No. 50	10 to 30
No. 100	2 to 10



2.03 JOINT SAND STABILIZER

- A. Manufacturers: The joint sand stabilizing material shall be one of the following.
1. Surebond SB-1300 as manufactured by Surebond Inc., 500 E. Remington Road, Schaumburg, IL, 60173 (t: 847-843-1818).
 2. BP Pro, Irvine, CA 92623 (t: 866 612-7776)

2.04 CEMENT TREATED BASE

A. General

Cement Treated Base (CTB) shall consist of aggregate, cement and water uniformly mixed in a central plant, transported to the project, spread, compacted, shaped, finished and cured in accordance with these specifications. It shall conform to the lines, grades, thicknesses and typical cross-section shown on the plans.

B. Materials

1. Cement shall comply with the latest specifications for Portland cement – ASTM C150 (Type I) or Portland-Pozzolan-ASTM C595 (Type IP).
2. Water shall be free from substances deleterious to the hardening of the Cement Treated Base.
3. Aggregate may be any granular material or combinations of aggregates that will, when mixed with adequate amounts of cement and water, produce laboratory mix design Unconfined Compression Test strength of 400 psi at 7 days in accordance with the ASTM D-1633 Method “A.” The preceding tests will utilize the Moisture-Density Relation as determined by ASTM D-558: AASHTO T-134. The maximum size of aggregate shall pass a 2-inch sieve.

- C. Equipment Cement Treated Base may be constructed with any combination of machines or equipment that will produce the results meeting these specifications.

PART 3 – EXECUTION

3.01 INSPECTION

- A. Verify that sub-base is dry and ready to support sand, concrete pavers and anticipated vehicle loads.
- B. Verify that gradients and elevations of sub-base are correct.
- C. Verify location, type, installation and elevations of edge restraints around perimeter area to be paved.
- D. Beginning of concrete paver installation means acceptance of base and edge restraints.



3.02 INSTALLATION OF SAND BEDDING

- A. Spread sand evenly over sub-base course and screed to a consistent 1-inch thickness.
- B. Do not disturb screeded sand.
- C. Place sufficient sand to stay ahead of laid concrete pavers.
- D. Lay concrete pavers in patterns as indicated on Drawings. Maintain straight pattern lines, unless otherwise noted on Drawings.
- E. Joints between concrete pavers: butt joints.
- F. Fill gaps at edges of paved area with cut concrete pavers or edge units.
- G. Cut concrete pavers along its edge with a double-bladed splitter or masonry saw.
- H. Use a low amplitude, high frequency plate vibrator capable of producing 3,000 to 5,000 lbs. centrifugal compaction force to vibrate concrete pavers into sand bedding course.
- I. Vibrate concrete pavers, sweeping dry sand into joints and vibrate until they are fully settled. This will require at least two or three passes with vibrator. Do not vibrate within 3-feet of unrestrained edges of concrete pavers.
- J. Sweep off excess sand when Work is complete.
- K. Do not allow final surface elevations to deviate more than 3/8-inches under a 10-foot long straight edge.
- L. Verify that surface elevations of concrete pavers are at least 1/8 to 1/4-inches above adjacent drainage inlets, paving edge restraints or gutters.

3.03 JOINTING SAND STABILIZER

- A. On completion of the entire pavement installation the surface shall be swept so that the sand level is at the bottom of the chamfers.
- B. The surface shall be made clean and free from oil, laitance, dust and any loose material prior to the application of joint sand stabilizer. The surface and joint sand should be dry for its full depth prior to commencing work.
- C. The joint sand stabilizer sealer shall be applied evenly at the appropriate coverage as follows: Surebond shall be applied from a low pressure regulated backpack sprayer at a coverage rate of 150sqft/gallon. Work the excess material into the joints using a floor squeegee ensuring that all joints are adequately flooded and that no surplus material is left on the surface. This work to be in strict accordance with the manufacturer's recommendations.
- D. The treated area shall be protected from rain or moisture and not be trafficked for 24 hours after completing to the stabilizer. Work shall cease if inclement weather (rain or



strong wind) will affect the stabilizing operation and shall not recommence until the joint sand has dried sufficiently to allow penetration of the sealant.

3.04 INSTALLATION OF CEMENT TREATED BASE

- A. Before other construction operations are begun, the area to be paved shall be graded and shaped as required to receive the Cement Treated Base in conformance with the grades, lines, thicknesses and typical cross-section shown on the plans. Unsuitable subgrade soil or material shall be removed and replaced with suitable soil. The subgrade shall be firm and able to support without displacement of the construction equipment and the compaction hereafter specified. Soft or Yielding subgrade shall be corrected and made stable before construction proceeds.
- B. The aggregate, cement and water shall be mixed in a pug mill. The plant shall be equipped with feeding and metering devices that will add the aggregate, cement and water into the mixer in the specified quantities to produce a mixture that will meet or exceed the mix design criteria as stated above. The aggregate and the cement shall be mixed sufficiently to prevent cement balls from forming when the mix water is added. The mixing time shall be sufficient to assure an intimate, uniform mixture of aggregate, cement and water. The percentage of moisture in the aggregate, at the time of cement application shall be the amount that assures a uniform and intimate mixture of aggregate and cement during mixing operations. It shall not exceed the specified moisture content required for adequate compaction. The mixture shall be hauled to the paving areas in trucks having beds cleaned of deleterious material.
- C. The mixture shall be placed on a moistened subgrade in a uniform layer by any approved method of spreading that will deposit the required quantity per lineal foot, without segregation, to produce a uniformly compacted base conforming to the grade and cross-section. Not more than 30 minutes shall elapse between placement of CTB in adjacent lanes at any location except at longitudinal and transverse construction joints. No CTB mixture shall be placed when the subgrade is frozen or when the air temperature is less than 40°F in the shade. Compaction shall start as soon as possible after spreading. The elapsed time between the addition of water to the CTB mixture and the start of compaction shall not exceed 60 minutes under normal conditions. Laboratory tests may be required to verify changes in compaction time limits. At the start of compaction, the percentage of moisture in the mixture shall not be more than one percentage point below or two percentage points above the specified optimum moisture content, and shall be less than that compaction and finishing. The specified optimum moisture content and density shall be determined in the field by a Moisture-Density Test. AASHTO T 134 or ASTM D 556, on representative samples of Cement Treated Base moisture obtained from the area prior to compaction. Prior to compaction, the mixture shall then be compacted uniformly to the specified density. During compaction operations, initial shaping may be required to obtain uniform compaction and required grade and cross- section.



- D. When initial compaction is completed, the surface of the Cement Treated Base shall be shaped to the required lines, grades and cross-section. The moisture content of the surface material shall be maintained at not less than its specified optimum moisture content during finishing operations. If any reshaping of the surface is necessary, it shall be lightly scarified to remove any compaction planes, scales or smooth surfaces left by equipment. Final compaction shall then be continued until uniform and adequate density is obtained. The CTB shall be uniformly compacted to the minimum of 95% of maximum density. Compaction and finishing shall be done in such a manner as to produce, in not longer than two hours, a smooth, dense surface free of compaction planes, cracks, ridges, or loose material.
- E. Finished portions of Cement Treated Base that are traveled on by equipment used in construction an adjoining section shall be protected in such a manner as to prevent equipment from marring or damaging completed work. Cement Treated Base shall be protected against freezing for seven days after its construction and until it has hardened. Curing shall be performed in accordance with manufacturer's recommendations. Construction Joints: At the end of each day's construction a transverse construction joint shall be formed by cutting back in to the completed work to form a full depth vertical face free of loose or shattered material. The section may be opened to all traffic provided that the Cement Treated Base has hardened sufficiently to prevent marring or distorting of the surface by equipment or traffic.
- F. The contractor shall be required within the limits of his contract to maintain the Cement Treated Base in good condition until all the work has been completed and accepted. Maintenance shall include immediate repairs of any defects that may occur. This work shall be done by the contractor at his own expense and repeated as often as may be necessary to keep the area continuously intact. Faulty work shall be corrected. Any low areas shall be remedied by replacing the material for the full depth of treatment rather than by adding a thin layer of Cement Treated Base to the completed work.

3.05 FIELD QUALITY CONTROL

- A. After removal of excess sand, re-check surface elevations for conformance to Drawings. Make adjustments as necessary.

3.06 CLEAN UP

- A. Upon completion of Work, remove rubbish, waste and debris resulting from operations off-site. Remove equipment and implements of service, and leave entire work area in a neat, clean, and Owner-accepted condition.

END OF SECTION



SECTION 32 16 00

CURBS, GUTTERS, SIDEWALKS AND DRIVES

PART 1 – GENERAL

1.01 SUMMARY

- A. This work includes furnishing materials, labor, transportation, services, and equipment necessary to furnish and install Minor Concrete as indicated on drawings and as specified in these Technical Specifications.
- B. Minor concrete shall include sidewalks, gutters, curbs, combined curbs and gutters, curb ramps, and curb ramp aprons.

1.02 RELATED SECTIONS

- A. Section 31 23 00 – Earthwork
- B. Section 32 11 16 – Aggregate Base
- C. Section 32 12 16 – Asphalt Paving
- D. Section 32 13 13 – Portland Cement Concrete Paving
- E. Section 32 17 26 – Detectable Warning Surfaces
- F. Section 03 20 00 – Concrete Reinforcement

PART 2 – PRODUCTS

2.01 CONCRETE

- A. Concrete for sidewalks, gutters, curbs, combined curbs and gutters, platform slab, utility pads, curb ramps and street rehabilitation shall conform to Section 201-1, "Portland Cement Concrete," of the SSPWC and these Technical Specifications.
- B. Minor concrete shall be 520-C-2500 in accordance with Section 201-1, "Portland Cement Concrete," of the SSPWC. Where Contractor proposes the use of a pumper for concrete placement the concrete shall be 520-C-2500P.
- C. Where cast in place detectable warning tiles are installed in the concrete for curb ramps shall have a slump range of 4 to 7 inches.

2.02 JOINT FILLER

- A. Shall be premolded, nonextruding and resilient filler and comply with Section 201-3, "Expansion Joint filler and Joint Sealants," of the SSPWC.



2.03 JOINT SEALANT

- A. Low modulus silicone or polyurethane joint sealant shall be furnished in a one-part formulation. Acid cure sealants shall not be used. The compound shall be compatible with the surface to which it is applied, match the color of the adjacent paving and shall be installed according to the manufacturer's requirements.
- B. Acceptable products include:
Vulkem 45 Sealant, as manufactured by Tremco, Beachwood, OH (216) 292-5000
Pecora – NR-201 as manufactured by Pecora Corporation, 800-355-8817
- C. The joint sealant shall be formulated to cure rapidly enough to prevent flow after application on grades of up to 15 percent.
- D. Contractor shall submit a Certificate of Compliance for the joint sealant to the Engineer prior to installation. The Certificate shall also be accompanied with a certified test report of the results of the required tests performed on the sealant material within the previous 12 months prior to proposed use. The Certificate and accompanying test report shall be provided for each lot of silicone joint sealant prior to use on the project.

2.04 CURING COMPOUNDS

- A. Curing compound shall be water-based, V.O.C. compliant, clear, non-staining and shall not inhibit the bond or performance of bonding agents, grouts, sealers or other coatings & toppings that will later be applied to the concrete surface.
- B. Acceptable materials include:
Atlas Quantum-Cure, as manufactured by Atlas Tech Products, San Diego, CA
Conspec 21, as manufactured by Conspec, Kansas City, KS

2.05 BONDING AGENT

- A. Bonding agent shall be a 100% solids, two-component, high-modulus, moisture tolerant epoxy bonding agent conforming to ASTM C-881, Type I, II & V, Grade 2, Class B & C.
- B. Acceptable materials include:
Sikadur 32 Hi Mod, as manufactured by Sika Corporation, Lyndhurst, NJ
Atlas LPL Epoxy Bonder, as manufactured by Atlas Tech Products, San Diego, CA

2.06 EPOXY ADHESIVE

- A. Epoxy adhesive shall be a 100% solids, two component, high modulus, moisture tolerant, non-sag, structural epoxy gel adhesive conforming to ASTM C-881, Type I, II, IV & V, Grade 3, Class B & C.



- B. Acceptable materials include:
 - Sikadur 31 Hi-Mod Gel, as manufactured by Sika Corporation, Lyndhurst, NJ
 - Atlas Hi Mod Epoxy Gel, as manufactured by Atlas Tech Products, San Diego, CA

PART 3 – EXECUTION

3.01 GENERAL

- A. All minor concrete elements shall be in accordance with Section 303-5, “Concrete curbs, Walks, Gutters, Cross gutters, Alley Intersections, Access Ramps, and Driveways,” of the SSPWC, these Technical Specifications, and the Plans.

3.02 PREPARATION OF SUBGRADE

- A. After demolition and removal of existing surface and obstructions, the ground shall be leveled and proof-rolled to 95 percent compaction. Where 95 percent compaction is not obtained by proof rolling the top 12 inches of the subgrade material shall be scarified and compacted to 95 percent relative compaction. The subgrade shall be graded to the elevation shown on the Plans. Where the grade is below plan grade, approved available material selected from excavation shall be added until the appropriate grade is met.

3.03 SIDEWALKS

- A. Where indicated sidewalks shall receive scoring in accordance with the dimensions shown on the plans.

3.04 CURB RAMPS

- A. All curb ramps shall be constructed with a slope of no greater than 8.33 percent (1:12) and no less than 5% (1:20), and include the specified detectable warning surfaces as shown on the Plans and concrete aprons where shown on the Plans. Transition from bottom of ramp to gutter or apron shall be smooth with no abrupt change resulting in a flush condition between surfaces. No scoring of concrete shall be applied to top of ramp. Curb ramp slopes shall be checked using a properly calibrated digital level. Curb ramps that do not meet the slope criteria shall be removed and reinstalled at no cost to the Owner. Any deviations from the SSPWC, the City Standards, these Technical Specifications, or the Plans will require approval by the Engineer.
- B. Curb ramps shall be both City standard and modified City standard as indicated on the Plans.
- C. Concrete shall have a broom finish.



3.05 CONSTRUCTION CONTACT JOINTS

- A. A transverse (contact) construction joint shall be constructed at the end of each day's work where concrete work is to continue or where concrete placement is interrupted for more than 30 minutes, to coincide with the next weakened plane joint location.
- B. If sufficient concrete has not been mixed to form a slab to match the next weakened plane joint, when an interruption occurs, the excess concrete shall be removed and disposed of back to the last preceding joint. The cost of removing and disposing of any excess concrete shall be at the Contractor's expense. Any excess material shall become the property of the Contractor and shall be properly disposed of.
- C. A metal or wooden bulkhead (header) shall be used to form the joint. The bulkhead shall be designed to accommodate the installation of dowel bars.

3.06 WEAKENED PLANE AND EXPANSION JOINTS

- A. The joint sealant detail for transverse and longitudinal joints, as shown on the plans, shall apply to all weakened plane joints. All weakened plane joints shall be constructed by the sawing method unless otherwise shown on plans. Should grinding or grooving be required over or adjacent to any joint after sealant has been placed, the joint materials shall be completely removed and replaced at the Contractor's expense. All joints shall have a sealant recessed below the final finished surface as shown on the plans.
- B. Seven days after the concrete pavement placement and not more than 4 hours before placing joint filler, backer rods and joint sealant materials, the joint walls shall be cleaned by means as necessary to completely remove from the joint all objectionable material such as soil, asphalt, curing compound, paint and rust. After cleaning the joint, all traces of sand, dust and loose material shall be removed from and near the joint for a distance along the pavement surfaces of at least 2 inches on each side of the joint by the use of a vacuum device. Surface moisture shall be removed at the joints by means of compressed air or moderate hot compressed air or other means approved by the Engineer. Drying procedures that leave a residue or film on the joint wall shall not be used. Sandblasting equipment shall have a maximum nozzle diameter size of 0.24 in \pm 0.04 in and a minimum pressure of 90 psi.
- C. Joint filler and backer rod shall be installed as shown on the plans. Joint filler and backer rod shall be installed when the temperature of the Portland Concrete Pavement is above the dew point of the air and when the air temperature is 40^oF (4^oC) or above. Joint filler and backer rod shall be installed when the joints to be sealed have been properly patched, cleaned and dried, as determined by the Engineer. Methods of placing joint filler and backer rod that leave a residue or film on the joint walls, shall not be used.
- D. Immediately after placement of joint filler and backer rod, joint sealant shall be placed in the clean, dry, prepared joints as shown on the plans. The joint sealant shall be



applied by a mechanical device with a nozzle shaped to fit inside the joint to introduce the sealant from inside the joint. Adequate pressure shall be applied to the sealant to ensure that the sealant material is extruded evenly and that full continuous contact is made with the joint walls. After application of the sealant the surface of the sealant shall be recessed as shown on the plans.

- E. Any failure of the joint material in either adhesion or cohesion of the material will be cause for rejection of the joint. The finished surface of joint sealant shall conform to the dimensions and allowable tolerances shown on the plans. Rejected joint materials or joint material whose finished surface does not conform to the dimensions shown on the plans, as determined by the Engineer, shall be repaired or replaced, at the Contractor's expense, with joint material that conforms to the requirements.
- F. After each joint is sealed, all surplus joint sealer on the pavement surface shall be removed. Traffic shall not be permitted over the sealed joints until the sealant is tack free and set sufficiently to prevent embedment of debris into the sealant.

3.07 CURING COMPOUNDS

- A. A curing compound shall be applied to all freshly placed and finished concrete surfaces.

3.08 BONDING AGENT

- A. A bonding agent shall be placed following surface preparation in all locations where new concrete, polymer modified concrete overlay, grout or mortar is applied to existing concrete surfaces.

3.09 EPOXY ADHESIVE

- A. An epoxy adhesive shall be utilized to bond new precast concrete units to existing concrete structures and pavements.

PART 4 – MEASUREMENT AND PAYMENT

4.01 MEASUREMENT

Measurement for quantities of minor concrete, by type, shall be as follows:

- A. Curbs, Gutters, and combined Curbs and Gutters shall be measured for payment by the linear foot.
- B. Sidewalk shall be measured for payment by the cubic foot.
- C. Curb Ramps shall be measured for payment by the square foot.



4.02 PAYMENT

Payment for minor concrete, by type, shall be as follows:

GENERAL

All payments for minor concrete shall include subgrade preparation, forming, bonding, concrete, joints, sealant, finishing, curing and any ancillary items unless otherwise indicated and as specified below.

A. CURBS, GUTTERS, AND COMBINED CURBS AND GUTTERS

The contract price paid per linear foot for Concrete Curbs, Gutters, Combined Curbs and Gutters, and Platform Curb and Gutter shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in Curbs, Gutters, and Combined Curbs and Gutters, complete in place, including class 2 base, as specified in the SSPWC, the City Standards, these Technical Specifications, the Plans, and as directed by the Engineer.

B. SIDEWALK

The contract price paid per cubic foot for Sidewalk shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in Sidewalk, complete in place, as specified in the SSPWC, these Technical Specifications, the Plans, and as directed by the Engineer.

C. CURB RAMPS

The contract price paid per square foot for Curb Ramp, shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals and for doing all the work involved in constructing Curb Ramps, complete in place, as shown on the plans, and as specified in SSPWC, and these Technical Specifications, and as directed by the Engineer.

END OF SECTION



SECTION 32 17 13

PRECAST CONCRETE PARKING BUMPERS

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

1. Precast concrete parking bumpers.
2. Parking bumper anchors.

B. Related Requirements:

1. Division 01 - General Requirements.
2. Section 03 30 00 – Cast-in-Place Concrete.
3. Section 32 12 16 - Asphalt Paving
4. Section 32 13 13 – Site Concrete Work.

1.02 SUBMITTALS

- A. Shop Drawings: Submit plans of the parking areas showing the location of the bumpers and installation details.
- B. Product Data: Submit manufacturers' product data for precast bumpers and bumper anchors.
- C. Material Sample: Submit one concrete bumper and one anchor.

1.03 QUALITY ASSURANCE

- A. Precast parking bumpers shall be manufactured for the intended purpose by a company or firm specializing in the manufacture of precast concrete parking appurtenances.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Precast Concrete parking Bumper: 28 day minimum compressive strength of 3,500 psi., reinforced with two No. 4 steel reinforcing bars, minimum. Provide chamfered



corners, drainage slots on underside and predrilled holes for dowel-anchoring to substrate.

1. Configuration: Half octagonal.
 2. Size: 7-1/2 inches wide by 5 inches high by 70-inches long, or as indicated on drawings.
- B. Bumper Anchors: # 6 reinforcing bar, 18 inches long, two per bumper.
- C. Adhesive and Sealant: As recommended by bumper manufacturer and approved by the OWNER's Office of Environmental Health and Safety (OEHS).
1. Epoxy adhesive for fastening bumpers to concrete or asphalt pavements.
 2. Adhesive for Bonding Dowel to Wheel Stop.
 3. Sealant for capping off and sealing the rebar at the predrilled holes.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Install bumpers as indicated on the Drawings. On bituminous paving, install anchors through pavement and into the ground a minimum of 12 inches. On concrete pavement, install bumpers in a continuous bed of adhesive.
- B. Fill predrilled anchoring holes with sealant, at both concrete and asphalt pavements.

3.02 CLEAN UP

- A. Remove rubbish, debris, and waste materials and legally dispose of off the Project site.

3.03 PROTECTION

- A. Protect the Work of this section until Substantial Completion.

END OF SECTION



SECTION 32 17 23 PAVEMENT MARKINGS

PART 1 – GENERAL

1.01 SUMMARY

A. The following items are covered in this Section:

1. Surface Preparation
2. Pavement Striping and Markings
 - a. For the purposes of these Specifications, traffic striping shall be defined as longitudinal centerlines and lane lines that separate traffic lanes in the same or opposing direction of travel, and longitudinal edge lines that mark the edge of the traveled way or the edge of the lanes. Curb markings shall be defined as colored markings on the curb that denote parking restrictions. Pavement markings shall be defined as transverse markings which include, but are not limited to, word and symbol markings, limit lines (stop lines), crosswalks, shoulder markings, parking stall markings, and railroad crossing markings.
3. Raised Pavement Markers
4. Removal of Pavement Markings on Roads and Parking Areas

1.02 REFERENCE SPECIFICATIONS, CODES, AND STANDARDS

- A. Standard Specifications for Public Works Construction, The “Greenbook”
Manual on Uniform Traffic Control Devices (MUTCD)
American Association of State Highway and Transportation Officials (AASHTO)
- B. Standards:
1. AASHTO M 247 Standard Specification for Glass Beads Used in Pavement Markings
 2. AASHTO M 248 Standard Specification for Ready-Mixed White and Yellow Traffic Paints
 3. ASTM D471 Standard Test Method for Rubber Property - Effect of Liquids
 4. ASTM D476 Dry Pigmentary Titanium Dioxide Pigments



5. ASTM D522/D522M Mandrel Bend Test of Attached Organic Coatings
6. ASTM D638 Standard Test Method for Tensile Properties of Plastics
7. ASTM D695 Standard Test Method for Compressive Properties of Rigid Plastics
8. ASTM D711 No-Pick-Up Time of Traffic Paint
9. ASTM D823 Standard Practices for Producing Films of Uniform Thickness of Paint, Coatings, and Related Products on Test Panels
10. ASTM D1652 Standard Test Method for Epoxy Content of Epoxy Resins
11. ASTM D2074 Standard Test Methods for Total, Primary, Secondary, and Tertiary Amine Values of Fatty Amines by Alternative Indicator Method
12. ASTM D2240 Standard Test Method for Rubber Property - Durometer Hardness
13. ASTM D2621 Standard Test Method for Infrared Identification of Vehicle Solids from Solvent-Reducible Paints
14. ASTM D2697 Volume Nonvolatile Matter in Clear or Pigmented Coatings
15. ASTM D3335 Low Concentrations of Lead, Cadmium, and Cobalt in Paint by Atomic Absorption Spectroscopy
16. ASTM D3718 Low Concentrations of Chromium in Paint by Atomic Absorption Spectroscopy
17. ASTM D3924 Standard Specification for Environment for Conditioning and Testing Paint, Varnish, Lacquer, and Related Materials
18. ASTM D3960 Determining Volatile Organic Compound (VOC) Content of Paints and Related Coatings
19. ASTM D4060 Abrasion Resistance of Organic Coatings by the Taber Abraser
20. ASTM D4061 Standard Test Method for Retroreflectance of Horizontal Coatings
21. ASTM D4280 Extended Life Type, Nonplowable, Raised, Retroreflective Pavement Markers
22. ASTM D4383 Standard Specification for Plowable, Raised Retroreflective Pavement Markers



23. ASTM D4505 Standard Specification for Preformed Retroreflective Pavement Marking Tape for Extended Service Life
24. ASTM D4541 Standard Test Method for Pull-Off Strength of Coatings Using Portable Adhesion Testers
25. ASTM D6628 Standard Specification for Color of Pavement Marking Materials
26. ASTM D7234 Standard Test Method for Pull-Off Adhesion Strength of Coatings on Concrete Using Portable Pull-Off Adhesion Testers
27. ASTM E1347 Standard Test Method for Color and Color Difference Measurement by Tristimulus (Filter) Colorimetry
28. ASTM E1710 Standard Test Method for Measurement of Retroreflective Pavement Marking Materials with CEN-Prescribed Geometry Using a Portable Retroreflectometer
29. ASTM E2177 Standard Test Method for Measuring the Coefficient of Retroreflected Luminance (RL) of Pavement Markings in a Standard Condition of Wetness
30. ASTM E2302 Standard Test Method for Measurement of the Luminance Coefficient Under Diffuse Illumination of Pavement Marking Materials Using a Portable Reflectometer
31. ASTM G154 Standard Practice for Operating Fluorescent Light Apparatus for UV Exposure of Nonmetallic Materials

1.03 CONTRACTOR SUBMITTALS

- A. CONTRACTOR shall submit to the City, for review, all materials specified herein in accordance with Section 013300 - Contractor Submittals.
- B. Product Data: Submit paint formulation for each type of paint.
- C. Manufacturer Instructions:
 1. Submit instructions for application temperatures, eradication requirements, application rate, line thickness, type of glass beads, and bead embedment and application rate.
 2. Submit detailed instructions on installation requirements, including storage and handling procedures.
- D. Manufacturer's Certificate: Certify that product meet or exceed specified requirements.



1.04 QUALITY ASSURANCE

- A. General
 - 1. Manufacturer's Certificate: Certify that product meet or exceed specified requirements.
 - 2. Test and Evaluation Reports: Indicate source and acceptance test results according to AASHTO M247.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Section 016000 – Product Requirements: Requirements for transporting, handling, storing, and protecting products.
- B. Inspection: Accept materials on Site in manufacturer's original packaging and inspect for damage.
- C. Storage:
 - 1. According to manufacturer instructions.
 - 2. Paint:
 - a. Invert containers several days prior to use if paint has been stored more than two months.
 - b. Minimize exposure to air when transferring paint.
 - c. Seal drums and tanks when not in use.
- D. Inspection: Accept materials on Site in manufacturer's original packaging and inspect for damage.

1.06 AMBIENT CONDITIONS

- A. Do not apply materials if surface and ambient temperatures are outside temperature ranges required by paint product manufacturer.
- B. Do not apply exterior coatings during rain or snow if relative humidity is outside range required by paint manufacturer, or if moisture content of surfaces exceeds that required by paint manufacturer.
- C. Minimum conditions: Do not apply paint if temperatures are or are expected to fall below 50 deg. F within 24 hours after application.
- D. Thermoplastic Compound: Do not apply unless pavement surface temperature is minimum 40 deg. F and rising.



- E. Maximum VOCs: Do not exceed limit required by State or Environmental Protection Agency.

1.07 TRAFFIC CONTROLS

- A. Place warning signs conforming to MUTCD near the beginning of the worksite and well ahead of the worksite for alerting approaching traffic from both directions. Place small markers along newly painted lines or freshly placed raised markers to control traffic and prevent damage to newly painted surfaces or displacement of raised pavement markers. Mark painting equipment with large warning signs indicating slow-moving painting equipment in operation. When traffic must be rerouted or controlled to accomplish the work, provide necessary warning signs, flag persons, and related equipment for the safe passage of vehicles.

1.08 WARRANTY

- A. Furnish manufacturer's warranty for pavement markings.

PART 2 – PRODUCTS

2.01 PAINTED PAVEMENT MARKINGS

- A. Performance and Design Criteria:
 - 1. Paint Adhesion: Adhere to road surface, forming smooth continuous film one minute after application.
 - 2. Paint Drying: Tack free by touch as not to transfer by vehicle tires within two minutes after application.
- B. Paint:
 - 1. Description: Ready mixed, conventional, fast-dry, waterborne traffic paints.
 - 2. Lead-free and nontoxic.
 - 3. Minimum Retroreflectance: 85 mcd.
 - 4. Durability Rating: 6 or more, after in place for nine months.
 - 5. Properties:
 - a. Pigment Percent by Weight: 60, plus or minus 2.
 - b. Vehicle Percent by Weight: 40, plus or minus 2.
 - c. Nonvolatile Percent by Weight of Paint: 75.0



- d. Viscosity: 80-90 Kneb Units at 77 deg. F.
6. Grind:
 - a. Method: Hegeman Gage
 - b. Minimum Field-Tested, No-Tracking Time under Ambient Conditions: 20 to 90 seconds.
7. Maximum Dry-Through Time:
 - a. 125 minutes
 - b. Wet Film Thickness: 15 mils at 90 percent relative humidity and 72 deg. F.
 - c. Comply with ASTM D1640/D1640M.
8. Maximum VOC Content: 1 lb./gal.
- C. Glass beads:
 1. Comply with AASHTO M247, Type 1.
 2. Coating: Enhance embedment and adherence with paint.
- D. Thermoplastic Compound:
 1. Binder Content: Hydrocarbon resin with pigment, beads, and filler uniformly dispersed.
 2. Asphalt Concrete Primer:
 - a. Description: Thermosetting adhesive with a solids content of pigment reinforced synthetic rubber and synthetic plastic resin dissolved or dispersed in a volatile organic solvent.
 - b. Solids Content: Not less than 10 percent by weight at 70 deg. F and 60 percent relative humidity.
 - c. Wet Film Thickness: 0.005 inch, plus or minus 0.03 inch.
 3. Portland Cement Concrete Primer: Epoxy resin primer, as recommended by manufacturer of thermoplastic compound.

2.02 APPLICATION EQUIPMENT

- A. Paint Application Equipment
 1. Hand-Operated, Push-Type Machines:
 - a. Provide hand-operated push-type applicator machine of a type commonly used for application of water based paint or two-component, chemically curing paint, thermoplastic, or preformed tape, to pavement surfaces for small marking projects,



such as legends and cross-walks, automotive parking areas, or surface painted signs. Provide applicator machine equipped with the necessary tanks and spraying nozzles capable of applying paint uniformly at coverage specified. Hand operated spray guns may be used in areas where push-type machines cannot be used.

2. Road Marking:

- a. Provide equipment used for marking roads capable of placing the prescribed number of lines at a single pass as solid lines, intermittent lines, or a combination of solid and intermittent lines using a maximum of three different colors of paint as specified.

3. Hand Application:

- a. Provide spray guns for hand application of paint in areas where the mobile paint applicator cannot be used.

4. Provide spray guns for hand application of paint in areas where the mobile paint applicator cannot be used:

- a. Provide equipment used for marking roads capable of placing the prescribed number of lines at a single pass as solid lines, intermittent lines, or a combination of solid and intermittent lines using a maximum of three different colors of paint as specified.

B. Thermoplastic Application Equipment

1. Thermoplastic pavement markings shall be applied with equipment and stencils specifically designed and constructed for that purpose.
2. Application equipment shall be approved by the Engineer prior to use. Preheaters with mixers having a 360 degree rotation shall be used to preheat thermoplastic material before it is applied.
3. Application equipment shall be capable of:
 - a. Utilizing either the spray or extrusion methods;
 - b. Applications that dry to “no pick up” in accordance with ASTM D711; and
 - c. Producing smooth, continuous lines having sharp dimensions.

C. Bead Gun:

- b. Description: Automatically dispense glass beads onto painted surface at required application rate.



c. Type: Pressurized

D. Measuring Device

1. Automatically and continuously measure to nearest foot length of each line placed.

E. Paint Heater

1. Capable of heating paint to 125 deg. F for fast-dry applications.

2.03 QUALITY CONTROL

A. Certificate of Compliance:

1. If manufacturer is approved by authorities having jurisdiction, submit certificate of compliance indicating Work performed at manufacturer's facility conforms to Contract Documents.
2. Specified shop tests are not required for Work performed by approved manufacturer.

PART 3 – EXECUTION

3.01 REMOVAL OF TRAFFIC STRIPING AND CURB AND PAVEMENT MARKINGS

- A. The contractor shall remove existing traffic striping and pavement markings by wet or dry sandblasting, high velocity water jet, grinding or other methods as specified. Obliteration with black paint or emulsified asphalt will not be allowed.
- B. Conflicting striping and pavement markings shall be removed before the application of new temporary or permanent striping, and curb and pavement markings.
- C. Removal of existing pavement markers shall be performed in such a manner as to leave the existing pavement undamaged.
 1. Asphalt concrete pavement shall be considered damaged when a depression of more than ¼ inch results. Damaged asphalt concrete pavement shall be patched with E-PG 64-10 asphalt concrete pavement conforming to Sections 203-6 and 302-5 for the SSPWC.

3.02 PREPARATION

- D. Do not apply paint to concrete surfaces until concrete has cured for 28 days.



- E. Mechanical mixers shall be used to mix paint. Prior to application, paint shall be mixed a sufficient length of time to thoroughly mix the pigment and vehicle together, and shall be kept thoroughly agitated during application.
- F. Surface Preparation.
 - 1. Clean and dry paved surfaces prior to painting. Areas which cannot be satisfactorily cleaned shall be scrubbed with a water solution of tri-sodium phosphate (1- percent Na_3PO_4) or other approved cleaning solution. After cleaning, the surface shall be rinsed with water and dried before painting. The cleaning solution and rinse water shall not be allowed to enter any storm drain or natural water course.
 - 2. Blow or sweep surface free of dirt, debris, oil, grease, or gasoline.
 - 3. Spot location of final pavement markings, as specified and as indicated on Drawings, by applying pavement spots.
 - 4. Request inspection by Engineer after placing pavement spots and minimum three days prior to applying traffic lines

3.03 APPLICATION

- A. Application Rate:
 - 1. Reflective Markings:
 - a. Paint: 100 sq. ft./gal.
 - b. Glass Spheres on Wet Paint: 0.5 lb./gal.
 - 2. Nonreflective Markings:
 - a. Paint: 100 sq. ft./gal
 - 3. Thermoplastic Compound:
 - a. After surface preparation has been completed, a primer, of the type recommended by the manufacturer of the thermoplastic material, shall be applied to asphalt concrete surfaces over 6 months old and to all Portland cement concrete surfaces. The primer shall be applied immediately in advance of, but concurrent with, the application of thermoplastic material. The primer shall be applied at the rate recommended by the manufacturer and shall not be thinned.



- b. Thermoplastic material shall be applied at a temperature between 400 deg. F and 425 deg. F, unless a different temperature is recommended by the manufacturer. Thermoplastic material shall be applied in a single layer. The pavement surface to which the thermoplastic material is applied shall be completely coated by the material and the voids in the pavement surface shall be filled.
 - c. Apply reflective glass spheres mechanically at rate of 1 lb./sq/ ft.
 - d. Application Thickness: Not less than 0.125 inch and not more than 0.190 inch.
- B. Paint
1. Apply paint pneumatically, using guidelines and templates as necessary to control application.
 2. Manually paint numbers, letters, and symbols.
 3. Prevent splattering and overspray when applying markings.
 4. Paint Guns: Simultaneously apply paint binder at uniform specified rates.
 5. Dispense at manufacturer recommended temperature, plus or minus 5 deg. F.
 6. Wet-Film Thickness:
 - a. 15 mils.
 - b. Edge Markings: 12 mils
- C. Reflective Media:
1. Immediately follow paint application.
 2. Bead Guns:
 - a. Dispense glass beads simultaneously at specified rate.
 - b. Check guns by dispensing glass beads into gallon container for predetermined fixed period of time.
 - c. Verify weight of glass beads.
- D. Thermoplastic Compound:
1. Place on dry pavement with a surface temperature above 50 deg. F. The wind shall be calm enough that no blowing dirt is deposited on the pavement surface.



2. Apply centerline, skip line, edge line, and other longitudinal type markings with mobile applicator.
 3. Place special markings, crosswalks, stop bars, legends, arrows, and similar patterns with portable applicator.
- E. Raised Pavement Markers:
1. Align prefabricated markers and permanently fix in place by means of epoxy adhesives.
 2. Prior to applying adhesive, thoroughly clean area by water blasting and by compressed air.
- F. Dimensions and Locations: As indicated on Drawings.
- G. Crosswalks, Intersections, Stop Lines, and Legends:
1. Use walk-behind stripers, hand spray, or stencil trucks.
 2. Do not use hand brushers or rollers.
 3. Glass beads may be applied by hand.

3.04 TOLERANCES

- A. Minimum Variation from Wet Film Thickness: 1 mil.
- B. Maximum Variation from Wet Paint Line Width: Plus or minus 1/8 inch.
- C. Automatic Line-Length Gages: Plus or minus 25 ft./mi.
- D. Cycle Length Timer: Plus or minus 6 in./40 ft.
- E. Paint Line-Length Timer: Plus or minus 3 in./10 ft.
- F. Paint Guns: Plus or minus 1 mil.

3.05 FIELD QUALITY CONTROL

- A. Inspect for incorrect location, insufficient thickness, line width, coverage, retention, uncured or discolored material, and insufficient bonding.
- B. Acceptance:
1. Repair lines and markings which after application and curing do not meet following criteria:
 - a. Incorrect location.



- b. Insufficient thickness, width, coverage, or retention.
- c. Uncured or discolored material.
- d. Insufficient bonding.

3.06 CLEANING

- A. Collect and legally dispose of residues from painting operations.

3.07 PROTECTION

- A. Protect painted pavement markings from vehicular and pedestrian traffic until paint is dry and track free.
- B. Unless material is track free at end of paint application convoy, use traffic cones to protect markings from traffic until track free.
- C. If vehicle crosses a marking and tracks it, or if splattering or overspray occurs, eradicate affected marking and resultant tracking and apply new markings.
- D. Follow manufacturer instructions or use minimum of 30 minutes of dry time.
- E. Barrier cones are satisfactory protection for material being dried.

3.08 MAINTENANCE

- A. Provide service and maintenance of traffic paints for three years from date of Substantial Completion.

PART 4 - MEASUREMENT AND PAVEMENT

4.01 MEASUREMENT

- A. All items of work shall be measured in accordance with the SSPWC.

4.02 PAYMENT

- A. Payment for all items of work shall be in accordance with the SSPWC.

END OF SECTION



SECTION 32 17 26 DETECTABLE WARNING SURFACES

PART 1 – GENERAL

1.01 SUMMARY

- A. This work includes furnishing materials, labor, transportation, services, and equipment necessary to furnish and install Detectable Warning Surfaces as indicated on drawings and as specified in these Technical Specifications.
- B. Detectable Warning Surfaces shall include detectable warning tile for curb ramps.

1.02 RELATED SECTIONS

- A. Section 32 13 13 – Portland Cement Concrete Paving
- B. Section 32 16 00 – Curbs, Gutters, Sidewalks, and Drives

1.03 REFERENCES

- A. ASTM International:
 - 1. B117 Practice for Operating Salt Spray (Fog) Apparatus
 - 2. C501 Test Method for Relative Resistance to Wear of Unglazed Ceramic Tile by the Taber Abraser
 - 3. C1028 Test Method for Determining the Static Coefficient of Friction of Ceramic Tile and Other Like Surfaces by the Horizontal Dynamometer Pull-Meter Method
 - 4. D570 Test Method for Water Absorption of Plastics
 - 5. D638 Test Method for Tensile Properties of Plastics
 - 6. D695 Test Method for Compressive Properties of Rigid Plastics
 - 7. D790 Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials
 - 8. D1308 Test Method for Effect of Household Chemicals on Clear and Pigmented Organic Finishes
 - 9. D5420 Test Method for Impact Resistance of Flat, Rigid Plastic Specimen by Means of a Striker Impacted by a Falling Weight (Gardner Impact)
 - 10. G155 Practice for Operating Xenon Arc Light Apparatus for Exposure of Non-



Metallic Materials

- B. Americans with Disabilities Act (ADA) Standards issued by U.S. Department of Transportation
- C. California Building Code

1.03 SUBMITTALS

- A. Product Data: Submit manufacturer's literature describing products, installation procedures and routine maintenance.
- B. Samples for Verification Purposes: Submit one (1) full size tile sample.
- C. Shop drawings and manufacturer's product data sheet are required for products specified showing fabrication details, material composition, surface profile, and material to be used for installation.
- D. Material Test Reports: Submit complete test reports from qualified accredited independent testing laboratories to qualify that materials proposed for use are in compliance with requirements and meet or exceed the properties indicated in the specifications. All tests shall be conducted on the tile (or approved equal) as specified herein.
- E. Maintenance Instructions: Submit one copy of manufacturer's specified installation and maintenance practices for each type of detectable warning surface.

1.04 QUALITY ASSURANCE

- A. Provide detectable warning surfaces as produced by a single manufacturer with a minimum of three (3) years' experience in the manufacturing of detectable warning surfaces.
- B. Provide detectable warning surfaces which are in compliance with the following standards:
 - 1. Americans with Disabilities Act (Title III Regulations, 28 CFR Part 36 ADA STANDARDS FOR ACCESSIBLE DESIGN, Appendix A, Section 4.29.2 DETECTABLE WARNINGS ON WALKING SURFACES).
 - 2. California Code of Regulations (CCR): Provide only approved DSAAC detectable warning products as provided in the California Code of Regulations (CCR) Title 24, Part 2, Section 205 definition of "Detectable Warning". Section 1117A.4 and 1127B.5 for "Curb Ramps" and Section 1133B.8.5 for "Detectable Warnings at Hazardous Vehicular Areas".
 - 3. Panels and accessories, including panel adhesive, fasteners, and sealants, shall be from a single source. Products shall have been in successful service for a period of five (5) years.

1.05 DELIVERY, STORAGE AND HANDLING



- A. Detectable warning surfaces shall be suitably packaged or crated to prevent damage in shipment and handling.
- B. Storing detectable warning surfaces at project site shall be on a level, clean surface, protected from other construction activities.

1.06 MANUFACTURER'S WARRANTY

- A. Detectable warning surfaces shall be warranted in writing for a period of five (5) years from date of substantial completion. The guarantee includes factory defects, breakage, and deformation. Warranty shall include furnishing new materials, removal of existing panels, and installation of new panels.

1.07 SITE CONDITIONS

- A. Environmental Conditions and Protection
 - 1. Conduct field operations only when environmental conditions fall within those recommended by manufacturers of the products.

1.08 SPARES

- A. Furnish a minimum of five (5) percent additional panels of the total amount installed of each panel and corresponding fasteners. Deliver spares to location (within 50 mile radius of work site) designated by the Engineer. Furnish spare materials from same manufactured lot as materials installed and enclose in protective packaging with appropriate identification.

PART 2 – PRODUCTS

2.01 DETECTABLE WARNING TILE (CURB RAMPS)

- A. Detectable warning tile shall be designed to be cast into fresh concrete and comply with “Detectable Warning Tiles (DWT)”, of the City Standard Specifications, these Technical Specifications, and the Plans.
- B. Material for tiles shall be stainless steel per the City’s approved materials list
- C. Color: Federal Yellow conforming to Federal Color No. 33538. Color shall be homogeneous throughout the panel.
- D. Dynamic loading in compliance with AASHTO HS20-44.
- E. Able to be cut without losing structural integrity.
- F. Produced by a single manufacturer with a minimum of five (5) years’ experience in the manufacturing of cast in place detectable/tactile warning surface tiles.



- G. Cast in place tiles shall be suitably packaged or crated to prevent damage in shipment or handling. Finished surfaces shall be protected by sturdy plastic wrappings to protect tile from concrete residue during installation and tile type shall be identified by part number.
- H. Subject to conformance with the requirements of this Section, use products fabricated by the following manufacturers or approved equal:
 - 1. Armor-Tile by Engineered Plastics, Inc. of Williamsville, NY
 - 2. ADA Solutions, Inc. of North Billerica, MA
 - 3. Access Products of Buffalo, NY
- I. Panels shall be manufactured from a fiber reinforced polymer composite.
- J. Truncated Dome Geometry
 - 2. Pedestrian Grade Crossings and Curb Ramps:
 - a. Square grid (in-line) pattern of raised truncated domes of 0.2-inch nominal height, base diameter of 0.9-inch and top diameter of 0.45-inch.
 - b. Truncated domes shall have a center-to-center (horizontally and vertically) spacing of 2.35-inch as measured side by side in-line.
- K. Panel Thickness: At a minimum, the thickness of the body of Detectable Warning Panel shall measure 3/16-inch (0.1875-inch) nominal.
- L. Panel Size: Pedestrian Grade Crossings and Curb Ramps (In-Line Pattern): Nominal 36-inch x 48-inch (or longer) with a 7/16-inch thick deep flange along both long sides.
- M. Fastener Holes in Panel
 - 1. Holes for fasteners shall be formed in the factory. Holes for fasteners, whether made in the factory or in the field, shall be located only at the centers of the truncated domes.

2.02 ACCESSORIES

- A. Fasteners for Concrete
 - 1. Color matched nylon expansion sleeves with 1/4 inch diameter by 1-1/2 inches long stainless steel drive pins, or as recommended by panel manufacturer for specific job conditions and accepted by the Engineer.
- B. Adhesive
 - 1. Type approved by panel manufacturer.
- C. Sealant



1. Urethane sealant of type approved by panel manufacturer.
- D. Backer Rod
1. Acceptable to sealant manufacturer. Where required, such as, at platform expansion joints.

PART 3 – EXECUTION

3.01 DETECTABLE WARNING TILE (CURB RAMPS)

- A. Detectable Warning Tile shall be installed in accordance with the Plans. Any damage to detectable warning tiles, due to Contractor activity, shall be repaired or fully replaced at no additional cost to the Owner. Repairs shall comply with Section 218, “Detectable Warning Tiles (DWT)”, of the City Standard Specifications. All repairs will require approval by the Engineer.
- B. Installation procedure shall eliminate all air voids under the tile.
- C. Tiles shall be installed to match slope of ramp as indicated on the Plans and per Section 32 17 26, “Curbs, Gutter, Sidewalk & Drives,” of these Technical Specifications. The field level of tiles, when set, shall be flush with adjacent concrete surface. Immediately after installation slope of tiles shall be checked to ensure it is in compliance. Care shall be taken to ensure no undo force is applied to tile once installed to the proper slope.
- D. Concrete edge around tile shall be finished using a small radius edging tool.
- E. Concrete bleeding onto tiles during installation and finishing activities shall be removed after concrete has set. Cleaning methods shall be in accordance with manufacturer’s recommendations.
- F. Protect and maintain tiles throughout installation and construction period. Prevent wear and damage up to the time of final acceptance.

3.01 CLEANING AND PROTECTING

- A. After the area has been fully paneled and sealant system applied, clean panel surface, following the manufacturer recommended maintenance and cleaning procedures.
- B. Protect sealant and panels against damage during construction period. Comply with panel and sealant manufacturers' recommendations.
- C. Protect panels against damage from rolling loads following installation by covering with plywood or hardwood.



- D. Clean panel by method specified by manufacturer.

PART 4 – MEASUREMENT AND PAYMENT

4.01 MEASUREMENT

- A. Detectable Warning Tile will be measured for payment by the square foot of Detectable Warning Tile, over the actual surfaces placed, within the limits shown on the Plans or as otherwise authorized by the Engineer.

4.02 PAYMENT

- A. The contract price paid per square foot for Detectable Warning Tile includes full compensation for furnishing all labor, materials, tools, equipment and incidentals and for doing all the work involved in installing Detectable Warning Tile, complete in place, including cutting, fitting, slope check, and cleaning as shown on the Plans and as specified in the City Standard Specifications, these Technical Specifications, and as directed by the Engineer.

END OF SECTION



SECTION 32 18 16

PLAYGROUND PROTECTIVE SURFACING

PART 1 – GENERAL

1.01 SUMMARY

- A. Section includes: Resilient playground protective tile surfacing system.
- B. Related Requirements:
 - 1. Division 01 - General Requirements..
 - 2. Section 11 6813 - Playground Equipment and Structures.
 - 3. Section 31 1116 – Aggregate Base.
 - 4. Section 32 1313 - Site Concrete Work.
 - 5. Section 32 1216 - Asphalt Paving.
 - 6. Section 32 3113 - Chain Link Fencing.

1.02 REFERENCES

- A. Reference to standard technical specifications of a society, institute, association, or governmental authority is a reference to the respective organization's standard technical specifications, which are in effect on the date of bid submission.
- B. ASTM International (ASTM) - The publications listed below form a part of this Specification to the extent referenced. The publications are referred to in the text by basic designation only.
 - 1. ASTM C136 – Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.
 - 2. ASTM D2859 – Standard Test Method for Ignition Characteristics of Finished Textile Floor Covering Materials.
 - 3. ASTM F355 - Standard Test Method for Impact Attenuation of Playing Surface Systems, Other Protective Sports Systems, and Materials Used for Athletics, Recreation and Play.
 - 4. ASTM F1292 – Standard Specification for Impact Attenuation of Surfacing Materials within the Use Zone of Playground Equipment.
 - 5. ASTM F1487 – Standard Consumer Safety Performance Specification for Playground Equipment for Public Use.
 - 6. ASTM F1951 - Standard Specification for Determination of Accessibility of Surface Systems under and Around Playground Equipment.



1.03 DEFINITIONS

- A. Critical Height: Standard measure of shock attenuation. According to CPSC (Consumer Safety Product Commission) No. 325, critical height is defined as “the fall height below which a life-threatening head injury would not be expected to occur.”
- B. Fall Height: According to ASTM F1487, fall height is defined as “the vertical distance between a designated play surface and the protective surfacing beneath it.” The fall height of playground equipment shall not exceed the critical height of the protective surfacing beneath it.
- C. Use Zone: As defined by ASTM F1487 and this Section.
- D. Certified Playground Safety Inspector (CPSI): A Certified Playground Safety Inspector shall possess a current and valid Certified Playground Safety Inspector certificate as recognized by the National Recreation and Parks Association (NRPA).

1.04 SUBMITTALS

- A. Shop and Coordination Drawings: Submit layout plans and elevations drawn to scale for the coordination of playground equipment with playground protective surfacing system. Indicate playground equipment locations, use zones, fall heights, extent of protective surfacing, depths of material, and critical heights, sub-base materials, hardware, penetrations, perimeter edge details, drainage, and surrounding hardscaping, handrail, and guardrails fencing where applicable.
- B. Color Samples: Submit manufacturer’s color charts or 4-inch squares of units (samples) indicating the full range of colors available.
- C. Product Data: Submit manufacturer’s descriptive data and installation instructions.
- D. Manufacturer’s Project References: Submit list of at least five installations where products similar to those specified are installed and have been in successful service for a minimum period of three years. List shall include owner, address of installation, service or maintenance organization, date of installation, contact person, and phone number of the contact person.
- E. Certificate of Compliance: Submit manufacturer’s certificate of compliance indicating materials comply with specified requirements of this Section.
- F. Certified Statement: Submit certified statement indicating that safety tile meets the requirements of ASTM F1292.
- G. Certificate of Insurance: Submit in accordance to Article 1.09 Warranty below.
- H. Maintenance Instructions: Submit maintenance, repair and cleaning instructions.
- I. Installer Certification: Manufacturer shall submit certified statement indicating the following:
 - 1. Installer is trained, approved and/or certified for the installation of the manufacturer’s specified playground protective surfacing.



2. Installer has at least five year experience installing manufacturer's playground protective surfacing of similar type to that specified.

1.05 PERFORMANCE REQUIREMENTS

- A. Safety: Safety surfacing shall meet or exceed the performance requirements of CPSC and ASTM F1292, that a surface yield both, a peak deceleration of no more than 200g, and a Head Injury Criteria (HIC) value of no more than 1,000g. ASTM F1487 specifies designated play surfaces as any elevated surface for standing, walking, sitting, or climbing, or a flat surface larger than 2.0 inches (51mm) wide and 2.0 inches (51mm) long having less than 30° angle from horizontal. The installer is responsible for obtaining a determination from the playground protective surfacing manufacturer of the required product depth to meet the performance requirements for play equipment.
- B. Accessibility: Playground Protective Surfacing intended to serve as accessible paths of travel for persons with disabilities shall be firm, stable and slip resistant and shall meet the requirements of the 2010 Americans with Disabilities Act Standards for Accessible Design (2010 ADAS), ASTM F1487, ASTM F1292, and ASTM F1951.

1.06 QUALITY ASSURANCE

- A. Qualifications:
 1. Manufacturer: Continuously engaged in manufacturing playground protective surfacing of similar type to that specified, with a minimum of five years successful experience.
 2. Installer: Shall be approved by manufacturer and shall have a minimum of five years successful experience installing playground protective surfacing of similar type to that specified.
- B. Regulatory Requirements:
 1. Accessibility: 2010 ADAS and CBC Chapter 11B.
 2. U.S. Consumer Product Safety Commission (CPSC) - Handbook for Public Playground Safety, latest edition, U.S. Consumer Product Safety Commission, Bethesda, MD 20814 Telephone (301) 504-7923.
- C. Certifications: Submit certified statement indicating that protective surfacing meets the requirements of ASTM F1292 for the installed play equipment. The impact attenuating qualities of the protective surfacing system shall not be diminished in the surface areas covering hardware and footings. Testing of products shall include tests conducted over hardware and concrete. The statement shall be dated after the Effective Date of the Contract, shall state CONTRACTOR name and address, and shall name the Project and location. The statement shall also provide the name, address, and telephone number of the testing agency, type of instrument used, instrument model and serial number, instrument recall date, the date of the test, and the test results.



- D. Fall heights shall be determined by the highest designated play surface, to the protective surfacing system below. Fall heights shall also be determined by the highest part of a climber intended for foot support and/or the highest part of upper body equipment, with the exception of support posts. Impact attenuation testing shall be performed at the highest of these values.
- E. Source Limitations: Provide secondary materials including adhesives, anchoring materials, filler/sealant materials, and repair materials of type and from source recommended by manufacturer and approved by the OAR.
- F. Coordination: Coordinate installation of playground protective surfacing with installation of playground equipment, including but not limited to, use zones and fall heights as specified in the CPSC and ASTM F1487.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Deliver manufactured materials in original package with seals unbroken and bearing manufacturer's labels.
- B. Store manufactured materials in a clean, dry location, protected from the weather and deterioration, and complying with manufacturer's written instructions for minimum and maximum temperature requirements for storage.
- C. Store units on flat surfaces.

1.08 PROJECT CONDITIONS

- A. Environmental Limitations: Do not install playground protective surfacing over wet or excessively damp substrates if prohibited by manufacturer's written instructions.
- B. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit playground tile system to be installed according to manufacturer's written instructions.
- C. Adhesives: Install adhesives only when temperatures of surfaces to be adhered to and ambient air temperatures are within range permitted by manufacturer's written instructions. Adhesives shall only be installed under dry conditions.
- D. Do not install products over concrete slabs until slabs have cured and are sufficiently dry and surfaces are within acceptable pH range to bond with adhesive, as recommended by surfacing manufacturer.

1.09 WARRANTY

- A. Product and General Liability: Manufacturer of Playground Protective Surfacing System shall provide OWNER Certificate of Insurance, covering both product and general liability, of not less than \$1,000,000. The issuing underwriter shall be AA rated.
- B. Materials and Fabrication:



1. Manufacturer shall provide OWNER written warranty that guarantees playground protective surfacing system for not less than ten (10) years against defective materials and fabrication.
 - a. Warranty shall include provisions that include, but is not limited to, cracking, shedding and/or abnormal markings.
 - b. Manufacturer shall provide a five (5) year warranty against color fading.
 2. Installer shall provide OWNER a written warranty that guarantees the installation of the playground protective surfacing system for not less than ten (10) years against defective products, faulty installation, adhesive and/or fastener failure, seam and/or perimeter edging separation, slope issues exceeding 1:48 (2.08%) and/or uneven surfaces.
 3. Warranty repairs shall be conducted without cost to OWNER. Prorated warranties are not acceptable.
- C. Performance: Warranty shall guaranty that the playground protective surfacing system will retain its original impact attenuation rating for a period of not less than ten (10) years and meet performance requirements of ASTM F1292. Impact attenuation rating shall be tested per ASTM F1292 after manufacturer makes repairs.

PART 2 – PRODUCTS

2.01 MANUFACTURERS

- A. Manufacturer’s product shall be approved for use by OWNER.

2.02 MATERIALS

- A. Accessories: Made of same material as protective surfacing.
 1. Beauty Rings: Prefabricated finish edging around penetrations in protective surfacing.
- B. Geotextile Fabric: UV stabilized, Terram Product grade 1500, Linq 200, or equal.
- C. Adhesive: Manufacturer recommended and compatible with protective surfacing system.
- D. Hardware: Corrosion resistant metal and/or composite clips, anchors and fasteners.
- E. Concrete: Per Section 32 1313 - Site Concrete Work.
- F. Asphalt: Per Section 32 1216 - Asphalt Paving.
- G. Chain Link Fence: Per Section 32 3113 – Chain Link Fencing.

2.03 AGGREGATE BASE ROCK

- A. Aggregate base rock shall be 3/4 inch minus sharp crushed rock conforming to following grading requirement:



SIEVE SIZE:	PERCENT PASSING:
1 inch	100 percent
3/4 inch	90 – 100 percent
3/8 inch	55-75 percent
1/4 inch or #10	40-60 percent

- B. Where a tolerance range is set forth in above grading requirements, midpoint of tolerance range is target value and product shall conform as closely as realistically possible to this target value. The purpose of tolerance range is only to permit occasional minor variations from target value that are, for practical reasons, unavoidable.
- C. Thickness: The minimum thickness of aggregate base rock shall be 4-inch or as required by manufacturer.
- D. Compaction: Compaction shall be a minimum 95 percent or as recommended in soils report.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine areas and conditions for compliance with requirements for sub-grade substrate conditions and drainage, for compliance with playground protective surfacing manufacturer's requirements and requirements herein, and other installation conditions affecting performance.
- B. Hard-Surface Substrates: Verify that substrates are satisfactory for playground protective surfacing installation and that substrate surfaces are dry, cured, and uniformly sloped to drain within recommended tolerances according to playground protective surfacing manufacturer's written requirements for cross-section profile.
- C. Concrete Substrates: Verify that substrates are dry, free from surface defects, and free of laitance, glaze, efflorescence, curing compounds, form-release agents, hardeners, dust, dirt, loose particles, grease, oil, and other contaminants incompatible with playground protective surfacing or that may interfere with adhesive bond.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

- A. General: Prepare, fill, patch, clean, remove high spots and ridges, and remove incompatible coatings from substrates to receive surfacing products according to playground protective surfacing manufacturer's written recommendations. Verify that substrates are sound and free from high spots, ridges, holes and depressions.
- B. Concrete Substrates: Provide leveling and patching materials and install according to manufacturer's written instructions. Fill holes and depressions.

3.03 INSTALLATION



A. General:

1. Comply with playground protective surfacing manufacturer's written recommendations.
2. Installation of protective surfacing system must comply with zone requirements of the latest edition of the "Consumer Product Safety Commission – Handbook for Public Playground Safety – Publication No. 325, ASTM F1487 and this Section.
3. The entire area shall be cleaned and made free from foreign and/or loose materials that would cause the protective surfacing to lay in an uneven fashion and expose surfacing. The area to be surfaced shall be void of depressions and/or protrusions edges or leave depressions. Depressions shall be filled with "LevelCrete" or equal type product prior to installation of the playground protective surfacing systems.
4. The playground protective surfacing system shall be installed only after the playground equipment and subsurface have been installed and have passed inspection by a third party or OWNER Certified Playground Safety Inspector, and the OWNER has obtained the completed inspection report stating compliance with ASTM and CPSC.
5. The playground protective surfacing shall cover hardware, footings and/or foundations with the full required thickness. With the exception of the perimeter sloped edging, the playground protective surfacing shall maintain its required thickness throughout. Tapered perimeter edges shall be outside of the Use Zone.
6. Repair work performed to existing protective surfacing shall use the same material components, unless specified otherwise by the manufacturer of the existing surfacing. The playground protective surfacing shall only be installed in straight sections. Radius and/or circles are not acceptable.
7. Border trim sections shall be completely glued down to the protective surfacing and concrete borders. When protective surfacing and/or border trim sections converge with playground equipment components, these sections shall be securely fastened to prevent efforts to displace the system.
8. When playground protective surfacing includes tapered edges, tapered edges shall be designed to fully adhere to subsurface with a combination of adhesive and fasteners. Adhesive shall be continuous. Spacing of fasteners shall not exceed six inches.
9. The maximum slope of tapered border edges shall be 1:3. Sloped border edges shall not exceed twenty-four inches horizontally, or five inches vertically.
10. The maximum cross-slope for the playground protective surfacing shall not exceed 1:48.
11. Playground protective surfacing shall be installed with a continuous reinforced concrete border around the perimeter of the playground. Concrete borders shall



have a maximum slope of one percent. Concrete borders shall be installed a minimum of one inch higher than the surrounding hardscaping's highest adjacent elevation. Existing hardscaping shall be cut back to allow for replacement hardscaping to slope up to concrete border. Slope for the surrounding hardscaping adjacent to the concrete border shall not exceed current ADA requirements. Outside edge of existing hardscaping shall be saw cut as to provide a straight, true line. Due to the raised perimeter concrete border, both above grade and flush with grade protective surfacing systems shall require drainage. Place appropriate forming on the inside and the outside of the curbing as needed. Forming material and installation shall be of sufficient strength to retain wet concrete so as to provide straight surfaces.

12. Provide drainage for Above Grade and Flush with Grade systems installing a minimum of one drywell for every one thousand square feet of protective surfacing. Drywell shall consist of 12 inch diameter PVC, schedule 40, 5 feet deep filled with gravel. Locate drywell at lowest section of the protective surfacing. Perforate lower half with 3/8" diameter holes at 6" on center each way and wrap with filter fabric Marafi 14ON or equal.
- B. Above Grade Installation Procedure: Protective surfacing shall be installed with a 12-inch wide by 5-inch deep concrete curb with two #4 rebars centered, around the entire perimeter to act as an attachment point.
- C. Flush with Grade Installation Procedure: Playground protective surfacing shall be installed with a 12-inch wide by 10-inch deep with three #4 rebars (with keyway) or 6-inch wide by 10-inch deep with two #4 rebars (without keyway) concrete curb around the entire perimeter to act as an attachment point. The type of protective surfacing being used will determine which concrete curbing will need to be utilized.
- D. Provide a base for the playground protective surfacing consisting of a 95 percent compaction of crushed base material. This compaction is to be achieved by the following procedure:
 1. Apply a 2-inch layer of Base Material and compact with a soil compactor.
 2. Apply a 1/8 inch layer of Portland cement over entire area and thoroughly wet down.
 3. Repeat above steps to obtain desired thickness of material.
 4. Finished base material shall be smooth, flat and uniform.
- E. Depressions shall be filled with "Levelcrete" or equal type product prior to installation of the playground protective surfacing. The entire area shall be cleaned and made free from any foreign and/or loose materials.

3.04 SITE TESTS

- A. Upon completion of installation, CONTRACTOR shall have surface system tested by an independent testing laboratory in accordance with ASTM F355 and provide certification that installed surfacing meets requirements of ASTM F1292.



3.05

CLEANING

- A. Prevent pedestrian use of system for at least 48 hours after installation. Riding and/or driving on the protective surfacing system is strictly prohibited. Protect playground surface system until Substantial Completion.
- B. Clean playground surface systems as recommended in writing by playground surface system manufacturer. Provide cleaning materials and procedures recommended in writing by system manufacturer and approved by the OAR.

END OF SECTION



SECTION 32 31 13

CHAIN LINK FENCING

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

1. Chain link fences and fabrications as indicated.

B. Related Requirements:

1. Division 01 - General Requirements.
2. Section 03 30 00_ - Cast-in-Place Concrete.
3. Section 31 10 00 – Site Clearing.
4. Section 31 22 00 - Grading.
5. Section 31 23 00 - Earthwork

1.02 SUBMITTALS

A. Shop Drawings: Submit dimensioned plans and details indicating extent of fences, locations of gates, and details of attachment and footings. Indicate means and methods for surface preparation and finishing.

B. Certifications: Manufacturers material certifications in compliance with the ASTM standards referenced in this Section.

1.03 REFERENCES

A. ASTM International:

1. ASTM A36 – Standard Specification for Carbon Structural Steel.
2. ASTM A47 - Standard Specification for Ferritic Malleable Iron Castings.
3. ASTM A53 - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.
4. ASTM A123 - Standard Specification for Zinc (Hot-Dipped Galvanized) Coatings on Iron and Steel Products.



5. ASTM A307 - Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60 000 PSI Tensile Strength.
6. ASTM A392: Standard Specification for Zinc-Coated Steel Chain Link Fence Fabric.
7. ASTM A500 - Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes.
8. ASTM A780 - Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings.
9. ASTM A824 – Standard Specification for Metallic-Coated Steel Marcellled Tension Wire for Use with Chain Link Fence.
10. ASTM F552 - Standard Terminology Relating to Chain Link Fencing.
11. ASTM C1107 – Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink).
12. ASTM F567: Standard Practice for Installation of Chain Link Fence.
13. ASTM F626 - Standard Specification for Fence Fittings.
14. ASTM F1083: Standard Specification for Pipe, Steel, Hot-Dipped Zinc-Coated (Galvanized) Welded, for Fence Structures.

B. Underwriters Laboratories (UL):

1. UL 325 - UL Standard for Safety Door, Drapery, Gate, Louver, and Window Operators and Systems.

C. American Welding Society (AWS):

1. AWS D1.1 Structural Welding Code - Steel.
2. AWS D1.3 Structural Welding Code - Sheet Steel.
3. AWS D-19.0 Welding Zinc Coated Steel.

1.04 QUALITY ASSURANCE

- A. Manufacturer: Company specialized in manufacturing chain link fence products with at least five years of experience.
- B. Fence Installer: Company with demonstrated successful experience installing similar projects and products in accordance with ASTM F567 and with at least five year experience.



PART 2 – PRODUCTS

2.01 CHAIN LINK FABRIC

- A. Galvanized Chain Link Fabric: Conforming to ASTM A392, Class 2 zinc coating, 2.00 ounces minimum per square foot of uncoated wire surface, hot-dipped galvanized after weaving, and with top and bottom edges knuckled (kk). Tie wires and hog rings shall conform to ASTM F626, and shall be 9 gage and galvanized.
- B. Chain Link Fabric Requirements:
 - 1. Fabric for perimeter fencing and interior fencing shall be 9 gage woven wire with 2 inch mesh, unless otherwise specified.
 - 2. Fences 12 feet high or less shall be furnished with single width fabric.
 - 3.
 - 4. Installed fence fabric shall be free from barbs, icicles, or other projections. Fence fabric with such defects will be deemed defective Work.

2.02 STEEL FENCE FRAMEWORK

- A. Posts, Top Rails, and Brace Rails: Standard weight, schedule 40, hot dip galvanized, welded steel pipe conforming to ASTM F1083, Group IA Heavy Industrial Fence Framework, with a minimum yield strength of 30,000 psi. Minimum 1.8 Oz/ft² hot dipped zinc coating average for interior and exterior.
- B. Miscellaneous Metals:
 - 1. Structural Steel Shapes: ASTM A36.
 - 2. Steel Pipe: ASTM A53 Type E or S, Grade B, standard weight (Schedule 40), unless otherwise noted. Use black finish where hot dip galvanizing after fabrication is indicated.
 - 3. Square and Rectangular HSS: ASTM A500 Grade B or C.
 - 4. Steel Bolts: ASTM A307, Grade A, or F3125 with hex steel nuts per ASTM A563 and washers. Galvanized in accordance with ASTM A153.



- C. Schedule of Posts, Rails, Bracings and Footings: Unless indicated otherwise on the drawings, shall be of sizes indicated on the following schedule.

Item	Height	Nomina l Pipe Size (inches)	Outside Diameter (inches)	Weight (pounds per foot)	Footings	
					Diameter (inches)	Depth (inches)
Top Rail, Brace Rails and Transom Rails	Up to 10'-0"	1-1/4	1.660	2.27	N/A	N/A
	10'-1" to 16'-0"	1-1/2	1.900	2.72	N/A	N/A
Line Posts	6'-1" to 8'-0"	2	2.375	3.65	12	36
	8'-1" to 10'-0"	2-1/2	2.875	5.80	12	36
	10'-0" to 16'-0"	3	3.5	7.58	14	60
Terminal, Corner, Angle & Pull Posts	Up to 8'-0"	2-1/2	2.875	5.79	12	36
	8'-0" to 10'-0"	2-1/2	2.875	5.79	14	42
	10'-1" to 16'-0"	3	3.5	7.58	14	60

2.03 FITTINGS

- A. Fittings shall be malleable iron conforming to ASTM A47 or ASTM F626.
- B. Post Caps: Designed to fit snugly over posts with a minimum projection of 1-1/2 inches below top of posts. Post caps shall be manufactured with a curved top.
- C. Eye Tops: Designed to fit over line posts, and for through passage of top rail.
- D. Expansion Sleeve Couplings for Top Rails: Steel, 6 inches long, designed to fit tightly on inside of rail, fitted with raised center.
- E. Rail Ends for Top Rails and Brace Rails: With holes to receive 3/8 inch bolts for securing to rail end bands.
- F. Tension Bands and Bands for Securing Rail Ends: Mild steel flats, at least 11 gage x one inch, tension bands in gates shall be 11 gage by 1 inch. Bolts for use with tension bands and rail end bands shall be galvanized machined 3/8 inch by 1 1/2-inch.
- G. Tension Bars: Mild steel flats at least 3/16 inch by 3/4 inch.

2.04 TENSION WIRE

- A. 6 gage marcelled steel wire conforming to ASTM A824, Type II Class 5 zinc coated, 2.00 ounces minimum per square foot of uncoated wire surface. Wavy type wire is not acceptable.



- B. ASTM F1664. Color shall match fabric and shall be in compliance with ASTM F934.
- C. Turnbuckles for installation with Tension Wires: Eye and hook type, drop forged steel, right and left hand threads, at least 3/8 inch screw diameter with at least 4 1/2-inches of take-up.

2.05 PAINT FOR GALVANIZING REPAIR

- A. Coatings for Refurbishing Galvanizing: Organic zinc-rich paint conforming to ASTM A780 or Carbomastic 15 by Carboline, or equal. Paints and coatings used on the site shall be approved by OWNER's Office of Environmental Health and Safety (OEHS).

2.07 PRIVACY FENCE SLATS

- A. Flat tubular shape with bottom lock track fabricated of PVC material with UV inhibitors.
- B. Privacy Percentage Factor: [95%]

2.08 CONCRETE AND GROUT

- A. Comply with requirements of Section 03 3000, Cast-in-Place Concrete. Provide normal-weight, air-entrained concrete with a minimum 28-day compressive strength of 3,000 psi, 4-inch slump, and one inch maximum size aggregate.
- B. Nonshrink, Nonmetallic Grout: Factory-packaged, non-staining, noncorrosive, nongaseous grout complying with ASTM C1107. Provide grout specifically recommended by manufacturer for interior and exterior applications "Rapid set Cement".

2.09 FABRICATION

- A. Items to be shop fabricated shall be preassembled to greatest extent possible. Use connections that maintain structural value of joined pieces. Mark units for reassembly and installation.
- B. Cut, drill, and punch metals cleanly and accurately. Remove sharp and rough areas on exposed surfaces. Form exposed work with accurate angles and surfaces and straight edges. Form exposed connections with hairline joints, flush and smooth.
- C. Weld connections unless otherwise indicated. Weld corners and seams continuously and in accordance with requirements of AWS D1.1 Structural Welding Code. Welds shall be inspected. Grind exposed welds smooth and flush to match and blend with adjoining surfaces.
- D. Galvanize fabrications in accordance with ASTM A123 and ASTM A153.



PART 3 - EXECUTION

3.01 EARTHWORK

- A. Refer to the following Sections for earthwork related work:
1. Section 31 2200 - Grading.
 2. Section 31 2300 - Earthwork.

3.02 FRAMEWORK INSTALLATION

- A. Install fences as indicated on Drawings.
- B. Space fence posts at equal intervals between terminal, angle, corner, and gate posts, and not more than 10 feet apart measured from center to center of posts. In curved fence sections having a radius of 50 feet or less, space posts not more than 5 feet - 6 inches apart. Install posts so that top of eye of post caps are level with top of fabric.
- C. Install angle or corner posts at each change in direction of 15 degrees or more, at change of 5 percent or more in grade of fencing, and at the beginning and end of curved fence sections.
- D. Install terminal posts at ends of runs of fencing.
- E. Embed posts into footing 6 inches less than the depth of the footing unless noted otherwise on drawings.
- F. Where a fence is to be installed on a curb, construct footings with top of footing level with the lower finish grade. Align posts, set plumb and true before placing footings. Remove splattered concrete from exposed pipe surfaces while concrete is still soft. In bituminous surfaced areas, install seal coat on top of concrete footings.
- G. Install fences with top rail. Top rail shall pass through eye tops and be secured at ends with rail-end fittings and bands.
- H. Install bottom tension wire a minimum of 3 inches from grade for fencing and secure to fence posts with ties. Provide a turnbuckle for each 150 feet of wire or fractional part thereof. Turnbuckles are not required in runs of 15 feet or less. Install ends of tension wires to posts in a manner to prevent slipping or loss of tension. Wrap should start from fence side of post. Turn end of wire around post tightly twisted at least three times around wire. At turnbuckles, wire through eye and tightly twist end at least three times around wire. Cut tail of bottom wire flush.



3.03 CHAIN LINK FABRIC INSTALLATION

- A. Install fence fabric on outward facing side of posts, except for tennis courts. Install fence fabric with top edge projecting above top rail of fence.
- B. Install bottom of fence fabric to clear finish grades, except on bituminous surface install 3/4 inch above such surface. Locally shape and trench ground surfaces where necessary to provide uniform top and bottom alignment of fence.
- C. Tightly stretch fabric and at terminal, pull corner, angle, and gateposts, secure with tension bars extending full height of fence. Secure tension bars to posts with bolted tension bands spaced not more than 14 inches apart.
- D. Bands and Ties: Install bands and ties in accordance with following schedule:

11 bands on 12 feet fence	12 ties on 12 feet fence
7 bands on 8 feet fence	7 ties on 8 feet fence
6 bands on 6 feet fence	6 ties on 6 feet fence
- E. Fasten fabric to line posts with wire ties spaced not more than 16 inches apart. Where 6 gage aluminum ties are furnished, hook the tie at both ends. Installation of hooked ties with links is not permitted.
- F. Fasten fabric to top rails, mid-rails, brace rails, with wire ties spaced not more than 18 inches apart. Bend back ends of tie wires so as not to be a hazard. At bottom tension wire, install hog rings spaced not more than 18 inches apart. Where 2 fabrics are furnished, lap the fabrics one mesh at mid-rail and tie both fabrics with 9 gage wire or 6 gage aluminum ties to midrails.

3.04 WELD GRINDING

- A. Grind field welds smooth, clean off flux and spatter, damaged galvanizing removed, burrs and projections ground off, properly prepared, then heavily coated with galvanizing repair coating. Install coating in accordance with written recommendations of manufacturer.

3.06 INSTALLATION ON TOP OF CONCRETE WALLS

- A. Posts for fences on top of new concrete or concrete masonry walls shall be installed in 24 gage galvanized iron inserts one inch larger than the outside post diameter. Wall thickness for such installation shall be 8 inches minimum. Depth of embedment of post shall not be less than 15 inches for fence height not exceeding 4 feet. Install post plumb, true, and fill joint space with non-shrink grout, finished flush with top of wall. Remove excess grout and clean posts.
- B. Do not install footings on existing walls without the review of the ARCHITECT.



3.07 HORIZONTAL APPLICATIONS

- A. Spacing of lid joist framing members shall not exceed four feet on center. Joists shall be welded on both ends to supporting chain link framing structure or mechanically fastened to adjacent buildings, as indicated on the drawings.

3.08 ALTERATIONS TO EXISTING FENCING

A. Resetting Fences:

1. Existing fences shall be reset where finish pavement is raised or lowered more than 6 inches from existing grade. Remove and reinstall entire fence assembly as specified in this Section.
 - a. Where the finish grade is raised 6 inches or less, cut and re-knuckle the existing fence fabric. Adjust tension wire and tie to fabric. Bottom of fence fabric shall be installed $\frac{3}{4}$ " above finish grade.
 - b. Where the finish pavement is lowered 6 inches or less, demolish the fence footing flush with the finish grade and adjust the fabric and its attachments. Bottom of fence fabric shall be installed $\frac{3}{4}$ inches above finish grade.
2. Where existing fencing posts are indicated to be removed, reset or relocated, remove posts including their concrete footings
 - a. Fill footing cavity with sand, compact and cap surface matching existing adjacent material.
 - b. Construct new concrete footings, as specified, in their designated location and set posts as indicated above in Framework Installation Article.
3. Bent posts, rails and accessories shall be replaced with new parts as specified to complete reinstallation. New materials shall closely match design of existing installation. Cut bent portion of posts and weld new sections of equal diameter and thickness. Install splice to inside of all welded section prior to welding. Previously repaired or welded posts shall be replaced.
4. Top rail is required in reinstalled fencing which does not have top rail in its existing condition. Install as specified for new installations.
5. Fabric Removal: Do not remove more than what can be replaced during one day unless a barricade, providing equal security, will be installed in its place. If freestanding temporary fence is used, it shall be clamped and wrap tied.



6. Remove and dispose of off-site concrete debris, chain link, hardware and accessories. Use new hardware and accessories.
- B. Painting: Disassemble existing fence and all attachment hardware (bands, pipe, and wire) prior to preparation of posts for painting. Replace attachment hardware with new.
1. Preparation: Prepare exposed steel posts, rails and accessories thoroughly cleaned of rust, oil and foreign materials. Painted galvanized metal shall be stripped to bare metal before applying prime coat.
 2. Priming: Spot prime areas from which the original surface coating had been removed with a metal primer to match adjoining surfaces. Subsequently, install a prime coat to the entire surface to be painted.
 3. First Coat: Install first coat as recommended by the paint manufacturer. Furnish a color that is 10 percent to 15 percent lighter or darker than the finish coat.
 4. Second or Finish Coat: Install finish coat after the first coat has cured.
 5. Install paint in accordance with manufacturer's written recommendations.
 6. Protect adjacent structures, walls, concrete or asphalt from paint.

3.10 COMPLETION

- A. Completed fencing shall form continuous units between points indicated with required parts, accessories, and fittings provided and installed. Clean exposed metal surfaces of cement, grout and other foreign substances.
- B. Fill in holes left by removal of existing fence footings, except in areas where grading Work is indicated or specified, to existing grade with clean earth thoroughly compacted to at least same density as adjoining soil.

3.11 PROTECTION

- A. Protect the Work of this section until Substantial Completion.

3.12 CLEANUP

- A. Remove rubbish, debris and waste materials and legally dispose of off the Project site.

END OF SECTION



SECTION 32 80 00 PLANTING IRRIGATION

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, shall apply to all work in this Section with the same force and effect as though repeated in full herein.

1.02 SUMMARY

- A. Furnish all materials, labor, transportation, services, and equipment necessary to install landscape irrigation as shown on the Drawings and as specified herein. Restore any existing landscaping disturbed during the installation.
1. Work included in this Section:
 - a. Layout.
 - b. Trenching.
 - c. Backfilling.
 - d. Assemblage.
 - e. Wiring.
 - f. System Flushing.
 - g. Sprinkler Head Installation.
 - h. Valve Installation.
 - i. System Testing and Adjustment.
 - j. Maintenance.
- B. Work related in other Sections:
1. Division 1 Section "Sustainable Design Requirements" for additional LEED requirements.
 2. Section 32 84 00 – Planting Irrigation - Drip Systems.
 3. Section 32 90 00 - Planting.
 5. Section 32 01 90 – Operations and Maintenance of Planting.

1.03 REQUIREMENTS OF REGULATORY AGENCIES

- A. All local, municipal and state laws and rules and regulations governing or relating to any portion of this work are hereby incorporated into and made a part of this Specification, and its provisions shall be carried out by the Contractor. Anything contained in this Specification shall not be construed to conflict with any of the above rules and regulations or requirements of the same. However, when the Drawings and Specifications call for or describe materials, workmanship, or construction of a better quality, higher standard, or



larger size than is required by the above rules and regulations, the provisions of the Drawings and Specifications shall take precedence.

1.04 QUALITY CONTROL

A. Manufacturer's Directions

1. The Manufacturer's directions and drawings shall be followed in all cases where the manufacturers of articles used in this Specification, furnish directions covering points not shown in the Drawings and Specifications.

B. Permits, Fees, Bonds and Inspections

1. The Contractor shall pay for any and all permits, fees, bonds and inspections necessary to perform and complete his portion of the Work.

C. Explanation of the Drawings

1. Due to the scale of the Drawings, it is not possible to indicate all offsets, fittings, sleeves, etc. which may be required. The Contractor shall carefully investigate the structural and finished conditions affecting all of his work and plan his work accordingly, furnishing such fittings, etc. as may be required to meet such conditions. The Drawings are diagrammatic only and are indicative of the work to be installed. The Work shall be installed in such a manner as to avoid conflicts between irrigation systems, planting, and architectural features.
2. All work called for on the Drawings by notes or details shall be furnished and installed whether or not specifically mentioned in this Specification.
3. The Contractor shall not willfully install the irrigation system as shown on the Drawings when it is obvious in the field that obstructions, grade differences or discrepancies in area dimensions exist that might not have been considered in engineering. Such obstructions or differences should be brought to the attention of the Owner's Authorized Representative. In the event this notification is not performed, the Contractor shall assume full responsibility for any revisions necessary.

1.05 SUBMITTALS

A. Materials List

1. The Contractor shall furnish the articles, equipment, materials, or processes specified by name in the Drawings and Specifications. No substitution will be allowed without prior written approval by the Owner's Authorized Representative.
2. Complete material list shall be submitted prior to performing any work. Material list shall include the manufacturer, model number and description of all materials and equipment to be used. Although manufacturer and other information may be different, the following is a guide to proper submittal format:

Item No.	Description	Manufacturer	Model No.
1.	Gate Valve	Nibco	T-113
2.	Etc.	Etc.	Etc.



- The irrigation submittal list must be specific and complete. All items must be listed and should include solvent/primer, wire, wire connectors, valve boxes, etc. No copies of manufacturer's literature (catalog cuts) are required as submittal information.
3. The Contractor may submit substitutions for equipment and materials listed on the Drawings by following procedures as outlined in Section 1.8 of this Specification.
 4. Equipment or materials installed or furnished without prior approval of the Owner's Authorized Representative may be rejected and the Contractor required to remove such materials from the site at no cost to the Owner.
 5. Approval of any item, alternate or substitute indicates only that the product or products apparently meet the requirements of the Drawings and Specifications on the basis of the information or samples submitted.
 6. Manufacturer's warranties shall not relieve the Contractor of his liability under the Guarantee. Such warranties shall only supplement the Guarantee.
- B. Record Drawings or "As-Built"
1. The Contractor shall provide and keep up to date at all times, a complete record set "as-builts" of prints which shall be corrected daily and show every change from the original Drawings and Specifications and the exact installed locations, sizes, and kinds of equipment. Prints for these purposes may be obtained from the Owner's Authorized Representative at the Contractor's cost. "As-builts" shall be kept on the site and shall be used only as a record set.
 2. "As-builts" shall also serve as work progress sheets and shall be the basis for measurement and payment for work completed. "As-builts" shall be available at all times for observation and shall be kept in a location easily accessible to the Owner's Authorized Representative. Should the "as-built" progress sheets not be available for review or not current at the time of any site visit by the Owner's Authorized Representative, it will be assumed no work has been completed and the Contractor will be assessed the cost of that site visit at the current billing rate of the Owner's Authorized Representative. No other site observations shall take place without prior payment of this assessment.
 3. The Contractor shall make neat and legible notations on the "as-built" progress sheets daily as the work proceeds, showing the work as actually installed. For example, should a piece of equipment be installed in a location that does not match the Drawings, the Contractor must indicate that equipment has been relocated in a graphic manner so as to match the original symbols as indicated in the irrigation legend. The relocated equipment and dimensions will then be transferred to the original "as-builts" at the proper time.
 4. Record Prints: Record accurately one set of prints of all changes in the Work constituting departures from the original Contract Drawings, including changes in pressure and non-pressure line locations.
 - a. Record the changes and dimensions in legible and manner to the satisfaction of Metro or its designee. Before final inspection of Work, submit record prints to Metro or its designee for review and acceptance.
 - b. As-Built shall be computer generated (AutoCad). Drawings shall be 30-



- inch by 42-inch minimum size.
- c. Dimension from two permanent points of reference (platforms, monuments, sidewalks, curbs, pavements). Record data shown on record prints day-to-day as the Project is being installed.
 - d. Show locations, depths and size, as applicable, of the following items:
 - Point of connection including hydrometer.
 - Routing of sprinkler pressure lines and non-pressure lines (dimension maximum 100 feet along routing).
 - Connection to existing electrical power.
 - Gate valves.
 - Routing of sprinkler pressure lines.
 - Sprinkler control valves.
 - Routing of control wiring.
 - Quick coupling valves.
 - Backflow preventer.
 - Other related equipment.
 - e. Maintain record prints onsite.
 - f. Before the date of the Final Walkthrough, the Contractor shall transfer all information from the "as-built" prints to CAD plans procured from the Owner's Authorized Representative at the Contractor's cost. The original digital PDF and CAD "as-builts" shall be submitted to the Owner's Authorized Representative for approval prior to the making of the irrigation controller charts.
6. On or before the date of the Final Walkthrough, the Contractor shall deliver the corrected and completed sepia mylar "as-builts" to the Owner's Authorized Representative. Delivery of the sepia "as-builts" will not relieve the Contractor of the responsibility of furnishing required information that may be omitted from the "as-builts".
- C. Irrigation Controller Charts
1. "As-built" drawings shall be approved by the Owner's Authorized Representative before irrigation controller charts are prepared.
 2. Provide one irrigation controller chart for each irrigation controller supplied.
 3. Each irrigation controller chart shall show the area controlled by that irrigation controller and shall be the maximum size of which the irrigation controller door will allow.
 4. The irrigation controller chart is to be a reduced drawing of the actual installed irrigation system. In the event that the irrigation controller chart is not legible when the chart is reduced, it may be enlarged to a size that will be readable when reduced.



5. The irrigation controller chart shall be a 11" x 17" Xerox bond reduction with each valve station represented by a different color.
 6. When completed, hermetically seal the irrigation controller chart between two pieces of 3 mil plastic with a 1/8" edge overlap.
 7. Irrigation controller charts shall be completed and approved by the Owner's Authorized Representative prior to the Final Walk-through.
- D. Proof of Backflow Registration:
1. CONTRACTOR to provide proof of registration with the jurisdictional authority.
 2. Backflow test results shall be acceptable to the jurisdictional authority.
- E. Operation and Maintenance Manuals
1. Prepare and deliver to the Owner's Authorized Representative within 10 calendar days prior to completion of irrigation installation, four (4) - 3 ring hard cover binders each containing the following information:
 - a. Index sheets stating the Contractor's address and telephone number and a list of equipment with the name and addresses of local manufacturer's representatives.
 - b. Catalog and part sheets on every material and equipment installed under this Contract.
 - c. Guarantee statement.
 - d. Complete operating and maintenance instruction on all major equipment.
 2. In addition to the above mentioned maintenance manual, provide the Owner with on-site instructions for major equipment and show evidence in writing to the Owner's Authorized Representative at the conclusion of the Project that this service was rendered.
- F. Equipment to be Furnished
1. Supply as a part of this Contract the following tools:
 - a. Two (2) sets of special tools required for removing, disassembling and adjusting each type of sprinkler and valve supplied on the Project.
 - b. Two (2) five-foot valve keys for operation of gate valves.
 - c. Two (2) keys for each automatic controller and irrigation controller enclosure.
 - d. One (1) quick coupler key and matching hose swivel for every five (5), or fraction thereof, of each type of quick coupling valve installed.
 - e. Quantity of units equal to 10 percent of amount of each type of sprinklers installed.
 2. The above mentioned equipment shall be turned over to the Owner at the conclusion of the Project. Before the Final Walk-through shall be performed, evidence that the Owner has received this material must be shown to the Owner's Authorized Representative.

1.06 PRODUCT DELIVERY, STORAGE AND HANDLING



A. Handling of PVC Pipe and Fittings

1. The Contractor is cautioned to exercise care in handling, loading, unloading, and storing of PVC pipe and fittings. All PVC pipe shall be transported in a vehicle which allows the length of pipe to lie flat so as not to subject it to undue bending or concentrated external load at any point. Any section of pipe that has been dented or damaged will be discarded and, if installed, shall be replaced with new piping at no cost to the Owner.

1.07 SUBSTITUTIONS

A. If the Contractor wishes to substitute any equipment or materials for those equipment or materials listed on the Drawings and Specifications, he may do so by providing the following information to the Owner's Authorized Representative for approval:

1. Provide a statement indicating the reason for making the substitution. Use a separate sheet of paper for each item to be substituted.
2. Provide descriptive catalog literature, performance charts and flow charts for each item to be substituted.
3. Provide the amount of cost savings if the substituted item is approved.

B. The Owner's Authorized Representative shall have the sole responsibility in accepting or rejecting any substituted item as an approved equivalent to those equipment and materials listed on the Drawings and Specifications.

1.08 PRIOR TO START OF THE LANDSCAPE MAINTENANCE PERIOD

A. The Contractor shall submit proof of warranty to the Owner's Authorized Representative prior to the start of the landscape maintenance period. All computerized irrigation control system materials except interconnect conductors shall have a five-year warranty. It is the Contractor's responsibility to obtain the necessary warranty inspections from the equipment supplier. No installations will be accepted without proof of warranty.

1.09 GUARANTEE

A. The Guarantee for the irrigation system shall be made in accordance with the Guarantee for Sprinkler Irrigation System form.

B. A copy of the Guarantee form shall be included in the Operations and Maintenance Manual.

C. The Guarantee form shall be re-typed onto the Contractor's letterhead and contain the following information:



1.10 GUARANTEE FOR SPRINKLER IRRIGATION SYSTEM

- A. We hereby guarantee that the sprinkler irrigation system we have furnished and installed is free from defects in materials and workmanship, and the work has been completed in accordance with the Drawings and Specifications, ordinary wear and tear and unusual abuse, or neglect excepted. We agree to repair or replace any defects in material or workmanship which may develop during the period of one year from date of final acceptance and also to repair or replace any damage resulting from the repairing or replacing of such defects at no additional cost to the Owner. We shall make such repairs or replacements within a reasonable time, as determined by the Owner, after receipt of written notice. In the event of our failure to make such repairs or replacements within a reasonable time after receipt of written notice from the Owner, we authorize the Owner to proceed to have said repairs or replacements made at our expense and we will pay the costs and charges therefore upon demand.

PROJECT:

LOCATION:

SIGNED:

ADDRESS:

PHONE:

DATE OF ACCEPTANCE:

1.11 RULES AND REGULATIONS

- A. Work and materials shall be in accordance with the latest edition of the National Electric Code, the Uniform Plumbing Code as published by the Western Plumbing Officials Association, and applicable laws and regulations of the governing authorities.

1.12 PROTECTION OF WORK AND MATERIALS

- A. The Contractor shall protect his work and work of others for the duration of the Contract. He shall protect pipes and fittings from direct sunlight, and avoid undue bending and any concentrated external loading. Pipe or fittings that have been damaged shall not be used.
- B. The Contractor shall exercise extreme care in excavating and working near existing utilities. Damage to utilities which are caused by contractor's operation shall be the Contractor's responsibility.
- C. The Contractor shall take necessary precautions to protect site conditions and plant material that is to remain. Should damage be incurred, Contractor shall repair damage to its original condition or furnish and install equal replacements.



- D. All existing irrigation systems shall be kept in operation at all times. If the existing system is damaged by Contractor, he shall be responsible for immediate repair of such damage. After each repair, all heads of the repaired system shall be removed so that the lines can be cleared of all dirt and foreign matter.

1.13 CORRECTION OF WORK

- A. Unsatisfactory work and discrepancies between installed work and the drawings shall be corrected by the Contractor at no additional expense to the Owner. The correction of work shall be finished with a reasonable period mutually agreed upon between the Owner and Contractor.

PART 2 - PRODUCTS

2.01 GENERAL

- A. Use only new materials of brands and types noted on the Drawings or Specifications or Owner-approved equipment.

2.02 PVC PRESSURE MAIN LINE PIPE AND FITTINGS

- A. Pressure main line piping for sizes 2" and larger, shall be PVC Class 315.
- B. Class 315 pipe shall be made from an NSF approved Type I, Grade I, PVC compound conforming to ASTM compound specification D1784. All pipe must meet requirements as set forth in ASTM D2241 (Solvent-weld Class Pipe), with an appropriate standard dimension (S.D.R.).
- C. Pressure main line piping for sizes 1-1/2" and smaller shall be PVC Schedule 40 with solvent welded joints.
- D. Schedule 40 pipe shall be made from NSF approved Type I, Grade I PVC compound conforming to ASTM compound specification D1784. All pipe must meet requirements as set forth in ASTM D1785 (Solvent-weld Schedule Pipe).
- E. PVC solvent-weld fittings shall be Schedule 40, 1-2, II-I NSF approved conforming to ASTM test procedure D2466.
- F. Solvent cement and primer for PVC solvent-weld pipe and fittings shall be of type and installation methods prescribed by the manufacturer.



- G. All PVC pipe must bear the following markings:
 - 1. Manufacturer's name.
 - 2. Nominal pipe size.
 - 3. Schedule or class.
 - 4. Pressure rating in PSI.
 - 5. NSF (National Sanitation Foundation) approval.
 - 6. Date of extrusion.

- H. All fittings shall bear the manufacturer's name or trademark, material designation, size, applicable IPS schedule and NSF seal of approval.

2.03 PVC NON-PRESSURE LATERAL LINE PIPING

- A. Non-pressure buried lateral line piping shall be PVC class 40 with solvent-welded joints.

- B. Non-pressure lateral line piping installed under paved areas shall be installed in a PVC Schedule 40 sleeve.

- C. Pipe shall be made from NSF approved, Type I, Grade II PVC compound conforming to ASTM compound specification D1784. All pipe must meet requirements set forth in ASTM D2241 (Solvent-weld Class Pipe) with an appropriate standard dimension ratio.

- D. Except as noted in paragraphs A, B, C and D of Section 2.2, all requirements for non-pressure lateral line pipe and fittings shall be the same as for solvent-weld pressure main line pipe and fittings as set forth in this Specification.

2.04 BRASS PIPE AND FITTINGS

- A. Where indicated on the Drawings, use red brass screwed pipe conforming to Federal Specification #WW-P-351.

- B. Fittings shall be red brass conforming to Federal Specification #WW-P-460.

2.05 GALVANIZED PIPE FITTINGS

- A. Where indicated on the Drawings, use galvanized steel pipe ASA Schedule 40 mild steel screwed pipe.

- B. Fittings shall be medium galvanized screwed beaded malleable iron, or Class 150 flanged steel with Corten bolts where required. Galvanized couplings may be merchant coupling.

- C. All galvanized pipe and fittings installed below grade shall be painted with two (2) coats of bitumastic. Or cover pipe with 2 layers of plastic, self-adhesive, pipe wrap, 2 mils thick.

- D. Use non-hardening, nontoxic pipe joint sealant formulated for use on water-carrying pipes on all metal threaded connections.



2.06 GATE VALVES

- A. Gate valves 3" and smaller shall be 125 psi SWP stainless steel ball gate valve with blow-out proof and full port.
- B. Gate valves 3" and smaller shall have threaded ends and shall be equipped with a bronze handle.
- C. All gate valves shall be installed per irrigation installation details.

2.07 QUICK COUPLING VALVES

- A. Quick coupling valves shall have a brass two-piece body designed for a working pressure of 150 PSI, operable with quick coupler. Key size and type shall be as indicated on the Drawings.

2.08 CHECK VALVES

- A. Swing check valves 2" and smaller shall be 200 psi WOG bronze construction with replaceable composition, neoprene or rubber disc and shall meet or exceed Federal Specification WW-V- 51D, Class A, Type IV.
- B. Check valves shall be of heavy duty virgin PVC construction with FIP threaded inlets and outlets. Internal parts shall be stainless steel and neoprene. Check valves shall be field adjustable against draw-out from 5 to 40 feet of head.

2.09 CONTROL WIRE

- A. Connections between the automatic controllers and the electric control valves shall be made with direct burial copper wire AWG-U.F. 600 volt. Pilot wires shall be a different color wire for each automatic controller. Common wires shall be #12 gauge and the color white with a different color stripe for each automatic controller. Install wires in accordance with valve manufacturer's specifications and wire charts. In no case shall wire size be less than #14 gauge. Wire color shall be continuous over its entire length.
- B. Wiring shall occupy the same trench and shall be installed along the same route as pressure supply or lateral lines wherever possible.
- C. Where more than one (1) wire is placed in a trench, the wiring shall be taped together at intervals of 10 feet.
- D. An expansion curl shall be provided within three (3) feet of each wire connection. Expansion curl shall be of sufficient length at each splice connection at each electric control, so that in case of repair, the valve bonnet may be brought to the surface without disconnecting the



control wires. Control wires shall be laid loosely in the trench without stress or stretching of the control wire conductors.

- E. All splices shall be made with either Scotch-Lok #3576 Connector Sealing Packs or Rain Bird Snap-Tite wire connector, or approved equivalent. Use one splice per connector sealing pack.
- F. Field wire splices between the automatic controller and the electrical control valves shall not be allowed without prior approval of the Owner's Authorized Representative.
- G. When control wiring is trenched separately from mainline trenches a continuous warning tape shall be installed with the wiring. Warning tape: Inert plastic film highly resistant to alkalis, acids, or other destructive chemical components likely to be encountered in soils. Three inches wide, colored yellow, and imprinted with "CAUTION: BURIED ELECTRIC LINE BELOW."
- H. Provide a 36-inch excess length of wire in an 8-inch diameter loop at each 90 degree change of direction, at both ends of sleeves, and at 100-foot intervals along continuous runs of wiring. Do not tie wiring loop.
- I. Install common ground wire and one control wire for each remote control valve. Multiple valves on a single control wire are not permitted. Install one common wire for each controller. Multiple controllers with one common wire will not be permitted.

2.10 AUTOMATIC IRRIGATION CONTROLLERS

- A. Existing automatic irrigation controllers shall be utilized for new irrigation systems and to be re-established for existing landscape areas currently irrigated by the controller and proposed to remain.
- B. Final location of automatic irrigation controllers shall be approved by the Owner's Authorized Representative.
- C. Unless otherwise noted on the Drawings, the 120-volt electrical power to the automatic irrigation controller shall be furnished by others. The final electrical hook-up shall be the responsibility of the Contractor.
- D. The automatic irrigation controller shall be included as a part of the Irrigation Controller Enclosure Assembly.

2.11 ELECTRICAL CONTROL VALVES

- A. All electric control valves shall be the same manufacturer as the automatic controllers unless noted otherwise on the Drawings.
- B. All electric control valves shall have a manual flow adjustment.



- C. Provide and install one (1) control valve box for each electric control valve.

2.12 VALVE BOXES

- A. Use a 10" diameter x 10-1/4" round valve box for gate valves, control wire splices and quick coupling valves as manufactured by Carson-Brooks Plastics, model #910-13B with green bolt-down cover (or approved equivalent). Extension sleeves shall be 6" minimum PVC piping material.
- B. Use a 11 3/4" wide x 17" long x 12" deep rectangular valve box for electrical control valves, master valves, and control wire pull boxes, as manufactured by Carson-Brooks Plastics, model #1419-12-3B with a green bolt-down cover (or approved equivalent).
- C. Valve boxes shall be a minimum of one (1) foot apart when arranged in a group or side by side, or unless noted otherwise in the Drawings.

2.13 SPRINKLER HEADS

- A. All sprinkler heads shall be of the same size, type, and deliver the same rate of precipitation with the diameter (or radius) of throw, pressure, and discharge as shown on the Drawings and in this Specification.
- B. Spray heads shall have a screw adjustment.
- C. Riser units shall be fabricated in accordance with the Drawings.
- D. Riser nipples for all sprinkler heads shall be the same size as the riser opening in the sprinkler body.
- E. All sprinkler heads of the same type shall be from the same manufacturer.

2.14 IDENTIFICATION TAGS

- A. Identification tags for electrical control valves, and other equipment assemblies as designated on Drawings, shall be manufactured from Polyurethane Behr Desopan. Use standard tag hot stamped with black letters on yellow background. The tags shall be numbered to match station identification as indicated on Drawings. Provide one (1) tag for each electric control valve. Tags shall be acceptable to the City of Goleta and the Goleta Valley Water District.

2.15 IRRIGATION CONTROLLER ENCLOSURE ASSEMBLY

- A. Located within electrical room.



2.16 SLEEVING

- A. Install separate sleeve beneath paved areas to route each run of irrigation pipe or wiring bundle.
- B. Sleeving material beneath pedestrian pavements - PVC Schedule 40 pipe with solvent welded joints.
- C. Sleeving beneath streets and drives - PVC Schedule 40 pipe with solvent welded joints.
- D. Sleeving diameter - equal to twice that of the pipe or wiring bundle. Minimum sleeving diameter shall be 2 inches.
- E. Marking stakes - 2" x 2" x 24" wood stakes.

2.17 OTHER COMPONENTS

- A. Tools and Spare Parts
 - 1. Provide operating keys, servicing tools, test equipment, other items, and spare parts as indicated in other areas of this Specification.
- B. Other Materials
 - 1. Provide other materials or equipment not indicated on the Drawings or referenced in this Specification, as necessary, to complete the installation of the irrigation system.

2.18 MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
- B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Cast Iron, Gate Valves for Underground Installation:
 - a. American AVK Co.
 - b. American Cast Iron Pipe Co.; American Flow control Div.
 - c. Griswold.
 - 2. Cast-Iron, Gate Valves for Above-ground and Control-Valve Box Installation:
 - a. American AVK Co.
 - b. Nibco, Inc.
 - c. Or equal.
 - 3. Ball Gate Valves for Underground Installation:
 - a. Hammond
 - b. Fibco
 - c. Or equal.
 - 4. Bronze Valves for Above-Ground and Control-Valve Box Installation: Bronze Ball Valves: MSS SP-110, Class 150, 600 psig (4140-kPa) cold working pressure. Include



- bronze, two-piece construction body with regular port; chrome-plated brass ball; blowout-proof stem; PTFE seats and seals; threaded-end connections; and lever handle.
- a. American Valve, Inc.
 - b. Nibco, Inc.
 - c. Griswold.
5. PVC Valves for Above-ground and Control-Valve Box Installation:
- a. American Valve, Inc.
 - b. Nibco, Inc.
 - c. Rainbird Sprinkler Mfg. Corp.
6. Bronze, Automatic Control Valves:
- a. Rain Bird Sprinkler Mfg. Corp.
 - b. Toro Co. – Irrigation Division
 - c. L. R. Nelson
7. Plastic, Automatic Control Valves: PVC with 150-psig (1035-kPA) minimum pressure rating, ends compatible with piping, and tee handle.
- a. Rain Bird Sprinkler Mfg. Corp.
 - b. Toro Co. – Irrigation Division
 - c. L. R. Nelson.
8. Control Valve Boxes: PE, ABS, fiberglass, polymer concrete, or pre-cast concrete box and cover, with open bottom, openings for piping, and designed for installing flush with grade. Include size as required for valves and service.
- a. American Drainage Products, Inc.
 - b. AMETEK; Plymouth Products Div.
 - c. NDS, Inc.
9. Quick Couplers: Factory fabricated, bronze or brass, two-piece assembly, Include coupler water-seal valve; removable upper body with spring-loaded or weighted, rubber-covered cap; hose swivel with ASME B1.20.7, 3/4-11.5NH threads for garden hose on outlet; and operating key.
- a. Rain Bird Sprinkler Mfg. Corp.
 - b. Toro Co. – Irrigation Division
 - c. L. R. Nelson.
10. Sprinklers:
- a. Rain Bird Sprinkler Mfg. Corp.
 - b. Toro Co. – Irrigation Division
 - c. Hunter.
11. Water Regulators:
- a. Cal-Val Co.
 - b. FLOMATIC Corp.
 - c. Wilkins.
12. Emitter and Drip-Tube Specialties:
- a. Rain Master Sprinkler Mfg. Corp.
13. Miscellaneous Specialties:
- a. Rain Bird Sprinkler Mfg. Corp.
 - b. Toro Co. – Irrigation Division



- c. Hunters.
14. Backflow Preventer: Reduced Pressure Type:
 - a. FEBCO Division of CMB Industries
 - b. WATTS Industries, Inc.
 - c. Zurn Industries, Inc.
 - d. Cla-va Co.
15. Identification Tags:
 - a. Rain Bird Sprinkler Mft. Corp.
 - b. T. Christy Enterprise
 - c. Or equal.

PART 3 - EXECUTION

3.01 GENERAL

- A. All scaled dimensions are approximate. The Contractor shall check and verify all size dimensions and receive the Owner's Authorized Representative's approval prior to proceeding with any work under this Specification. Contractor shall locate with 2" x 2" wood stakes with identifying markings for all proposed locations of electrical control valve boxes, gate valve boxes and quick coupler boxes for approval by the Owner's Authorized Representative. After locating all these items contact the Owner's Authorized Representative for review and approval. Minor adjustments to the stake locations may be requested of the Contractor by the Owner's Authorized Representative at that time.
- B. Exercise extreme care in excavating and working near existing utilities. The Contractor shall be responsible for damages to these utilities which are caused by his operations. Check existing utility drawings for existing utility locations.
- C. Coordinate installation of sprinkler irrigation materials including pipe, so that there shall be no interference with utilities, construction elements, or the planting of trees, shrubs, and ground covers.
- D. The Contractor shall carefully check all finish grades to satisfy himself that he may safely proceed before starting work on the irrigation system.
- E. Report irregularities to Owner's Authorized Representative prior to beginning work. Beginning of work implies acceptance of existing conditions.

3.02 SITE PREPARATION

- A. Physical Layout
 1. Prior to installation, the Contractor shall stake out all pressure and non-pressure supply lines and the location of all sprinkler heads.



2. All layout shall be approved by the Owner's Authorized Representative prior to installation.
- B. Water Supply Point-of-Connections
1. Water supply points of connection are as indicated on the Drawings. The Contractor shall be responsible for minor changes caused by actual site conditions.
 2. The sprinkler irrigation system shall be connected to water supply points of connection as indicated on the Drawings.
- C. Electrical Supply Point-of-Connections
1. Electrical supply point-of-connections for the automatic irrigation controllers are as indicated on the Drawings. The Contractor shall be responsible for minor changes caused by actual site conditions.
 2. Connections shall be made at approximate locations as indicated on the Drawings. The Contractor shall be responsible for minor changes caused by actual site conditions.

3.03 INSTALLATION

- A. Trenching
1. Dig trenches straight and support pipe continuously on bottom of trench. Lay pipe to an even grade. Trenching excavation shall follow the layout as indicated on the Drawings.
 2. Provide a minimum soil cover of 18 inches for all pressure supply lines.
 3. Provide a minimum soil cover of 12 inches for all non- pressure lines.
 4. Provide a minimum soil cover of 18 inches for all control wire.
 5. Where piping is indicated under paved areas, but running parallel and adjacent to planting areas, install the piping in the planted areas. Irrigation head spacing as indicated on the Drawings shall not be exceeded.
- B. Backfilling
1. The trenches shall not be backfilled until all required tests are performed. Trenches shall be carefully backfilled with the excavated materials approved for backfilling, consisting of earth, loam, sandy clay, sand, or other approved materials, free from large clods of earth or stones. Backfill in planting areas shall be 85% compacted in layers. Backfill shall be mechanically compacted landscaped areas to a dry density equal to adjacent undisturbed soil in planting areas. Backfill shall conform to adjacent grades without dips, sunken areas, humps or other surface irregularities.
 2. A fine granular material backfill shall be initially placed over all lines. No foreign matter larger than one-half inch in size will be permitted in the initial backfill.
 3. If settlement occurs and subsequent adjustments in pipe, valves, sprinkler heads, planting, or other construction elements are necessary, the Contractor shall make all required adjustments without cost to the Owner.



C. Trenching and Backfilling Under Paving

1. Trenches located under areas where asphaltic concrete or concrete paving occur, shall be backfilled with sand (a layer six (6) inches below the pipe and three (3) inches above the pipe) and compacted in layers to 95% compaction, using manual or mechanical tamping devices. Trenches for piping shall be compacted to equal the compaction of the existing adjacent undisturbed soil and shall be left in a firm unyielding condition. All trenches shall be left flush with adjoining finish grade. The Contractor shall set in place, cap and pressure test all piping under paving prior to the paving work.
2. Generally piping under existing walks is done by jacking, boring or hydraulic driving, but where any cutting or breaking of concrete is necessary, it shall be done and replaced by the Contractor at no cost to the Owner. Permission to cut or break concrete shall be obtained from the Owner's Authorized Representative. No hydraulic driving will be permitted under concrete paving.
3. Provide a minimum soil cover of 18 inches between the top of the pipe and the bottom of the aggregate base for all pressure and non-pressure piping installed under asphaltic concrete paving.

D. Assemblies

1. Routing of irrigation lines as indicated on the Drawings is diagrammatic only. Install lines and various assemblies in such a manner as to conform with the Drawings.
2. Install no multiple assemblies in plastic lines. Provide each assembly with its own outlet.
3. Install all assemblies specified herein in accordance with their respective details. In absence of Drawings or Specifications pertaining to specific items required to complete this work, perform such work in accordance with best standard practice with prior approval of the Owner's Authorized Representative.
4. PVC pipe and fittings shall be thoroughly cleaned of dirt, dust and moisture before installation. Installation and solvent welding methods shall be as recommended by the pipe and fitting manufacturer.
5. On PVC to metal connections work the metal connections first. Teflon tape or approved equivalent, shall be used on all threaded PVC to PVC and threaded PVC to metal joints. Apply a light wrench pressure only. Where threaded PVC connections are required, use threaded PVC adapters into which the pipe may be solvent welded.

E. Assembling Pipe and Fittings:

1. Inspect all pipe and fittings before installation.
2. Keep pipe free from dirt and pipe scale. Cut pipe ends square and debur. Clean pipe ends of loose pipe shavings.
3. Keep ends of assembled pipe capped. Remove caps only when necessary to continue assembly.
4. Install pipe with all markings up for visual inspection and verification.
5. All lines shall have a minimum clearance of six (6) inches from each other and from lines of other trades. Parallel lines shall not be installed directly over one another.



6. Maintain 10-foot minimum horizontal separation from all potable water piping. Provide a minimum vertical clearance of six (6) inches.
 7. Use only strap-type friction wrenches for threaded plastic pipe.
 8. Snake pipe from side to side within the trench.
- F. Line Clearance
1. All lines shall have a minimum clearance of six (6) inches from each other and from lines of other trades. Parallel lines shall not be installed directly over one another.
- G. Irrigation Controller Installation
1. Install the irrigation controller per the manufacturer's instructions. Remote control valves shall be connected to the irrigation controller in numerical sequence as indicated on the Drawings.
- H. High Voltage Wiring for the Irrigation Controller
1. 120 volt power connection to the irrigation controller shall be provided by the Contractor.
- I. Electric Control Valve Installation
1. Install electric control valves as indicated on the Drawings. When grouped together, allow at least twelve inches between electric control valves. Install each electric control valve in a separate valve box. Each electric control valve number shall be heat-branded on valve box top with 2" tall letters.
 2. The Owner's Authorized Representative shall approve electric control valve and quick coupling valve box locations prior to final installation.
- J. Valve Box Installation
1. Install valve boxes as indicated on the Drawings. When grouped together, allow at least twelve inches between valve boxes.
 2. Heat brand valve box identification. All valve boxes to be clearly identifiable.
- K. System Flushing
1. After all pipe lines and risers are in place and connected and all necessary diversion work has been completed, and prior to installation of sprinkler heads, the control valves shall be opened and a full head of water used to flush out the system. Sprinkler heads shall be installed only after flushing of system has been performed.
- L. Sprinkler Head Installation
1. Install the sprinkler heads as indicated on the Drawings.
 2. Spacing of sprinkler heads shall not exceed the maximum spacing as indicated on the Drawings. In no case shall the spacing exceed the maximum recommended by the manufacturer.
 3. Install check valves on sprinkler heads that drain water after the control valve is turned off. "Low head" drainage will not be allowed on sprinkler heads.



- M. Sleeving
 - 1. Extend sleeve ends a minimum of 12 inches beyond the edge of the paved surface. Cover pipe ends and mark with stakes. Route wire through and tie at each end to stakes.

3.04 TEMPORARY REPAIRS

- A. The Owner reserves the right to make temporary repairs as necessary to keep the irrigation system in operating condition. The exercise of this right by the Owner shall not relieve the Contractor of his responsibilities under the terms of the Guarantee as herein specified.

3.05 INSTALLATION OF OTHER COMPONENTS

- A. Tools and Spare Parts
 - 1. Prior to the Pre-Maintenance Walk-through, supply the Owner operating keys, servicing tools, test equipment, and any other items as indicated on the Drawings.
- B. Other Materials
 - 1. Install other materials or equipment to be part of the irrigation system, as indicated on the Drawings, even though such items may not have been referenced in this Specification.

3.06 EXISTING TREES

- A. Where it is necessary to excavate adjacent to existing trees, the Contractor shall use all possible care to avoid injury to trees and their roots. Excavation in areas where two (2) inch and larger roots occur shall be done by hand. All roots two (2) inches and larger in diameter, except directly in the path of pipe or conduit, shall be tunneled under and shall be heavily wrapped with burlap, to prevent scarring or excessive drying. Where a ditching machine is run close to trees having roots smaller than two (2) inches in diameter, the wall of the trench adjacent to the tree shall be hand trimmed. Roots one (1) inch and larger in diameter shall be painted with two coats of an approved tree seal. Trenches adjacent to existing trees should be closed within 24 hours. Where this is not possible, the side of the trench adjacent to the existing tree shall be kept shaded with burlap or canvas.

3.07 FIELD QUALITY CONTROL

- A. Adjustment of the Irrigation System
 - 1. Flush and adjust all sprinkler heads for optimum performance and to reduce overspray onto walks, roadways, and buildings as much as possible.
 - 2. If it is determined that adjustments to the sprinkler heads will provide proper and more adequate coverage, the Contractor shall make such adjustments prior to any planting. Adjustments may also include changes in nozzle sizes and degrees of arc as required.



3. Lowering raised sprinkler heads by the Contractor shall be accomplished within 10 days after notification by the Owner's Authorized Representative.
4. All sprinkler heads shall be set perpendicular to finish grades unless otherwise indicated on the Drawings.

B. Irrigation System Testing

1. The Contractor shall request the presence of the Owner's Authorized Representative at least 48 hours in advance of irrigation system testing.
2. Test all pressure lines under hydrostatic pressure of 150 PSI for a period of two (2) hours.
Note: Testing of pressure mainline shall occur prior to installation of any electric control valves.
3. All piping (pressure and non-pressure) under paved areas shall be pressure tested under a hydrostatic pressure of 150 PSI for a period of two (2) hours.
4. If during the pressure test, a pressure drop occurs - indicating a leak, replace the faulty joints and repeat the pressure test until the entire system is proven watertight.
5. All hydrostatic tests shall be made only in the presence of the Owner's Authorized Representative. No pipe shall be backfilled until it has been observed, tested and approved in writing. Contractor shall maintain a test log and submit with record documents.
6. The Contractor is to furnish the necessary force pump and all other test equipment for the hydrostatic pressure test.
7. When the irrigation system passes the hydrostatic pressure test and is completed, perform a sprinkler coverage test in the presence of the Owner's Authorized Representative. Determine if the water coverage is complete and adequate. Furnish all materials and perform all work necessary to correct any inadequacies of water coverage due to deviations from the Drawings, or where the irrigation system has been willfully installed as indicated on the Drawings when it is obviously inadequate, without bringing this to the attention of the Owner's Authorized Representative. This test shall be accomplished before any groundcover is planted.
8. Upon completion of each phase of work, the entire system shall be coverage tested and adjusted to meet specific site requirements.

3.08 IRRIGATION SYSTEM MAINTENANCE

- A. The entire irrigation system shall be under full, automatic operation for a period of seven (7) days prior to beginning any planting. The Owner reserves the right to waive or shorten this operation period.

3.09 CLEAN UP

- A. Clean up shall be made as each portion of work progresses. Refuse and excess dirt shall be removed from the site, all walks and paving shall be broom swept or washed down, and any damage sustained to the work of other contractors shall be repaired to original conditions at no cost to the Owner.



- B. Upon completion of the Work, the Contractor shall smooth all ground surfaces. Remove excess materials such as rubbish, debris and sweep adjacent streets, curbs, gutters, walkways and trails. Remove construction equipment from the premises.

3.10 FINAL WALK-THROUGH PRIOR TO ACCEPTANCE

- A. The Contractor shall operate the irrigation system in its entirety for the Owner's Authorized Representative at time of the Final Walk through. Any items deemed not acceptable by the Owner's Authorized Representative shall be reworked to his complete satisfaction.
- B. The Contractor shall show evidence to the Owner's Authorized Representative that the Owner has received all accessories, charts, "As-built drawings", and equipment as required before the Final Walk through will be performed.

3.11 SITE VISIT OBSERVATION SCHEDULE

- A. The Contractor shall be responsible for notifying the Owner's Authorized Representative in advance of the following site visits:
 1. Pre-Job or "Kick-Off" meeting - 7 days.
 2. Pressure supply line installation and testing - 2 days.
 3. Automatic controller installation - 2 days.
 4. Control wire installation - 2 days.
 5. Lateral line and sprinkler head installation - 2 days.
 6. Sprinkler coverage test - 2 days.
 7. Final Walkthrough - 7 days.
- B. When site visits are conducted by other than the Owner's Authorized Representative, show evidence in writing of when and by whom these site visits were made.
- C. No site visits will commence without "As-builts". In the event the Contractor schedules a site visit without "As-builts" or without completing previously noted corrections, or without preparing the system for said visit, the Contractor will be responsible for reimbursing the Owner's Authorized Representative at his current billing rate per hour portal to portal (plus transportation costs) for this inconvenience. No further site visits will be performed by the Owner's Authorized Representative until this charge has been paid and received.

END OF SECTION



SECTION 32 84 01 PLANTING IRRIGATION - DRIP SYSTEMS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, shall apply to all work in this Section with the same force and effect as though repeated in full herein.

1.02 SUMMARY

- A. Conditions within Irrigation System specification Section 32 80 00 shall apply to this section.
- B. This Section includes the installation of low volume irrigation components including Control Zone Kits, Landscape Dripline, Fittings and Emission Devices.

PART 2 - DRIP IRRIGATION PRODUCTS

2.01 CONTROL ZONE KITS

- A. General
 - 1. Control zone kit assemblies for drip irrigation zones must include a valve, filtration and pressure regulation to meet the flow requirements of the zone. Where necessary a check valve shall also be installed.
 - 2. Components shall be sized according to the hydraulic demands of the system.
- B. Basket Filter
 - 1. Commercial Control Zone Kit for zones with flows from 3.0 to 20.0 GPM
 - a. Control Zone Kit shall be a Commercial Control Zone Kit with 1" valve, Quick Check Basket Filter with 200-mesh (75 micron) screen and 40 psi Pressure Regulator.
 - b. The control zone kit shall have a 1" isolation ball valve.
 - c. The filter shall be a 1" inline Quick Check Basket Filter body constructed of heavy-duty, glass-filled, UV resistant polypropylene capable of withstanding pressures of not less than 150 psi (10,3 bars). The design shall be a basket style body with jar-top cap. The cap shall incorporate an indicator that goes from green to red during operation when the filter element needs cleaning. The dimensions for the filter shall not exceed the following: Height: 6 1/2" (16,5 cm), Length: 6 1/2" (16,5 cm), Width: 3 1/2" (8,9 cm). The filter element shall be constructed of a durable stainless steel mesh attached to a propylene



frame and shall be a standard 200-mesh (75 micron). The screen shall be serviceable for cleaning purposes by unscrewing the cap from the body and removing the filter element.

- d. The control zone kit shall have an inline pressure regulator. The pressure regulator shall be constructed of durable, UV resistant non-corrosive material able to accommodate an inlet pressure rating of not less than 150 psi (10,3 bar). The pressure regulating device is a normally open device that allows full flow with little pressure loss unless the inlet pressure is greater than the preset level. As the inlet pressure increases above the preset level it compresses a spring and begins to reduce the flow and downstream pressure. The inline pressure regulator shall have a preset outlet pressure of approximately 40 psi (2,8 bar).
- e. The control zone kit shall have a 1” series automatic irrigation control valve, or approved equivalent. The valve pressure rating not to be less than 150 psi (10,3 bars). The valve body and bonnet shall be constructed of high-impact, weather-resistant plastic, stainless steel and other chemical/UV resistant materials. The valve shall have a diaphragm constructed of a durable Buna-N rubber material reinforced with nylon.

2.02 LANDSCAPE DRIPLINE

A. Inline Emitter Tubing

1. Pressure-Compensating Landscape Dripline
 - a. The inline emitter shall be welded to the inner circumference of the polyethylene tubing. The inline emitter shall have dual outlet ports, 180° apart, ensuring only one port has contact with the ground when the tubing is installed at grade and mulched over.
 - b. ADI emitter (Advanced Drip Inline) shall pressure compensate by lengthening the emitter’s turbulent flow path. The emitter shall be cylindrical in shape and provide surface area for filtration throughout 360° of its outer circumference. This increased filtration surface area shall assure that the water that enters the inline emitter can always come from the upper half, or cleanest part of the flow path in the polyethylene tubing regardless of how the inline tubing lays on the ground.
 - c. Landscape Dripline tubing shall be brown in color and conform to an outside diameter (O.D.) of 0.630 inches (16 mm) and an inside diameter (I.D.) of 0.540 inches (13,7 mm) and wall thickness of 0.045 inches (1,1 mm).
 - d. Landscape Dripline shall have factory installed, pressure-compensating, inline emitters installed every [12] or [18] or [24] inches on center as indicated on drawings.
 - e. Landscape Dripline shall have factory installed, pressure-compensating, inline emitters with spacing as indicated on drawings.
 - f. The flow rate from each installed inline emitter shall be a consistent [0.6] or [0.9] gallons per hour when inlet pressure is between 8.5 and 60 psi (0,7 to 4,1 bars).



- g. Operating pressure range: 8.5 to 60 psi (0,7 to 4,1 bar).

2.03 FITTINGS

A. Compression Fittings

1. Easy Fit Compression Fittings:
 - a. The Easy Fit Compression Fitting System shall consist of 3 fittings (tee, coupling and elbow) plus 5 adapters and two removable flush caps.
 - b. The Easy Fit Compression Fittings shall accept all polyethylene tubing from .630" to .710" (16mm-18mm) OD and shall provide a leak-free compression fit. They also shall provide connections to threaded components when used with any of the 5 adapters. The fittings shall be molded from UV-resistant ABS material with a Buna-N rubber seal for long-term, leak free connections.
 - c. The adapters shall be made of UV-resistant ABS materials and shall only be used with Easy Fit Compression Fittings. The adapters shall be installed in the Easy Fit Compression Fittings and threaded onto ½" or ¾" Male- or Female-threaded components. Pressure loss for the Easy Fit Adapters is a maximum of .1 PSI for each adapter used.
 - d. The removable [black] or [purple] flush cap shall be used to close off a line. The purple flush cap shall be used to close off a line containing non-potable water.
 - e. The operating pressure range for the Easy Fit Compression Fitting System shall be 0 to 60 psi (0 to 4,1 bars).

END OF SECTION



SECTION 32 90 00

PLANTING

PART 1 – GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, shall apply to all work in this Section with the same force and effect as though repeated in full herein.

1.02 SUMMARY

- A. Furnish all materials, labor, transportation, services, and equipment necessary to install landscape planting as shown on the Drawings and as specified herein.
- B. Work included in this Section:
 - 1. Fine grading.
 - 2. Soil preparation.
 - 3. Pre-plant weed control.
 - 4. Tree, shrub and ground cover planting.
 - 5. Tree staking and guying.
 - 7. Mulching.
 - 9. Concrete mowstrip installation.
 - 10. Hydroseeding
 - 11. Clean-up.
- C. Work related in other Sections:
 - 1. Section 32 80 00 & Section 32 84 00 – Planting Irrigation & Planting Irrigation - Drip Systems.
 - 2. Section 32 01 90 – Operations and Maintenance of Planting

1.03 REQUIREMENTS OF REGULATORY AGENCIES

- A. All Federal, State, and local laws and regulations governing this work are hereby incorporated into and made part of this Section. When this Section calls for certain materials, workmanship or a level of construction that exceeds the level of Federal, State, or local requirements, the provisions of this Section shall take precedence.

1.04 REFERENCE STANDARDS

- A. All plant material shall be true to botanical and common name as indicated in "An Annotated Checklist of Woody Ornamental Plants of California, Oregon and



Washington", (Number 4091)" published by the University of California School of Agriculture - 1979.

- B. "American Standard for Nursery Stock" edition 1985 by The American National Standards Institute for plant materials.
- C. Hortus Third", 1976; Cornell University for plant nomenclature.
- D. All plant material shall conform to the California State Department of Agriculture's regulation for nursery inspections, rules and ratings.

1.05 QUALITY CONTROL

- A. Manufacturer's Directions - manufacturer's directions and drawings shall be followed in all cases where the manufacturers of articles used in this Specification furnish directions covering points not shown in the Drawings and Specifications.
- B. Permits, Fees, Bonds and Inspections - the Contractor shall pay for any and all permits, fees, bonds and inspections necessary to perform and complete his portion of the Work.
- C. Plant Source Quality - submit written documentation to the Owner's Authorized Representative within 25 days of Contract award that the plant material listed on the Drawings is available. Any substitutions required due to unavailability must be requested in writing prior to confirmation of ordering.
- D. Upon execution of the order, the Owner's Authorized Representative has the option of either inspecting the plant material at the source of growth, requesting representative color photos, or inspecting the material as it is being delivered to the site for conformity to the Drawings and Specifications. Such approvals shall not impair the right of additional inspections during further progress of the Work.
- E. Any tagging of plant material by the Owner's Authorized Representative does not constitute his approval of the plant materials' health and vigor. The health and vigor of the plant material is the sole responsibility of the Contractor.
- F. Submit written request to the Owner's Authorized Representative for inspection of the specified plant material, either at the place of growth or by color photographs. Requests for inspection shall state the place of growth and the quantity and variety of plant material.
- G. The Owner's Authorized Representative reserves the right to refuse inspection if in his judgment, a sufficient quantity of plant material at that time is not available for inspection.



H. Topsoil Inspection

1. Within 25 days of contract award, furnish source of topsoil to the Owner's Authorized Representative for purpose of soil inspection.
2. Take representative soil samples from areas identified in the Drawings.
3. Soil samples shall be tested for pH, alkalinity, total soluble salts, porosity, sodium content, organic matter and soil preparation recommendations.
 - i. Soil Fertility: Half-saturation percent, pH, salinity, nitrate, ammonium, phosphate, potassium, calcium, magnesium.
 - ii. Agricultural Suitability: pH, salinity, boron, Sodium Absorption Ratio (SAR) using saturation paste extract.
 - iii. Particle Size/Appraisal: pH, salinity, organic percent, USDA Particle size.
 - iv. Germination (bio-assay) test.
 - v. Tendency towards compaction.

I. Within 25 days of contract award, furnish source of topsoil to the Owner's Authorized Representative for purpose of soil inspection.

J. Take representative soil samples from areas identified in the Drawings.

K. The Soil Analysis Report shall include a statement that the laboratory has reviewed the planting plan and the planting specifications, and that its recommendations respond to the specific needs of the project.

L. Certificates: certify compliance with accepted soil mixes and amendments, including Rates of applications.

1.06 QUALIFICATIONS

A. The applicator of all weed control materials shall be licensed by the State of California as a Pest Control Operator and a Pest Control Advisor in addition to any subcontractor licenses that are required.

B. Landscape Contractor shall have a minimum 5-years experience installing plants for similar project types.

1.07 SUBMITTALS

A. The Contractor shall submit no later than 30 days after the award of Contract (2) bound booklets containing the following landscape information:



1. List of all proposed landscape materials indicated by description, manufacturer and model number. Include catalog cuts of all items.
 2. List of all trees indicated by botanical name, common name, quantity, size, nursery and location and any specific remarks, i.e. "unable to locate", "photo submitted", etc. The tree list is to be accompanied with color photographs of each tree type and size with specifications, i.e. height, spread and caliper. Include a person in each photograph for scale purposes.
 3. List of all shrubs, vines and ground covers indicated by botanical name, common name, size, nursery and location and specific remarks, i.e. "unable to locate", "photo submitted", etc.
 4. Soil amendment receipts containing analytical data and physical samples of all specified amendments.
 5. Receipts from the soil supplier of all soil mixes specified in this section.
- B. The Contractor shall submit no later than 30 days after the award of Contract the following physical samples sent to the Owner's Authorized Representative in plastic bags:
1. Shredded bark mulch.
 2. Certificates
 3. Compliance with State of California and federal quarantine restrictions.
- C. Weed, Insects & Pest Control
1. Prior to the installation of any weed control materials, the Pest Control Advisor shall submit to the Owner's Authorized Representative, a list of the weed control materials and quantities per acre intended for use in controlling the weed types prevalent and expected on the site.
 2. The Pest Control Advisor shall furnish data to demonstrate the compatibility of the weed control materials and methods with the intended planting and seed varieties.
 3. Submit to Owner's Authorized Representative proof of required governmental permits for the use of pesticides, insecticide and herbicides.

1.08 SUBSTITUTIONS

- A. Substitutions shall be in accordance with "General Provisions".
- B. Specific reference to manufacturer's names and products specified in this Specification are used as standards of quality, this implies no right to the Contractor to substitute other materials without prior written approval by the Owner's Authorized Representative.
- C. Any materials installed without written approval by the Owner's Authorized Representative may be rejected.
- D. If an approval is granted for a substitution, adjustment in the Contract amount will be made in accordance with the Contract Conditions.



1.09 SAMPLES, TESTS AND MOCK-UPS

- A. The Owner's Authorized Representative reserves the right to take and analyze selected samples of plant material for conformity to this Specification at any time. Rejected plant material shall be removed from the site and be replaced by the Contractor at no cost to the Owner.

1.10 PROJECT CONDITIONS

- A. Perform planting operations only when weather and soil conditions are suitable in accordance with locally accepted practice.

1.11 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Delivery
 1. Deliver all plant material with legible and durable identification labels.
 2. Deliver fertilizer to the site in original, unopened containers bearing the manufacturer's name, guaranteed chemical analysis, and its conformance to California State Law.
 3. Notify the Owner's Authorized Representative within seven (7) days of the delivery of plant material to the site. Indicate the quantity and type of plant material in each delivery.
- B. Storage
 1. Store plant materials in the shade and protect from the weather.
 2. Maintain and protect plant material not planted within four (4) hours of delivery.
- C. Protection
 1. Protect plant material during delivery and to the site and after, in order to prevent damage to the root ball or desiccation of leaves.
- D. Handling
 1. Take extreme care in the loading and unloading of plant material. Do not pick up container plants by the stems or trunks.
 2. Any plant material that has been damaged due to mishandling shall be removed and replaced with new material.

1.12 REJECTION OF PLANT MATERIAL

- A. All plant material not conforming to the requirements herein, shall be considered defective. Such plants, whether in place or not, shall be marked as rejected and immediately removed from the site and replaced with new material at the full expense of the Contractor.



Replacement plant material shall be of the same size, specie and condition as that indicated on the Drawings.

1.13 PROTECTION OF THE SITE

- A. Protect previously installed work and materials which may be affected by work of this Section. Provide safeguards and exercise caution against injury or defacement of existing site improvements.
- B. The Contractor shall be responsible for any damage resulting from his landscape planting operations. Repair damage and return the area to the previous condition at no additional cost to the Owner.

1.14 COORDINATION

- A. The Contractor shall notify the General Contractor and all other trades related to the installation of his work, so as to allow sufficient time for those contractors' to perform their portion of the work.
- B. Determine the locations of underground utilities and perform work in a manner which will avoid damage to the utilities.

1.15 GUARANTEE

- A. The manufacturer's warranty shall not relieve the Contractor of his own liability under the guarantee. Such warranties shall only supplement the guarantee.
- B. All plant material installed under this Contract shall be guaranteed against poor, inadequate and inferior quality and installation for a period of 1 year from the date of Final Acceptance. Any plant material not meeting the satisfaction of the Owner's Authorized Representative shall immediately be removed and replaced at no cost to the Owner. Replaced plant material will also be guaranteed for a period of 1 year upon installation.
- C. Replace without cost to the Owner and as soon as weather permits, all dead plants and all plants not found in a vigorous, thriving condition, as determined by the Owner's Authorized Representative during and at the end of the plant warranty period. Replacement of plants shall closely match adjacent specimens of the same specie and shall be subject to all requirements of this section.
- D. Repair damage to adjacent plant material caused by the Contractor's work at no cost to the Owner. All repairs shall be made with materials, varieties, sizes "in kind" with adjacent existing materials.



E. Guarantee for Planting

We hereby guarantee that the planting we have furnished and installed is free from defects in materials and workmanship and the work has been completed in accordance with the drawings and specifications, ordinary wear and tear and unusual abuse or neglect excepted. We agree to replace plants 15 gallons and larger for one (1) year after acceptance due to plant's dying or partially dying, thereby damaging shape, size or symmetry. Including damages consequential to defects in materials and workmanship and repair or replacement, which develop during one (1) year after Final Acceptance of the work, at no additional cost to the Owner. We agree to make such repairs and replacements within thirty (30) days after receipt of written notice. In the event of our failure to make such repairs and replacements within thirty (30) days of written notice, we authorize the Owner to proceed to have such repairs and replacements made at our expense and will pay all costs and charges upon demand:

Date of Final Acceptance:

Signed:

Company Name:

Address:

PART 2 - PRODUCTS

2.01 PRE-EMERGENT WEED CONTROL

- A. Pre-emergent weed control to be EPA registered and recommended by a licensed Pest Control Advisor. Ronstar-G, Treflan, Eptam, Vegitex, or approved equivalent.

2.02 PLANTING SOIL

- A. Reuse of Stockpiled On-Site Soil
Stockpiled on-site soil may be available from the Owner's stockpile for use if it complies with the criteria in 2.02B. Soils for miscellaneous landscape areas are classified as 2-inch minus.
- B. Topsoil shall be obtained from sources within the site of the work, or shall consist of imported topsoil obtained from sources outside the site, or from both such sources. Stripped site soil, if used as topsoil, shall meet the requirements specified herein.
- C. Topsoil shall consist of fertile, friable soil of loamy character, and shall contain organic matter in amounts normal to the region. Imported topsoil shall be obtained from well-drained arable and fertile agricultural land and shall be free from refuse, roots, heavy or stiff clay, stones larger than one inch in size, coarse sand, noxious



seeds, sticks, brush, litter, grasses, weeds, toxic waste, and other deleterious substances detrimental to the health of plants, animals, and humans. Imported topsoil shall be capable of sustaining healthy plant life.

- D. Topsoil shall have no inherent tendency towards compaction due to texture or soil structure or both as indicated in the soils analysis.
- E. Soil Characteristics for Stockpiled Native Soil
1. Composition for 3/8-inch minus topsoil - fertile, friable, well-drained soil of uniform quality, free of materials larger than 3/8" in diameter such as sticks, rocks, concrete, oils, chemicals and other deleterious materials.
 2. Composition for 2-inch minus topsoil - fertile, friable, well-drained soil of uniform quality, free of materials larger than 2" in diameter such as sticks, rocks, concrete, oils, chemicals and other deleterious materials.
 3. Soil Analysis - If soil has not been tested within 30 days of the date of delivery to the project, obtain an agricultural suitability and chemical analysis of the proposed soil from a company as determined by the Owner's Authorized Representative. Cost of the testing will be paid for by the Contractor. The soil report is to include the following information:
 4. Elemental Analysis: Nitrate Nitrogen, Phosphorus, Potassium, Calcium, Magnesium, Sulfur, Sodium Zinc, Iron, Copper, Manganese, Boron and free Lime.
 5. Other: pH factor, % base saturation, electrical conductivity, mechanical analysis, % of organic content, cation exchange capacity (C.E.C.).
 6. Recommendations: Type and quantity of additives required to establish satisfactory pH factor and supply of nutrients to bring topsoil to a satisfactory level for planting.
 7. All stockpiled native soil to be used from 3/8-inch minus topsoil is to be amended at the levels listed in this Section as part of the base bid. Additional amendments, if requested by the Owner's Authorized Representative are not part of the contract and the Contractor will be compensated for this work on a Time and Materials basis. Rates for labor and equipment will be charged according to the Construction Contract.
- C. Imported Top Soil
1. In order to insure conformance with this Specification, soil samples shall be taken by the Contractor and submitted to a qualified soil testing laboratory for analysis prior to planting i.e., Wallace Laboratories, (310) 615-0116 or approved equivalent. The Owner's Authorized Representative shall monitor the Contractor's soil sampling.



2. Use natural friable soil of the local region, free from lumps, toxic substances sticks, debris, vegetation or stones over 1-inch in diameter.
3. Silt plus clay content shall not exceed 20% by weight with a minimum 95% passing the 2.0 millimeter sieve.
4. Sodium absorption ratio (SAR) shall not exceed 6.
5. Electrical conductivity (EC_e) of the saturated extract of this soil shall not exceed 3.0 millimeters per centimeter at 25 centigrade.
6. Boron content shall not exceed (1) part per billion as measured on the saturation extract.
7. Thoroughly blend the planter mix and amendments through a soil blender before placing the soil.

2.03 SOIL AMENDMENTS

- A. Peat Moss - natural product of sphagnum moss, reed, or sedge peat, taken from a fresh water site, free from lumps, woody material, stones and other foreign matter.
- B. Soil Sulfur - agricultural grade sulfur containing a minimum of 99% sulfur (expressed as elemental).
- C. Iron Oxide - 45% iron (expressed as metallic iron), derived from iron oxide with micronutrients.
- D. Calcium Carbonate - 95% lime as derived from oyster shells.
- E. Gypsum - agricultural grade product containing 98% minimum calcium sulfate.
- F. Iron Sulfate - 20% iron (expressed as metallic iron), derived from ferric and ferrous sulfate, 100% sulfur (expressed as elemental).
- G. Ground Limestone - agricultural limestone containing not less than 85% of total carbonates, ground to such fineness that 50% will pass a #1000 sieve and 90% will pass a #20 sieve.
- H. Dolomite Lime - agricultural grade mineral soil conditioner containing 35% minimum magnesium carbonate and 49% minimum carbonate, 100% passing the #65 sieve.
- I. Sulfate of Potash - agricultural grade product containing 50% to 53% of water soluble potash.
- J. Single Superphosphate - commercial grade product containing 20% to 25% available phosphoric acid.



- K. Ammonium Sulfate - commercial grade product containing approximately 21% ammonia.
- L. Ammonium Nitrate - commercial grade product containing approximately 34% ammonia nitrogen.
- M. Urea Formaldehyde - granular commercial product containing 38% nitrogen.
- N. IBDU (Iso Butldiene Diurea) - commercial grade product containing 31% nitrogen.
- O. Iron: Gro-Power Premium Green Iron - 45% Fe, non-staining.

2.04 FERTILIZERS

- A. General Purpose Soil Conditioner Fertilizer (5-3-1)
 - 1. Consisting of the following minimum percents by weight:
 - 5% Nitrogen
 - 3% Phosphoric Acid
 - 1% Potash
 - 50% Humus
 - 15% Humic Acids
 - 1% Soluble Metallic Iron
 - 2. Soil Conditioner Fertilizer shall be "Gro-Power Plus", as manufactured by Gro-Power (909) 393-3744 or approved equivalent.
 - 3. General Purpose Soil Conditioner Fertilizer with Soil Penetrant (5-3-1)
 - 4. Soil conditioning fertilizer for use in areas of clay, adobe soils or soils high in salt, sodium boron or pH consisting of the following minimum percents by weight:
 - 5% Nitrogen
 - 3% Phosphoric Acid
 - 1% Potash
 - 50% Humus
 - 15% Humic Acids
 - 4% Sulfur
 - 1% Soluble Metallic Iron
- B. Pre-Plant Fertilizer (16-20-0)
 - 1. Ammonium phosphate consisting of the following minimum percentages by weight:
 - 16% Nitrogen
 - 20% Phosphoric Acid



- 0% Potash
- 2. Pre-Plant Fertilizer shall be Best "16-20-0", as manufactured by J.R. Simplot Company (800) 992-6066, or approved equivalent.

- C. General Purpose Planting Fertilizer (12-12-12)
 - 1. Pelleted or granular form shall consist of the following minimum percents by weight:
 - 12% Nitrogen
 - 12% Phosphoric Acid
 - 12% Potash
 - 2. General Purpose Planting Fertilizer shall be Best "Triple Twelve", as manufactured by J.R. Simplot Company (800) 992-6066, or approved equivalent.

- D. Controlled Release Fertilizer (12-8-8)
 - 1. Consisting of the following minimum percents by weight:
 - 12% Nitrogen
 - 8% Phosphoric Acid
 - 8% Potash
 - 25% Humus
 - 5% Humic Acids
 - 2. Acceptable product - "Gro-Power Controlled Release", as manufactured by Gro-Power (909) 393-3744, or approved equivalent.

- E. Planting Tablets (20-10-5)
 - 1. Shall be 7 gram, 24-month release, non-burning tablets containing the following percentages of nutrients by weight:
 - 20% Nitrogen
 - 10% Phosphoric Acid
 - 5% Potassium
 - 2.5% Humic acids
 - 2. Acceptable product - "Gro-Power Planting Tablets", as manufactured by Gro-Power (909) 393-3744, or approved equivalent.

2.05 PLANT MATERIAL

- A. General Plant Condition
 - 1. Furnish nursery-grown trees and shrubs conforming to ANSI Z60.1, with healthy root systems developed by transplanting or root pruning. Provide well-shaped, fully-branched, healthy, vigorous stock free of disease, insects, eggs, larvae, and defects such as knots, sun scald, injuries, abrasions, or other objectionable disfigurements.



2. Grade: Provide trees and shrubs of sizes and grades conforming to ANSI Z60.1 for type of trees and shrubs required. Trees and shrubs of a larger size may be used if acceptable to the City of Goleta, with a proportionate increase in size of roots or balls.
3. Plant material shall be grown under climatic conditions similar to those in the locality of the project unless approved otherwise by the Owner's Authorized Representative.
4. Label at least 1 tree and 1 shrub of each variety and caliper with a securely attached, waterproof tag bearing legible designation of botanical and common name.
5. The use of plant material larger than that specified on the Drawings may be used, pending approval from the Owner's Authorized Representative, however, there will be no change in the Contract amount if the larger plant material is approved and used.

B. Trees and Shrubs

1. Tree and shrub trunks shall be sturdy and well hardened with vigorous and fibrous root systems which are not root-bound.
2. In the event of a disagreement as to the condition of the root system, the root conditions of the plants furnished by the Contractor will be determined by the removal of soil around the roots of not less than 10 plants or more than 2% of the total number of plants of each specie.
3. When container grown plants are supplied from several sources, the roots of not less than 10 plants of each species from each source will be inspected. In case the plants sampled are found to be defective, the Owner's Authorized Representative has the right to reject the entire lot represented by the defective sample. Any plant material rendered unsuitable for use because of this inspection will be considered as samples and will be provided at the full expense of the Contractor.

C. Nursery Grown and Collected Stock

1. Nursery grown and collected stock shall be grown under climatic conditions similar to that found in the locality of the site.

D. Container Grown Stock

1. Container grown stock shall be in a vigorous and healthy condition, not root bound or with the root system hardened off.

2.06 AUXILIARY ACCESSORIES

A. Tree Stakes and Guys

1. Wood stakes - 2" diameter by 10 feet Lodgepole Pine stake without splits or bowing. Refer to the Drawings for which trees receive wood stakes.



2. Guy and Tie Wire: ASTM A 641 (ASTM A 641M), Class 1, galvanized-steel wire, 2-strand, twisted, 0.106 inch (2.7 mm) in diameter.
 3. Guy Cable: 5-strand, 3/16-inch (4.8-mm) diameter, galvanized-steel cable, with zinc-coated turn buckles, 3-inch- (75-mm-) long minimum, with two 3/8-inch (10- mm-) galvanized eyebolts.
 4. Hose Chafing Guard: Reinforced rubber or plastic hose at least 1/2 inch (13 mm) in diameter, black, cut to lengths required to protect tree trunks from damage.
 5. Flags: Standard surveyor's plastic flagging tape, white, 6 inches (150 mm) long.
 6. Turnbuckles - 6" long, galvanized eye/hook type.
 7. Wire Clamps - 3/4" galvanized "U" clamps.
- B. Top Dressings
1. Organic Mulch: Organic mulch, free from deleterious materials and suitable as a top dressing of trees and shrubs, consisting of one of the following:
 - a. Type: Ground or shredded bark.
 - b. Type: Wood and bark chips.
 2. Fiber Mulch: Biodegradable dyed-wood cellulose-fiber mulch, nontoxic, free of plant growth- or germination-inhibitors, with maximum moisture content of 15 percent and a pH range of 4.5 to 6.5.
- C. Erosion Control Materials
1. Blankets: Biodegradable wood excelsior, straw, or coconut-fiber mat enclosed in a photodegradable plastic mesh. Include manufacturer's recommended steel wire staples, 6 inches (150 mm) long.
 2. Staples - 11-gauge, 6" x 1" looped wire.
 3. Fiber Mesh: Biodegradable twisted jute or spun-coir mesh, 0.92 lb per sq. yd. (0.5 kg per sq. m) minimum, with 50 to 65 percent open area. Include manufacturer's recommended steel wire staples, 6 inches (150 mm) long.
- D. Weed Barrier Fabric
1. Permeable weed barrier fabric "Tyvar" as manufactured by Reemay approved equivalent.
- E. Tree Root Barriers
1. Tree root barriers as supplied by Deep Root Corporation (Catalog #UB 24-2) or Root Solutions Root Guide Barrier by Root Solutions, Inc. (415)434-3072, or approved equivalent. Provide commercially available manufactured root barriers, consisting of polyvinyl chloride or polypropylene sheeting having ultraviolet inhibitors and a minimum thickness of 0.085 inch. Barriers shall be either factory preformed into the circular shape shown, or have an integrated



joining system for instant assembly into the final shape. Glued joints will not be acceptable.

Root barrier sheeting shall have horizontal tabs to prevent root growth from lifting the barrier. These tabs shall be spaced vertically not less than 8 inches on centers, and horizontally not less than 8 inches on centers. Depth of these tabs shall be not less than 3/8 inch at its widest point.

Root barrier sheeting shall have vertical fins running the full length on the inside face of the barrier at 90 degrees to the inside face, to direct root growth downwards. These fins shall be not less than 6 inches on centers, and its width shall be not less than 1/2 inch.

F. DECOMPOSED GRANITE

1. Decomposed granite shall be crushed granite rock screenings, graded from 1/4-inch particles to dust, with uniform tan or buff color. Decomposed granite shall conform with the following aggregate gradation:

<u>Sieve Size</u>	<u>% Passing</u>
No. 4	95-100
No. 30	30-50
No. 200	5-15

2. Binder/Stabilizer shall be a polymer based, water resistant (once cured), non-toxic, and clear in color. Compressive strength of the decomposed granite mixed with the binder/stabilizer shall result in a minimum 5,000 pounds stability per ASGTMD 1559, per manufacturer's data.

G. Concrete Header

1. Refer to construction details as specified on the drawings.

G. Wood Header

1. 2" x 4" Pressure – treated redwood.
2. Nails shall be hot dipped galvanized common nails.

PART 3 - EXECUTION

3.01 RENOVATION AND PREPARATION OF EXISTING SOIL



- A. Contractor shall prepare Horticultural soil samples taken in (6) selected locations for initial horticultural analysis and soil amendment recommendations. See drawings for locations.
- B. The contractor's Soil Scientist shall examine the site prior to preparing recommendations.
- C. Contractor shall perform soil renovation procedures to the soil as required by soils report.

3.02 CULTIVATION OF EXISTING SOIL

- A. In areas where topsoil will not be applied, rip or cultivate the existing soil that will be receiving planting to a depth of at least 10-inches immediately prior to applying soil amendments.
- B. In areas where topsoil will be applied the following procedures are to be followed:
- C. Verify that subgrades for installation of topsoil have been established under rough grading, subgrade depth plus specified depth of topsoil should equal finished grade. Do not spread topsoil prior to the Owner's Authorized Representative acceptance of all subgrade work.
- D. Rip or cultivate subgrade in all planting areas to a minimum depth of 10-inches immediately prior to spreading topsoil.
- E. Remove all rocks, stones, sticks and debris larger than 1-inch in diameter from the surface of the subgrade prior to applying topsoil.

3.03 SOIL SCARIFICATION

- A. Planting areas which become compacted in excess of 85% relative compaction due to construction activities, shall be thoroughly cross-ripped to a minimum depth of 9-inches to alleviate the condition, taking care to avoid existing subsurface utility lines, if present.

3.04 VERIFICATION OF EXISTING CONDITIONS

- A. Prior to the work in this Section, examine previously installed work from other trades and verify that such work is complete and as required, to the point where this installation may commence properly.

3.05 ROUGH GRADING CERTIFICATION

- A. Obtain the Owner's Authorized Representative's written certification that indicates that final rough grade has been set by previous contractors to plus or minus 0.10-foot prior to commencing fine grading operations.

3.06 FINE GRADING OPERATIONS



- A. Ensure that the top 2-inches of soil is free of stones, roots, stumps, wire, or other deleterious matter 1-inch in diameter and larger. Dispose of debris offsite.
- B. All planting areas to be fine graded to within 1-1/2-inches of paved areas, irrigation valve boxes, concrete mowstrips.
- C. Upon acceptance of rough grade by the Owner's Authorized Representative and prior to beginning planting operations, finish grade all planting areas, fill as needed and remove surplus soil and float areas to a smooth, uniform grade to elevations as indicated on the Drawings. Obtain the Owner's Authorized Representative approval of the fine grading prior to commencing planting operations.

3.07 SURFACE DRAINAGE OF PLANTING AREAS

- A. The Contractor shall bear final responsibility for properly draining all planting areas. Any discrepancy in the Drawings or Specifications, obstructions on the site, or prior work done by another contractor, which the Contractor feels precludes establishing proper drainage, shall be brought to the immediate attention of the Owner's Authorized Representative for correction or relief of said responsibility. The Contractor is to insure proper drainage of all planting areas at a minimum of 2% slope.

3.08 SOIL PREPARATION

- A. After finish grades for all landscaped areas have been established and approved by the Owner's Authorized Representative perform the following operations:
- B. Cross-rip all area to a depth of 9-inches.
- C. Spread organic amendments uniformly on the surface of the soil and cultivate thoroughly into the top 4-6 inches in a minimum of two directions with a mechanical rototiller.
- D. The following soil amendments and fertilizers are to be used for bid purposes only. Specific amendment recommendations will be made after horticultural soil samples are taken and paid for by the Contractor and analyzed. Application rates per 1,000 square feet shall be as follows:
 - Nitrolized Fir bark - 6 cu. yds.
 - Planting fertilizer - 200 lbs. of Gro-Power Plus.
 - Agricultural gypsum - 100 lbs.
 - Soil sulfur - 20 lbs.
- E. After applying soil amendments and prior to planting, irrigate with overhead irrigation so that a minimum of 1-3 inches of good quality water passes through the soil profile.
- F. For acid loving plant materials, surface treat planting areas with 2-inches of peat moss for base bid. This may change after soils recommendations are prepared based upon the required soils testing by the selected contractor.



3.09 BACKFILL MIX FOR SHRUBS AND TREES

- A. The following backfill mix is for bid price basis only. Final backfill recommendations will be made only after rough and fine grading operations are completed and horticultural soil testing has been performed and paid for by the Contractor and approved by the Owner's Authorized Representative.
 - 7 parts by volume on-site soil.
 - 3 parts by volume nitrolized stabilized Fir bark.
 - 2 lbs. iron sulfate per cubic yard of mix.
 - 18 lbs. of Gro-Power Plus per cubic yard of mix (or approved equivalent).
 - Planting tablets - quantity based on size of plant.
- B. Thoroughly blend the backfill mix prior to placement.
- C. Do not apply iron sulfate over paved materials since severe staining is likely to occur.

3.10 PRE-PLANT WEED CONTROL

- A. Clear and remove existing weeds by mowing or grubbing to at least 1/4-inch below the soil surface.
- B. Fertilize areas to receive planting with urea 46-0-0 commercial fertilizer at the rate of 1/2-pound per 1,000 square feet.
- C. Water area thoroughly and continuously for a period of 3 consecutive weeks. Employ a specific watering duration and frequency program designed to germinate all residual weeds.
- D. After sufficient weed germination is present, apply a post-emergent contact weed killer according to the directions of the manufacturer.
- E. Allow for a sufficient period of time to ensure that the weeds are dead and the weed killer has dissipated before applying a second weed kill.
- F. Water planting areas thoroughly and continuously for a period of 3 weeks. Discontinue the watering process for 1 day prior to the second application of the herbicide. Reapply the spraying operation with a straight contact weed killer according to the pest control adviser's recommendations. Avoid any irrigation for a minimum of 4 days for effective weed kill.
- G. After the second weed kill, water planting areas thoroughly and continuously for 3 consecutive days to saturate upper layers of soil prior to commencing planting operations.

3.11 TREE PIT PERCOLATION TESTING



- A. Due to the potential of standing water in the tree pits, Contractor is to perform a tree pit percolation test (for trees larger than 15 gallon only) in each tree pit prior to planting the tree. Fill the tree pit to the top with water. If the water has not drained by more than 95% within 24 hours, do not plant the tree and bring this to the immediate attention of the Owner's Authorized Representative. The Contractor may be required to install a drainage sump in the existing plant pit. Substitute plant pits are the responsibility of the Contractor under the Base Bid. Drainage sumps are not part of the Base Bid and compensation will be awarded to the Contractor based on an itemized amount to be provided by the contractor in the Construction Agreement.
- B. Submit written results of each plant pit percolation test with locations, date and time of test to the Owner's Authorized Representative.

3.12 CONCRETE MOWSTRIP LAYOUT

- A. Concrete mowstrips shall be laid true to line and grade. Protect adjacent improvements and existing landscape from damage.
- B. Refer to construction details as specified on the drawings.

3.13 PLANTING OPERATIONS

- A. Planting Layout
 - 1. It is the Contractor's responsibility to verify with the Owner's Authorized Representative's site superintendent and local governing agencies the location and depth of all underground utilities. If any underground construction or utility lines are encountered in the excavation of planting holes, alternative planting locations may be selected by the Owner's Authorized Representative.
 - 2. Locations for all shrubs and trees shall be marked on the ground either by flagged grade stakes indicating plant type and size or the actual plants themselves for the Owner's Authorized Representative's review and approval prior to planting.
- B. General Planting Guidelines
 - 1. Plant only as many plants that can be planted and watered on that same day in a given planting area.
 - 2. Protect the planting area from excessive vehicle compaction.
 - 3. Face plant material with fullest growth into the prevailing wind and/or the primary direction of view.
 - 4. Center plant material in the planting hole.
 - 5. Set plant material plumb and hold rigidly in place until soil has been tamped firmly around the rootball.
 - 6. Planting pits shall have vertical sides and roughened surfaces. The size of the plant pit shall be twice the diameter and only as deep as the rootball itself.
- C. Container Removal



1. Plant containers shall be opened and removed in such a manner that the soil surrounding the rootball shall not be broken.
 2. Do not injure the root ball while removing the container. After removing plant, superficially cut edge roots with a knife on three (3) sides.
- D. Tree Box Removal
1. Remove the bottom of the box before planting.
 2. Remove the sides of the box without damaging the rootball after positioning the tree and partially backfilling the plant pit.
- E. Shrub and Tree Installation
1. Apply backfill mix to the plant pit up to 1/2 the height of the rootball. Add water to the top of the remaining plant pit and let soak in before completing the remainder of backfilling.
- F. Placement of Plant Tablets
1. Prior to planting, place the required amount of planting tablets per plant size on top of each root ball while the plants are still in their containers so that the Owner's Authorized Representative can easily verify their existence and quantity.
 2. After obtaining approval by the Owner's Authorized Representative on plant tablet quantity and after water has completely drained from the plant pit, add plant tablets to the planting pits in the following quantities:
 - 1 gallon - 3 tablets
 - 5 gallon - 8 tablets
 - 15 gallon - 14 tablets
 - 24" box - 15 tablets
 - 36" box - 19 tablets
 - 48" box - 24 tablets
 3. Dig planting pit to the recommended depth.
 4. Backfill the plant pit to attain the proper level for the plant.
 5. Place the specified amount of plant tablets between the bottom of the rootball but not higher than 1/3 of the way up the rootball. Space the plant tablets equally around the perimeter of the rootball approximately 2" from the rootball.
 6. Finish backfilling of the planting pit by tamping the soil firmly around the rootball and watering thoroughly.
- G. Final Backfilling
1. Once the water has soaked in thoroughly, place the remaining backfill and tamp firmly.
 2. After final backfilling, construct an earthen basin around the base of each plant with backfill mix sufficient to hold water for the following plant sizes:
 - 1 gallon - 2-inches of water.
 - 5 gallon through 24" box - 3-inches of water.
 - 36" box and larger - 4-inches of water.
- H. Plant Settling



1. Any plant material that has settled deeper than the surrounding grade shall be raised to the correct level.

I. Ground Cover Planting

1. Ground cover flats shall contain sufficient moisture to reduce soil separation when lifting out the plants.
2. Plant ground covers in straight rows, evenly, triangular spaced, and at an on-center spacing as indicated on the Drawings.
3. Each rooted ground cover plant shall be planted with its proportional amount of soil.
4. Apply a 2-inch layer of wood mulch at the completion of planting.

3.14 WATERING

- A. All planting shall be watered immediately after planting. After the first watering, water shall be applied to all plants as conditions may require keeping the plants in a healthy and vigorous growing condition until the completion of the Contract.

3.15 TREE STAKING

- A. Staking of trees shall be completed immediately after planting trees. Trees shall stand plumb before stakes are applied.
- B. All stakes shall be installed plumb when tied to the tree. Stakes may be located in a specific location to the trunk - refer to the Drawings.
- C. When locating a single stake, locate it on the windward side of the tree and as close to the main trunk as possible without damaging the trunk.
- D. Stakes shall be driven at least 3' into the ground or as specified on the plans.
- E. Tie the tree trunk to the stake with the specified tree guy. Cut off stake after installation 4-inches above the upper tie.

3.16 TREE GUYING

- A. Guying of trees shall be completed immediately after planting trees. Trees shall stand plumb before guys are applied.
- B. Trees shall stand plumb once guys are installed.
- C. Guy trees at points of branching with guys spaced 120 degrees apart.
- D. Guys shall be covered with black rubber hose at points of contact with bark positioned at crotches and fastened to a deadman. One turnbuckle shall be provided for each guy wire. Use (2) cable clamps at each cable terminus.



- E. Install a warning guy wire tube on each guy wire.

3.17 PRUNING

- A. At no time shall plant material be pruned, trimmed or topped prior to delivery. Any alteration to their shape shall be conducted only on-site and in the presence of the Owner's Authorized Representative.
- B. All planted material requiring pruning shall be done under the observation of the Owner's Authorized Representative. Prune planted material only when necessary and under standard horticultural practices to preserve the natural character of the plant.

3.18 WOOD MULCH INSTALLATION

- A. Spread a 3" deep layer of shredded bark mulch in all landscaped areas.

3.19 JUTE MESH INSTALLATION

- A. Install Jute Mesh on slopes greater than 3 to 1.
- B. Clear away trash, large stones and other debris. Fine grade area to receive jute mesh, eliminating footprints, tracks and ruts.
- C. Install jute mesh completely in contact with the ground. Confirm that there is not tension on the mesh to minimize soil contact.
- D. Overlap jute mesh a minimum of 4-inches on the sides and 18-inches on the ends. Staples shall be inserted at intervals no greater than 3-feet on-center along overlaps and down the center of each roll length.
- E. Joining (2) jute mesh rolls shall be installed at the down channel end of installed roll which should overlap up-channel end of roll being installed. Overlap should be a minimum of 18-inches. Use (5) staples on a 12-inch on-center spacing.
- F. Anchor slot at top of slope shall be installed by burying up-channel end in trench a minimum of 6-inch deep. Use (5) staples at a 12-inch on-center spacing.
- G. On slopes less than (6) feet in height, jute mesh may be installed with roll perpendicular to the contours.



- H. The terminal fold shall be installed by bringing the jute mesh down to the level area before terminating. Turn the end under a minimum of 6-inches. Use (5) staples across the fold at a 12-inch on-center spacing.

3.20 CLEANUP

- A. Contractor shall remove all trash caused from his Work on a weekly basis throughout the duration of the Project.
- B. Upon completion of his Work under this Section, the Contractor shall remove all rubbish, waste and debris resulting from his operations offsite or as directed by the Owner's Authorized Representative.
- C. All scars, ruts or other marks in the ground caused by the Contractors work shall be repaired.
- D. Remove all equipment and implements of service, and leave the entire work area in a neat, clean, and Owner's Authorized Representative-accepted condition. All sidewalks and other paving areas shall receive a broom-clean treatment.

3.21 SITE VISIT SCHEDULE

- A. The Contractor shall be responsible for notifying the Owner's Authorized Representative in advance to schedule the following site visits:
 - 1. Pre-construction "Kick-Off" meeting - 7 days.
 - 2. At completion of fine grading - 2 days.
 - 3. At completion of soil preparation - 2 days.
 - 4. Delivery of plant material - 2 days.
 - 5. Plant layout prior to plant pit excavation - 2 days.
 - 6. At start of tree planting, staking and guying - 2 days.
 - 7. Final walkthrough prior to going on contracted maintenance period - 7 days.
 - 8. Final walkthrough for project acceptance - 7 days.
- B. The Owner's Authorized Representative may or may not attend all of the above mentioned site visits. He may also elect to attend more than is listed above, and without notice to the Contractor.
- C. When site visits are made by other than the Owner's Authorized Representative, the Contractor shall show evidence in writing of when and by whom the site visit was made.
- D. No site visit will commence without all previous punch list items being completed, unless compliance has been waived by the Owner's Authorized Representative. Failure to accomplish the timely execution of previous field report punch list items and preparing adequately for the next site visit shall make the Contractor potentially liable for reimbursing the Owner's Authorized Representative's for his labor and reimbursable expenses. No



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further site visits will be made until outstanding charges have been paid to the Owner by the Contractor.

END OF SECTION



SECTION 32 91 13 SOIL PREPARATION

PART 1 – GENERAL

1.01 SUMMARY

- A. This section includes soil and soil amendments products for on-structure plantings. Execute all labor to achieve soil preparation, complete, as shown and as specified.

1.02 DEFINITIONS

- A On-Structure: Planted areas to be installed on top of concrete structure built under another section.

1.03 SUBMITTALS

- A. Product Data: Manufacturer's current catalog cuts and specifications of the following:
 - 1. Fertilizer
 - 2. Organic Amendments
 - 3. Soil Conditioner
 - 4. Herbicide
- B. Quality Control Submittals:
 - 1. Testing Agency: Wallace Laboratories, El Segundo, CA 90245, (310) 615-0116.

1.04 SEQUENCING AND SCHEDULING

- A. Do not install on-structure drainage materials and soil mix prior to acceptance of waterproofing in another section.

PART 2 – PRODUCTS

2.01 ORGANIC COMPONENTS

- A. Peat Moss:
 - 1. Type: Finely shredded, brown in color, suitable for horticultural purposes and frequently referred to in the trade as "greenhouse" or "coarse grind".
 - 2. Measurement: Measure peat in air dry condition, containing not more than 35% moisture by weight on an "as-received" basis. Ash content shall not exceed 10%.



3. Physical Properties:

<u>Percent Passing</u>	<u>Sieve Size</u>
95 - 100	9.51 mm (3/8 in.)
0 - 40	500 micron (#35, 32 mesh)
4. Organic Content (dry weight basis): 90-100%
5. Chemical Properties:

Nitrogen (dry weight basis): 0.6-3.0%
Salinity/Soluble Salts: Saturation extract conductivity 0.0-3.0 millimhos/cm @ 25 degrees C.
pH: 3.0-4.5
6. Acceptable Substitute: Ground redwood bark, per specifications for peat moss.

2.02 SOIL CONDITIONER

- A. Humus based fertilizer and soil conditioner 'Gro-Power Plus' with 1.00% soil penetrant and consisting of the following percent by weight: 5-3-1 (N-P-K), 70 humus, and 15 humus acids. Gro-Power, Inc. (800) 473-1307 or equivalent.

2.03 ACCESSORIES

- A. Fine Sand:
 1. Physical Properties (by dry weight basis):

<u>Percent Passing</u>	<u>Sieve Size</u>
100	4.76 mm (#4, 4 mesh)
95 - 100	1.00 mm (#18, 16 mesh)
65 - 100	500 micron (#35, 32 mesh)
0 - 50	250 micron (#60, 60 mesh)
0 - 20	105 micron (#140, 150 mesh)
0 - 5	53 micron (#270, 270 mesh)
 2. Chemical Properties: (by Saturation Extract Method):
 - a. Soluble Salts/Salinity: Maximum conductivity of 3.0 millimhos/cm at 25 degrees C.
 - b. Boron: Maximum concentration of 1.0 ppm.
 - c. Sodium Absorption Ratio (SAR): Maximum 6.0.
- B. Pre-emergence Weed Control: "Rout" by Scotts (800) 492 8255 "Treflan 5G", by Dow Elanco, (800) 352-6776, or equal.
- C. Water: Clean, fresh and potable, as available from Owner. Transport as required.

2.04 COMMERCIAL FERTILIZERS

- A. Pre-Plant Fertilizer:



1. Type: Mixed by a commercial fertilizer supplier and consisting of the following percent by weight: 6-20-20 (N-P-K).
2. Manufacturer: J.R Simplot Company - (800) 992-6066.

2.05 CHEMICAL COMPONENTS

The following additives may or may not be used depending on the outcome of the soil report.

- A. Ground Limestone: Agricultural limestone containing not less than 85% of total carbonates, ground to such fineness that 50% will pass #100 sieve and 90% will pass #20 sieve.
- B. Dolomite Lime: Agricultural grade mineral soil conditioner containing 35% minimum magnesium carbonate and 49% minimum calcium carbonate, 100% passing #65 sieve.
- C. Gypsum: Agricultural grade product containing 80% minimum calcium sulphate.
- D. Iron Sulfate (Ferric or Ferrous): Supplied by a commercial fertilizer supplier, containing 20% to 30% iron and 35% to 40% sulphur.
- E. Sulphate of Potash: Agricultural grade containing 50% to 53% of water-soluble potash.
- F. Single Superphosphate: Commercial product containing 20% to 25% available phosphoric acid.
- G. Ammonium Sulphate: Commercial product containing approximately 21% ammonia.
- H. Ammonium Nitrate: Commercial product containing approximately 34% ammonia.
- I. Calcium Nitrate: Agricultural grade containing 15-1/2% nitrogen.
- J. Urea Formaldehyde: Granular commercial product containing 38% nitrogen.
- K. I.B.D.U. (Iso Butyldiene Diurea): Commercial product containing 31% nitrogen.
- L. Soil Sulfur: Agricultural grade sulfur containing a minimum of 96% sulfur.
- M. Calcium Carbonate: 95% lime as derived from oyster shells.
- N. Triple Superphosphate: Commercial product containing 50% available phosphoric acid



2.06 POTTING MIX

- A. Pot Planting Soil Mix: Commercial Potting Soil. Submit analysis and sample bag for approval.

2.07 BIO-RETENTION SOIL MIX

- A. Bioretention Soil Landscape Mix: In accordance with, "Stormwater Technical Guide for Low Impact Development" of the latest edition of the "*County of Santa Barbara Water Resource Division*".

1. General Requirements: Bioretention soil shall achieve a long-term, in-place infiltration rate of at least 5 inches per hour. Bioretention soil shall also support vigorous plant growth.
2. Soil Mix: Bioretention Soil shall be a mixture of topsoil or fine sand, and compost measured on a volume basis. (Amount per Cubic Yard)

a. Mix B – Fine Sand Blend

1. 70% Fine Sand (Number 16 gives better growth. Number 20 gives a firmer soil but it will have a reduced growth rate.)
2. 30% Compost (by volume medium size peat moss)

- b. Sand for Bioretention Soil shall be free of wood, waste, coating such as clay, stone dust, carbonate, etc., or any other deleterious material. All aggregate passing the No. 200 sieve size shall be non-plastic. Sand for Bioretention Soils shall be analyzed by an accredited lab using #200, #100, #40, #30, #16, #8, #4, and 3/8 inch sieves (ASTM D 422 or as approved by municipality), and meet the following gradation:

<u>Sieve Size</u>	<u>Percent Passing (by weight)</u>	
	<u>Min</u>	<u>Max</u>
3/8 inch	100	100
No. 4	90	100
No. 8	70	100
No. 16	40	95
No. 30	15	70
No. 40	5	55
No. 100	0	15
No. 200	0	5



- c. Topsoil for Bioretention Soil shall be free of wood, waste, or any other deleterious material. The overall topsoil texture shall be loamy sand as analyzed by an accredited laboratory. The overall dry weight percentages shall be 60-90% sand, with less than 20% passing than the #200 sieve and less than 5% clay of the total weight with no gravel.
- d. Composted Material shall be a well decomposed, stable, weed free organic matter source meeting the standards developed by the US Composting Council (USCC). The product shall be certified through the USCC Seal of Testing Assurance (STA) Program (a compost testing and information disclosure program). Before delivery of the soil, the supplier shall submit a copy of lab analysis performed by a laboratory that is enrolled in the US Composting Council's Compost Analysis Proficiency (CAP) program and using approved Test Methods for the Evaluation of Composting and Compost (TMECC).

PART 3 – EXECUTION

3.01 SOIL MOISTURE CONTENT

- A. General: Do not work soil when moisture content is so great that excessive compaction will occur, nor when it is so dry that dust will form in air. Apply water, if necessary, to bring soil to an optimum moisture content for planting.
- B. Range: Maintain within 2 percent above or below optimum moisture content at all times during the work.

3.02 CLEARING AND CULTIVATION

- A. Clearing: Clear all planting areas of weeds, debris and other extraneous materials prior to soil preparation work.

3.03 BLENDING OF SOIL MIXES

- A. Acid-Loving Planting Soil Mix: Thoroughly bulk blend all components in stockpiles on site. Do not blend in individual planters or plant pits.
- B. On-structure Planting Soil Mix: Thoroughly bulk blend all components in stockpiles on site. Do not blend in individual planters. Required chemical components that could potentially stain completed improvements can be applied in individual planters after placement of soil mix.



3.04 FIELD QUALITY CONTROL

- A. Tests: Right is reserved to take samples of prepared soil for testing for conformity to Specifications.
- B. Rejected Materials: Remove off site at Contractor's cost. Pay cost of testing of materials, not meeting Specifications.

END OF SECTION



SECTION 33 01 10

WATERLINE DISINFECTION AND TESTING

PART 1 – GENERAL

1.01 REQUIREMENTS

- A. The Contractor shall perform flushing, disinfection, and testing of all waterlines, services, and appurtenances, complete, in accordance with the Contract Documents.

1.02 RELATED WORK SPECIFIED ELSEWHERE

Section 33 05 09 – Piping, General

Section 33 05 31 – PVC Pressure Pipe (AWWA C900, Modified)

1.03 REFERENCE SPECIFICATIONS, CODES, AND STANDARDS

- A. The Contractor shall perform flushing, disinfection, and testing of all waterlines, services, and appurtenances, complete, in accordance with the Contract Documents.

ANSI/AWWA B300 Hypochlorites

ANSI/AWWA B301 Liquid Chlorine

ANSI/AWWA C651 Disinfecting Water Mains

1.04 CONTRACTOR SUBMITTALS

- A. A proposed plan and schedule for water conveyance, cleaning, disinfection, flushing and water disposal, and pressure testing shall be submitted in writing for approval a minimum of two weeks before testing is to start. The plan shall demonstrate that personnel are experienced and prepared to resolve problems which may arise.

PART 2 – PRODUCTS

2.01 MATERIALS REQUIREMENTS

- A. All test equipment, chemicals for chlorination, temporary valves, bulkheads, or other water control equipment and materials shall be selected and furnished by the Contractor



subject to the Goleta Water District's review. No materials shall be used which would be injurious to the construction or its future function.

- B. Chlorine for disinfection may be in the form of liquid chlorine or sodium hypochlorite solution.
- C. Liquid chlorine shall be in accordance with the requirements of ANSI/AWWA B301. Liquid chlorine shall be used only:
 - 1. In combination with appropriate gas flow chlorinators and ejectors;
 - 2. Under the direct supervision of an experienced technician;
 - 3. When appropriate safety practices are observed.
- D. Sodium hypochlorite and calcium hypochlorite shall be in accordance with the requirements of ANSI/AWWA B300.

PART 3 – EXECUTION

3.01 GENERAL

- A. All waterlines, services, and appurtenances shall be disinfected prior to pressure and leakage testing. Unless otherwise indicated, water for disinfecting and testing waterlines shall be furnished by the Contractor on private contracts and by Goleta Water District on District contracts. In both cases the Contractor shall make all necessary provisions for conveying the water from the District-designated source to the points of use. The Contractor shall furnish all equipment and materials for disinfection and testing of waterlines.
- B. Disinfection shall be accomplished by chlorination. All disinfection and testing operations shall be performed in the presence of the Goleta Water District. All pressure waterlines, services, and appurtenances shall be disinfected and tested.
- C. Disinfection operations shall be scheduled by the Contractor as late as possible during the contract time period so as to assure the maximum degree of sterility of the facilities at the time the work is accepted by the District.

3.02 DISINFECTING PIPELINES

- A. General: All potable waterlines, services, and appurtenances shall be disinfected in accordance with the requirements of ANSI/AWWA C651. Prior to disinfecting, waterlines shall be flushed or blown out as appropriate.



- B. Chlorine-water solution method: A chlorine-water solution shall be uniformly introduced into the waterline by means of a solution-feed chlorinating device. The chlorine solution shall be introduced at one end of the pipeline through a tap such that the concentration of free chlorine in the water entering the pipe is a minimum of 25 mg/l. Care shall be taken to prevent the strong chlorine solution in the waterline being disinfected from flowing back into the line supplying the water. The table below provides the quantity of chlorine required to produce 25 mg/L concentration in 100 feet of pipe – by diameter.

Pipe Diameter (inches)	12.5 % Chlorine Solution (ounces)
4	0.16
6	0.36
8	0.65
10	1.02
12	1.44
16	2.60

- C. Tablet Method: The tablet method may be used only when all foreign materials have been kept out of the waterline during construction. If groundwater has entered the pipe during installation and tablets have been installed, Contractor shall flush main and use chlorine-water solution method. Do not use this method if the temperature is below 41 degrees Fahrenheit. Tablets shall be secured with non-toxic adhesive in each pipe length in top of pipe. The table below provides the number of 5-g hypochlorite tablets required for a minimum dose of 25 mg/L, based on 3.25g available chlorine per tablet.

Pipe Diameter	Length of pipe section				
	13 ft	18 ft	20 ft	30 ft	40 ft
6	1	1	1	2	2



8	1	2	2	3	4
10	2	3	3	4	5
12	3	4	4	6	7
16	4	6	7	10	13

- D. Disinfection: Assure valves are closed on existing system to prevent chlorine solution flowing into water supply system. Chlorinated water shall be retained in the waterline long enough to destroy all non-sporeforming bacteria. This period shall be at least 24 hours. After the chlorine-treated water has been retained for the required time, the free chlorine residual at the waterline extremities and at other representative points shall be at least 10 mg/l. Should the chlorine level drop below 10 mg/l at the end of 24 hours, the waterline shall be flushed and the disinfection procedure repeated until 10 mg/l residual is achieved.
- E. Chlorinating Valves: During the disinfection process of chlorinating the waterline, all valves, hydrants, and other appurtenances shall be operated while the pipeline is filled with the heavily-chlorinated water.
- F. Sampling Ports: The Contractor shall provide sampling ports along the waterline as defined in AWWA C651.
- G. Preliminary Flushing: Prior to chlorinating, waterlines shall be filled to eliminate air pockets and flushed to remove particulates.
- H. Final Flushing: After disinfection is successfully completed, the heavily chlorinated water shall be flushed from the pipeline using fresh potable water until chlorine measurements show that the concentration in the water leaving the pipeline is no higher than 2 mg/l. The Contractor shall notify the Goleta Water District that final flushing will be required. The District will then send personnel to operate District valves and assist the Contractor with the final flushing. If there is any question that the chlorinated discharge will cause damage to the environment, a reducing agent shall be applied to the water to neutralize thoroughly the chlorine residual remaining in the water.
- I. Bacteriological Testing: After final flushing and before the waterline is placed in service, two consecutive sets of samples, taken at least 24 hours apart shall be collected from the ends and intermediate points of the line. Samples shall be tested for bacteriological quality in accordance with the requirements of the State Department of Health Services. For this purpose, for the first set of samples, the pipe shall be re-filled with fresh potable



water and left for a period of 24 hours before any sample is collected, for the second set of samples, wait at least 24 hours after the first set of samples were collected and tested before any sample is collected. Contractor shall contact the Goleta Water District a minimum of 3 working days prior to requested date of sampling. The District will collect samples and perform bacteriological tests. Should the initial disinfection treatment fail to produce satisfactory bacteriological test results, the disinfection procedure shall be repeated until acceptable results are obtained.

3.03 PRESSURE AND LEAKAGE TESTING OF WATERLINES

- A. Prior to pressure and leakage testing, waterlines shall be flushed or blown out as appropriate. The Contractor shall test all waterlines either in sections or as a unit. Test sections shall not exceed 1000 feet in length. No section of waterline shall be tested until all field-placed concrete or mortar has attained an age of 14 days, or the waterline has been fully restrained against thrust forces. The test shall be made by closing valves when available, or by placing temporary bulkheads in the pipe and filling the line slowly with water. The Contractor shall be responsible for ascertaining that all test bulkheads are suitably restrained to resist the thrust of the test pressure without damage to, or movement of, the adjacent pipe. Any unharnessed sleeve-type couplings, expansion joints, or other sliding joints shall be restrained or suitably anchored prior to the test, to avoid movement and damage to piping and equipment. The Contractor shall utilize waterline appurtenances or provide sufficient temporary air tappings in the waterline to allow for evacuation of all entrapped air in each pipe segment to be tested. After completion of the tests, such taps shall be permanently plugged. Care shall be taken to see that all air vents are open during filling.
- B. The waterline shall be filled at a rate which will not cause any surges or exceed the rate at which the air can be released through the air valves at a reasonable velocity and all the air within the pipeline shall be properly purged. For steel and ductile iron pipe, after the waterline has been filled, it shall be allowed to stand under a slight pressure for at least 24 hours to allow the mortar lining to absorb what water it will and to allow air to escape from any air pockets. During this period, bulkheads, valves, and connections shall be examined for leaks. If leaks are found, corrective measures shall be taken.
- C. Pressure Test: The hydrostatic test shall consist of holding the test pressure (+/- 5 psi) on the waterline for a period of 2 hours. The test pressure at the low point of the section being tested shall be 1.5 times the working pressure or 100 psi, whichever is greater. At the end of the pressure test period, the amount of water used to maintain the test pressure shall be determined.
- D. Leakage Test: The leakage test shall be conducted concurrently with the pressure test. Leakage is defined as the quantity of water that must be supplied to a section of pipe to



maintain the pressure within 5 psi of the specified test pressure after the pressure test has begun. The maximum allowable leakage shall be according to the following formula:

$$L = S \times D \times P^{1/2} / 133,200$$

where:

L = leakage (gallons per hour)

S = length (feet), the lessor of the actual length being tested or the maximum length for determining leakage. Maximum length for determining leakage is [2000 feet].

D = pipe diameter (inches) P = test pressure (psi)

Pipe with welded joints shall have no leakage.

- E. Waterlines, services, and appurtenances that fail to pass the prescribed pressure and leakage test shall be considered defective work. The Contractor shall determine the cause of the failure/leakage, repair the leaks, and shall retest the waterline.

3.04 CONNECTIONS TO EXISTING SYSTEM

- A. Where connections are to be made to an existing potable water system, the interior surfaces of all pipe and fittings used in making the connections shall be swabbed or sprayed with a one percent hypochlorite solution before they are installed. Thorough flushing shall be started as soon as the connection is completed and shall be continued until discolored water is eliminated.

END OF SECTION



33 05 09

PIPING, GENERAL

PART 1 – GENERAL

1.01 REQUIREMENTS

- A. The Contractor shall provide all piping systems indicated, complete and operable, including pipe supports, hangers, guides, anchors, and connection to and abandonment of existing water facilities in accordance with the GWD Standards & Specifications and Contract Documents.
- B. The provisions of this Section shall apply to all piping sections in Divisions 2 and 33.
- C. The drawings define the general layout, configuration, routing, method of support, pipe size, and pipe type. The drawings are not pipe construction or fabrication drawings. It is the Contractor's responsibility to develop the details necessary to construct all piping systems, to accommodate the specific equipment provided, and to provide all spools, spacers, adapters, and connectors for a complete and functional system

1.02 RELATED WORK SPECIFIED ELSEWHERE

Section 02 82 00 – Asbestos Cement Pipe Removal and Disposal

Section 31 23 16 – Trenching, Backfill, and Compaction

Section 33 01 10 – Waterline Disinfection and Testing

Section 05 50 00 – Miscellaneous Metalwork

Section 09 90 00 – Protective Coatings

1.03 CONTRACTOR SUBMITTALS

- A. General: Submittals shall be furnished in accordance with Section 013300 - Contractor Submittals.
- B. Shop Drawings: Shop Drawings shall contain the following information:
 - 1. Drawings: Layout drawings including all necessary dimensions, details, pipe joints, fittings, specials, bolts and nuts, gaskets, valves, appurtenances, anchors, guides, and material lists. Fabrication drawings shall indicate all spool pieces, spacers, adapters,



connectors, fittings, and supports to accommodate the equipment and valves in a complete and functional system.

2. Drawings of pipe supports, hangers, anchors, and guide rails.
 3. Calculations for special supports and anchors.
- C. Samples: Performing and paying for sampling and testing as necessary for certifications are the Contractor's responsibility.
- D. Certifications
1. Location: As the Contractor's first order of work, the various connection points to the existing waterlines shall be potholed to identify depth, diameter, and pipe material. Pothole information shall be immediately provided to the DISTRICT for review. The DISTRICT will not review any other Contractor Submittals until after the pothole data is received.
 2. Leak-By: The Contractor shall note that existing DISTRICT valves do not close drip tight. Existing valves in many areas are known to allow significant leak-by when fully closed. The Contractor shall expect leak-by conditions and provide the necessary labor, materials, and equipment to address this condition such that the connection can be made under safe conditions for personnel and contaminated water is prevented from entering the open ends of the existing and new mains. The Contractor shall not operate any DISTRICT valves. Only DISTRICT personnel shall operate existing system valves to facilitate the Contractors connection work. Also, only DISTRICT personnel shall operate valves connecting new mains to the existing in-service mains.

PART 2 – PRODUCTS

2.01 GENERAL

- A. Extent of Work: Pipes, fittings, and appurtenances shall be provided in accordance with the requirements of the applicable Sections of Divisions 2 and 33 and as indicated.
- B. Pipe Supports: Pipes shall be adequately supported, restrained, and anchored in accordance with this Section and as indicated.
- C. Coating: Pipes above ground or in structures shall be field-coated in accordance with Section 099000 - Protective Coatings.
- D. Pressure Rating: Piping systems shall be designed for the maximum expected pressure as defined in Section 330110 - Water Pipeline Testing and Disinfection, or as indicated on



the Piping Schedule. Minimum pressure rating shall be 200 psi, which corresponds to a working pressure of 133 psi when pressure tested at 1.5 times the working pressure. Where there is a working pressure greater the 133 psi, the minimum pressure rating shall be 305 psi.

- E. Inspection: Pipe shall be subject to inspection at the place of manufacture. During the manufacture of the pipe, the City shall be given access to all areas where manufacturing is in progress and shall be permitted to make all inspections necessary to confirm compliance with requirements.
- F. Tests: Except where otherwise indicated, materials used in the manufacture of the pipe shall be tested in accordance with the applicable specifications and standards. The Contractor shall be responsible for performing material tests.
- G. Welder Qualifications: Welding shall be done by skilled welders and welding operators who have adequate experience in the methods and materials to be used. Welders shall be qualified under the provisions of ANSI/AWS D1.1 by an independent local, approved testing agency not more than 6 months prior to commencing work on the pipeline. Machines and electrodes similar to those used in the work shall be used in qualification tests. Qualification testing of welders and materials used during testing are part of the work.

2.02 PIPE FLANGES

- A. General: Flanges shall have flat faces and shall be attached with bolt holes straddling the vertical axis of the pipe (2-holed) unless otherwise indicated. Attachment of the flanges to the pipe shall conform to the applicable requirements of ANSI/AWWA C207. Flange faces shall be perpendicular to the axis of the adjoining pipe. Flanges for miscellaneous small pipes shall be in accordance with the standards indicated for these pipes.
- B. Pressure Ratings
 - 1. 150 psi or less: Flanges shall conform to either ANSI/AWWA C207 - Steel Pipe Flanges for Waterworks Service--Sizes 4 In. Through 144 In., Class D, or ANSI/ASME B16.5 - Pipe Flanges and Flanged Fittings, 150-lb class.
 - 2. 150 psi to 275 psi: Flanges shall conform to ANSI/ASME B16.5, 300-lb class.
 - 3. 275 psi to 700 psi: Flanges shall conform to ANSI/ASME B16.5, 300-lb class.
 - 4. Selection based on test pressure: AWWA flanges shall not be exposed to test pressures grater than 125 percent of rated capacity. For higher test pressures, the next higher rated AWWA flange or an ANSI-rated flange shall be selected.



- C. Blind Flanges: Blind flanges shall be in accordance with ANSI/AWWA C207, or as indicated for miscellaneous small pipes. Blind flanges for pipe sizes 12 inches and greater shall be provided with lifting eyes in form of welded or screwed eye bolts.
- D. Flange Coating: Machined faces of metal blind flanges and pipe flanges shall be coated with a temporary rust-inhibitive coating to protect the metal until the installation is completed.
- E. Flange Bolts: Bolts and nuts shall conform to Section 055000 - Miscellaneous Metalwork. Studs and bolts shall extend through the nuts a minimum of 1/4-inch. All-thread studs shall be used on all valve flange connections, where space restrictions preclude the use of regular bolts.
- F. Insulating Flanges: Insulated flanges shall have bolt holes 1/4-inch diameter greater than the bolt diameter.
- G. Insulating Flange Sets: Insulating flange sets shall be provided where indicated. Each insulating flange set shall consist of an insulating gasket, insulating sleeves and washers and a steel washer. Insulating sleeves and washers shall be one piece when flange bolt diameter is 1-1/2-inch or smaller and shall be made of acetal resin. For bolt diameters larger than 1-1/2-inch, insulating sleeves and washers shall be 2-piece and shall be made of polyethylene or phenolic material. Steel washers shall be in accordance with ASTM A 325 - Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength. Insulating gaskets shall be fullface.
- H. Insulating Flange Manufacturers, or equal

JM Red Devil, Type E
Maloney Pipeline Products Co., Houston
PSI Products, Inc.
- I. Flange Gaskets: Gaskets for flanged joints shall be ring type, with material and thickness in accordance with ANSI/AWWA C207, suitable for temperatures to 700 degrees F, a pH of one to eleven, and pressures to 1000 psig. Blind flanges shall have gaskets covering the entire inside face of the blind flange and shall be cemented to the blind flange.
- J. Flange Gasket Manufacturers, or equal

John Crane, Style 2160
Garlock, Style 3000

2.03 THREADED INSULATING CONNECTIONS



- A. General: Threaded insulating bushings, unions, or couplings, as appropriate, shall be used for joining threaded pipes of dissimilar metals and for piping systems where corrosion control and cathodic protection are involved.
- B. Materials: Threaded insulating connections shall be of nylon, Teflon, polycarbonate, polyethylene, or other non-conductive materials, and shall have ratings and properties to suit the service and loading conditions.

2.04 MECHANICAL-TYPE COUPLINGS & MECHANICAL JOINT ADAPTERS

- A. Mechanical-type Couplings: Cast mechanical-type couplings (grooved or banded pipe) shall be provided where indicated. The couplings shall conform to the requirements of ANSI/AWWA C606 - Grooved and Shouldered Joints. Bolts and nuts shall conform to the requirements of Section 055000 - Miscellaneous Metalwork. Gaskets for mechanical-type couplings shall be compatible with the piping service and fluid utilized, in accordance with the coupling manufacturer's recommendations. The wall thickness of grooved piping shall conform with the coupling manufacturer's recommendations to suit the highest expected pressure. To avoid stress on equipment, equipment connections with mechanical-type couplings shall have rigid-grooved couplings or flexible type coupling with harness in sizes where rigid couplings are not available, unless thrust restraint is provided by other means. Mechanical-type couplings shall be bonded. Have the coupling manufacturer's service representative verify the correct choice and application of couplings and gaskets, and the workmanship, to assure a correct installation. To assure uniform and compatible piping components, all grooved fittings, couplings, and valves shall be from the same manufacturer.

- B. Manufacturers of Couplings for Steel Pipe, or equal

- Aeroquip Corp. (banded or grooved)
 - Victaulic Style 41 or 44 (banded, flexible)
 - Victaulic Style 77 (grooved, flexible)
 - Victaulic Style 07 or HP-70 (grooved, rigid)

- C. Manufacturers of Ductile Iron Pipe Couplings, or equal

- Aeroquip Corp.
 - Victaulic Style 31 (flexible or rigid grooving)

Note: Ductile iron pipe couplings shall be furnished with flush seal gaskets.

- D. Manufacturers of Couplings for PVC Pipe, or equal

- Aeroquip Corp
 - Victaulic Style 77



Note: Couplings for PVC pipe shall be furnished with radius cut or standard roll grooved pipe ends.

- E. Mechanical Joint Adapters: The direct connection of mechanical joint (MJ) fittings shall be made using MJ restraint adapters where indicated on the Construction Drawings. The MJ restraint adapters shall be constructed of ductile iron and comply with applicable AWWA Standards. Bolts and nuts shall conform to the requirements of Section 055000 - Miscellaneous Metalwork. The MJ restraint adapters shall be designed for a working pressure of 200 psi and to withstand a test pressure of 250 psi. MJ restraint adapters shall be lined and coated in accordance with AWWA C104 and C110. Manufacturer shall be Infact Corporation, Foster Adaptor, or approved equal

2.05 SLEEVE-TYPE COUPLINGS

- A. Construction: Sleeve-type couplings shall be provided where indicated, in accordance with ANSI/AWWA C219 - Standard for Bolted Sleeve-Type Couplings for Plain-End Pipe. Couplings shall be steel with steel bolts, without pipe stop. Couplings shall be of sizes to fit the pipe and fittings indicated. The middle ring shall be not less than 1/4-inch in thickness and shall be either 5 or 7 inches long for sizes up to and including 30 inches and 10 inches long for sizes greater than 30 inches, for standard steel couplings, and 16 inches long for long-sleeve couplings. The followers shall be single-piece contoured mill sections welded and coldexpanded as required for the middle rings, and of sufficient strength to accommodate the number of bolts necessary to obtain adequate gasket pressures without excessive rolling. The shape of the follower shall be of such design as to provide positive confinement of the gasket. Bolts and nuts shall conform to the requirements of Section 055000 – Miscellaneous Metal Work. Buried sleeve-type couplings shall be epoxy-coated at the factory as indicated.
- B. Pipe Preparation: Where indicated, the ends of the pipe shall be prepared for flexible steel couplings. Plain ends for use with couplings shall be smooth and round for a distance of 12 inches from the ends of the pipe, with outside diameter not more than 1/64-inch smaller than the nominal outside diameter of the pipe. The middle ring shall be tested by cold-expanding a minimum of one percent beyond the yield point, to proof-test the weld to the strength of the parent metal. The weld of the middle ring shall be subjected to air test for porosity.
- C. Gaskets
 - 1. Gaskets for sleeve-type couplings shall be rubber-compound material that will not deteriorate from age or exposure to air under normal storage or use conditions. Gaskets for wastewater and sewerage applications shall be Buna "N," Grade 60, or equivalent suitable elastomer. The rubber in the gasket shall meet the following specifications:
 - a. Color - Jet Black



- b. Surface - Non-blooming
 - c. Durometer Hardness - 74 plus or minus 5
 - d. Tensile Strength - 1000 psi Minimum
 - e. Elongation - 175 percent Minimum
2. The gaskets shall be immune to attack by impurities normally found in water or wastewater. All gaskets shall meet the requirements of ASTM D 2000 - Classification System for Rubber Products in Automotive Applications, AA709Z, meeting Suffix B13 Grade 3, except as noted above. Gaskets shall be compatible with the piping service and fluid utilized.
- D. Insulating Couplings: Where insulating couplings are required, both ends of the coupling shall have a wedge-shaped gasket which assembles over a rubber sleeve of an insulating compound in order to obtain insulation of all coupling metal parts from the pipe.
- E. Restrained Joints: Sleeve-type couplings on pressure lines shall be harnessed unless thrust restraint is provided by other means. Harnesses shall be designed by the pipe manufacturer in accordance with Manual M11, or as indicated. Harness sets shall be designed for the maximum test pressure of the pipe in which they are installed.
- F. Manufacturers, or equal
- Dresser
 - Ford Meter Box Co.
 - Smith-Blair
 - Romac

2.06 FLANGED COUPLING ADAPTERS

- A. Construction: Flanged coupling adapters (FCA's) shall be provided where indicated, in accordance with the applicable provisions of ANSI/AWWA C219 - Standard for Bolted Sleeve-Type Couplings for Plain End Pipe. FCA's shall be steel with steel bolts, and sized to fit the pipe and fittings indicated. The middle ring shall be not less than 1/4-inch in thickness and shall be a minimum of 5 inches long for sizes up to and including 30 inches. The followers shall be single-piece contoured mill sections welded and cold-expanded as required for the middle ring, and of sufficient strength to accommodate the number of bolts necessary to obtain adequate gasket pressures without excessive rolling. The shape of the follower shall be of such design as to provide positive confinement of the gasket. Bolts and nuts shall be stainless steel. FCA's shall be epoxy-coated at the factory as indicated.
- B. Pipe Preparation: Where indicated, the end of the pipe shall be prepared for use with the FCA and shall be smooth and round for a distance of 12 inches from the ends of the pipe,



with outside diameter not more than 1/64-inch smaller than the nominal outside diameter of the pipe.

C. Gaskets:

1. Gaskets for FCA's shall be rubber-compound material that will not deteriorate from age or exposure to air under normal storage or use conditions. The rubber in the gasket shall meet the following specifications:

Color - Jet Black
Surface - Non-blooming
Durometer Hardness - 74 plus or minus 5
Tensile Strength - 1000 psi Minimum
Elongation - 175 percent Minimum

2. The gaskets shall be immune to attack by impurities normally found in water or wastewater. All gaskets shall meet the requirements of ASTM D 2000 - Classification System for Rubber Products in Automotive Applications, AA709Z, meeting Suffix B13 Grade 3, except as noted above. Gaskets shall be compatible with the piping service and fluid utilized

- D. Restrained Joints: FCA's shall be restrained by the use of thrust blocks, harnesses, or other means. Harness sets shall be designed for the maximum test pressure of the pipe in which they are installed. For PVC and ductile iron pipe, EBAA Iron Sales, Mega-Flange may be substituted for restrained FCA's.

E. Manufacturers, or equal

Dresser, Style 127 & 128W
Smith-Blair, Style 911
Romac, Style FC400 & FCA501
EBAA Iron Sales, Mega-Flange

2.07 EXPANSION JOINTS

- A. Piping subject to expansion and contraction shall be provided with sufficient means to compensate for such movement without exertion of undue forces to equipment or structures. This may be accomplished with expansion loops, bellow-type expansion joints, or sliding-type expansion joints. Expansion joints shall be of stainless steel, monel, rubber, or other materials best suited for each individual service. Submit detailed calculations and manufacturer's Shop Drawings of all proposed expansion joints, piping layouts, and anchors and guides, including information on materials, temperature, and pressure ratings.



2.08 PIPE THREADS

- A. Pipe threads shall be in accordance with ANSI/ASME B1.20.1 - Pipe Threads, General Purpose (inch), and be made up with Teflon tape unless otherwise indicated.

2.09 RESTRAINING GLANDS AND JOINT HARNESSSES

- A. Restraining glands shall be of a model and type designed for the intended pipe material and service conditions, and shall be EBAA Iron Sales, Romac, or approved equal. Joint harnesses shall be of a model and type designed for the intended pipe material and service conditions, and shall be EBAA Iron Sales, Romac, Star, Sigma, or approved equal.

2.10 RESTRAINING GLANDS AND JOINT HARNESSSES

- A. Thrust blocks and anchor blocks shall be constructed of Portland Cement Concrete with a minimum compressive strength of 2500 psi. Anchor rods for anchor blocks shall be #5 rebar or 5/8 inch diameter steel rods, and shall be epoxy coated.

2.11 TAPE WRAPPING AND CATHODIC PROTECTION

- A. All nuts and bolts on all pipe fittings shall be primered and single tape wrapped with Trenton Wax Tape #1 to fully encapsulate the nuts and bolts without any air voids. The nuts and bolts should broadcast through the wax tape . Manufacturer shall be Polyken or approved equal.
- B. Existing buried steel piping shall be cathodically protected by welding a sacrificial anode to the pipe and flat strap jumpers across couplers whenever uncovered for work

2.12 TRACER WIRE

- A. For non-metallic pipelines, 12 gauge continuous location wire shall be placed on all water mains and brought up in valve can per Goleta Water District direction. Underground detectable warning tape shall also be used.

2.13 PIPE HANGERS AND SUPPORTS

- A. Code Compliance: All piping systems and pipe connections to equipment shall be properly anchored and supported to prevent undue deflection, vibration, dislocation due to seismic events and line pressures, and stresses on piping, equipment, and structures. All supports and parts thereof shall conform to the requirements of ANSI/ASME B31.1 - Power Piping, except as supplemented or modified below. Supports for plumbing piping shall be in accordance with the latest edition of the applicable plumbing code or local administration requirement.



- B. **Structural Members:** Wherever possible, pipes shall be supported from structural members. Where it is necessary to frame structural members between existing members, such supplementary members shall be provided. All supplementary members shall be in accordance with the requirements of the building code and the American Institute of Steel Construction and shall be acceptable to the City.
- C. **Pipe Hangers:** Pipe hangers shall be capable of supporting the pipe in all conditions of operation, allowing free expansion and contraction of the piping, and preventing excessive stress on equipment. All hangers shall have a means of vertical adjustment after erection. Hangers shall be designed to prevent becoming disengaged by any movement of the supported pipe. Hangers subject to shock, seismic disturbances, or thrust imposed by the actuation of safety valves, shall include hydraulic shock suppressors. All hanger rods shall be subject to tensile loading only.
- D. **Hangers Subject to Horizontal Movements:** At hanger locations where lateral or axial movement is anticipated, suitable linkage shall be provided to permit such movement. Where horizontal pipe movement is greater than 1/2-inch, or where the hanger rod deflection from the vertical is greater than 4 degrees from the cold to the hot position of the pipe, the hanger rod and structural attachment shall be offset in such a manner that the rod is vertical in the hot position.
- E. **Spring-Type Hangers:** Spring-type pipe hangers shall be provided for piping subject to vibration or vertical expansion and contraction, such as engine exhausts and similar piping. All spring-type hangers shall be sized to the manufacturer's printed recommendations and the loading conditions encountered. Variable spring supports shall be provided with means to limit misalignment, buckling, eccentric loading, or to prevent overstressing of the spring, and with means to indicate at all times the compression of the spring. Supports shall be capable of accommodating at least 4 times the maximum travel due to thermal expansion.
- F. **Thermal Expansion:** Wherever expansion and contraction of piping is expected, a sufficient number of expansion loops or joints shall be provided, together with the necessary rolling or sliding supports, anchors, guides, pivots, and restraints permitting the piping to expand and contract freely in directions away from the anchored points. All components shall be structurally suitable to withstand all loads imposed.
- G. **Heat Transmission:** Supports, hangers, anchors, and guides shall be so designed and insulated, that excessive heat will not be transmitted to the structure or to other equipment.
- H. **Riser Supports:** Where practical, risers shall be supported on each floor with riser clamps and lugs, independent of the connected horizontal piping.



- I. Freestanding Piping: Free-standing pipe connections to equipment such as chemical feeders and pumps shall be firmly attached to steel frames fabricated from angles, channels, or I-beams anchored to the structure. Exterior, free-standing overhead piping shall be supported on fabricated pipe stands consisting of pipe columns anchored to concrete footings, with horizontal, welded steel angles and U-bolts or clamps securing the pipes.
- J. Materials of Construction:
 - 1. General: All pipe support assemblies, including framing, hardware, and anchors, shall be steel construction, galvanized after fabrication, unless otherwise indicated.
 - 2. Submerged Supports: All submerged piping, as well as piping, conduits, and equipment in hydraulic structures within 24 inches of the water level, shall be supported with support assemblies, including framing, hardware, and anchors, constructed of Type 316 stainless steel, unless otherwise indicated.
- K. Point Loads: Any meters, valves, heavy equipment, and other point loads on PVC, FRP, and other plastic pipes, shall be supported on both sides, according to manufacturer's recommendations to avoid undue pipe stresses and failures. To avoid point loads, all supports on PVC, FRP, and other plastic piping shall be equipped with extra wide pipe saddles or galvanized steel shields.
- L. Noise Reduction: To reduce transmission of noise in piping systems, all copper tubes in buildings and structures shall be wrapped with a 2-inch wide strip of rubber fabric or similar, suitable material at each pipe support, bracket, clip, or hanger.

2.14 SUPPORT SPACING

- A. Supports for piping with the longitudinal axis in approximately a horizontal position shall be spaced to prevent excessive sag, bending, and shear stresses in the piping, with special consideration given where components such as flanges and valves impose concentrated loads. Pipe support spacing shall not exceed the maximum spans in the tables below. For temperatures other than ambient temperatures, or those listed, and for other piping materials or wall thicknesses, the pipe support spacings shall be modified in accordance with the pipe manufacturer's recommendations. Vertical supports shall be provided to prevent the pipe from being overstressed from the combination of all loading effects.
 - 1. Support Spacing for Schedule 40 and Schedule 80 Steel Pipe:

Nominal Pipe Diameter (inches)	Maximum Span (feet)



1/2	6
3/4 and 1	8
1-1/4 to 2	10
3	12
4	14
6	17
8 and 10	19
12 and 14	23
16 and 18	25
20 and greater	30

2. Support Spacing for Welded Fabricated Steel Pipe:

Maximum Spans for Pipe Supported in Minimum
 120 degree Contact Saddles (feet)

Nominal Pipe Diameter (inches)	Wall Thickness (inches)							
	3/16	1/4	5/16	3/8	7/16	1/2	5/8	3/4
24	33	37	41	43	45	47		
26	34	38	41	44	46	48		
28	34	38	41	44	47	49		
30	34	38	42	45	48	49		
32	34	39	42	45	48	50		
34	35	39	43	46	48	50		
36	35	39	43	46	49	51	55	
38	35	39	43	46	49	51	55	
40	35	40	43	47	49	52	56	
42	35	40	44	47	50	52	56	
45	--	40	44	47	50	53	57	
48	--	40	44	47	50	53	58	61

For steel pipe sizes not presented in this table, the support spacing shall be designed so that the stress on the pipe does not exceed 5,000 psi. Maximum deflection of pipe shall be limited to 1/360th of the span and shall be calculated by using the formula:

$$L = (7500tD/(32t+D))^{1/2}$$

where: t = Thickness (inches)
 D = Diameter (inches)



$$L = \text{Maximum span (feet)}$$

3. Support Spacing for Ductile-Iron Pipe:

Nominal Pipe Diameter (inches)	Maximum Span (feet)
All Diameters	Two supports per pipe length or 10 feet (one of the 2 supports located at joint)

4. Support Spacing for Copper Tubing:

Nominal Pipe Diameter (inches)	Maximum Span (feet)
1/2 to 1-1/2	4
2 to 4	6
6 and greater	8

5. Support Spacing for Schedule 80 PVC Pipe:

Nominal Pipe Diameter (inches)	Maximum Span (at 100 degrees F) (feet)
1/2	4
3/4	4.5
1	5
1-1/4	5.5
1-1/2	5.75
2	6.25
3	7.5
4	8.25
6	10
8	11
10	12.25
12	13.25

2.15 MANUFACTURED SUPPORTS

- A. Stock Parts: Where not specifically indicated, designs which are generally accepted as exemplifying good engineering practice and use stock or production parts, shall be



utilized wherever possible. Such parts shall be locally available, new, of best commercial quality, designed and rated for the intended purpose.

B. Manufacturers, or Equal:

Basic-PSA, Johnstown, PA
Bergen-Paterson Pipesupport Corp., Woburn, MA
Power Piping Company, Pittsburgh, PA
Standon, Model S89 &S92
Pipeline Products

2.16 COATING

- A. Galvanizing: Unless otherwise indicated, all fabricated pipe supports other than stainless steel or nonferrous supports shall be blast-cleaned after fabrication and hot-dip galvanized in accordance with ASTM A 123 - Specifications for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
- B. Other Coatings: Other than stainless steel or non-ferrous supports, all supports shall receive Protective Coatings in accordance with the requirements of Section 099000 - Protective Coatings.

2.17 CONNECTIONS TO EXISTING FACILITIES

- A. All materials used in making the connection or removing the facility from service shall conform to the applicable sections of the City's Standards & Specifications and the Construction Drawings.

PART 3 – EXECUTION

3.01 MATERIAL DELIVERY, STORAGE, AND PROTECTION

- A. Pipe and pipe appurtenances such as fittings, valves, etc. shall be delivered in a clean and undamaged condition. The Contractor shall be responsible for unloading and loading of pipe and pipe appurtenances at the job site in accordance with the manufacturer's printed instructions and recommendations. All pipe shall be unloaded at the site with care using a double padded sling or as specified in the applicable Sections. Pipe appurtenances shall be unloaded at the site with care using hoists or skids to avoid damage to materials. Under no circumstances shall materials be dropped. When unloading pipe, trucks shall be parked on level ground. All pipe and pipe appurtenances shall be kept in a safe storage area where they can be protected from heat, dirt, weather, or other detrimental factors. Cement mortar lined pipe shall be stored with proper stulling per the manufacturer's recommendations. Pipe shall be stored in such a way as not to inflict loading which may cause bending, cracking, or other damage. Pipe appurtenances shall be stored off the



ground for protection against oxidation caused by ground contact. Defective or damaged materials shall be replaced with new materials at the Contractor's expense.

3.02 GENERAL

- A. Pipes, fittings, and appurtenances shall be installed in accordance with the requirements of the applicable Sections of Divisions 2 and 33.
- B. Corrosion Protection: All nuts and bolts on flanges, fittings, couplings, joint harnesses, etc. for buried service shall be tape wrapped, after installation is completed, using heavy duty joint wrap, in accordance with Section 099000 – Protective Coatings. Entire length of bolts and all hardware shall be fully encapsulated with tape wrapping.
- C. Core Drilling: Where core drilling is required for pipes passing through existing concrete, core drilling locations shall be determined by radiograph of concrete construction to avoid damage to embedded raceways and rebar.
- D. Cleanup: After completion of the work, cuttings, joining and wrapping materials, and other scattered debris shall be removed from the Site. The entire piping system shall be handed over in a clean and functional condition.

3.03 THRUST RESTRAINT

- A. General: Thrust restraint shall be provided at all vertical and horizontal bends, tees, crosses, dead ends, hydrants, reducers, valves, and fittings. Thrust restraint shall be accomplished by the use of restraining glands and joint harnesses, or thrust blocks. Restraining Glands shall be used where specified on mechanical joint fittings for PVC and ductile iron pipe.
- B. Restraining Glands and Joint Harnesses: Restraining glands and joint harnesses shall be installed in accordance with manufacturer recommendations. After installation, all nuts and bolts shall be primed and wrapped with 2 layers of 35 mil adhesive pipe wrap. Joint harnesses shall be used in conjunction with retainer glands wherever retainer glands are to be used to provide thrust restraint.
- C. Thrust Blocks: Thrust and anchor blocks shall be formed out of concrete meeting requirements of Section 033000 – Cast-in-Place Concrete. Blocks shall be sized and configured in accordance with Section 2.04 C and Standard Detail 2-08 of these Standards & Specifications. Concrete shall be poured against undisturbed ground.
- D. Epoxy coated number 5 reinforcement bar shall be embedded and wrapped around appurtenance as shown in Standard Detail 2-08. Care shall be taken not to cover fittings, valves, bolts, nuts, or other appurtenances with concrete. Blocks shall be cured 24 hours



prior to backfill, and shall be cured a minimum of 7 days or have 75% of the 28-day strength before the water line can be filled and pressurized.

3.04 TRACER WIRE

- A. Continuous tracer wire shall be placed directly on the top surface of all water mains. Where detectable warning tape is also used, place it no less than 1 foot above the top of the water main.

3.05 INSTALLATION OF PIPE SUPPORTS

- A. General: All pipe supports, hangers, brackets, anchors, guides, and inserts shall be fabricated and installed in accordance with the manufacturer's printed instructions and ANSI/ASME B31.1 - Power Piping. All concrete inserts for pipe hangers and supports shall be coordinated with the formwork.
- B. Appearance: Pipe supports and hangers shall be positioned to produce an orderly, neat piping system. All hanger rods shall be vertical, without offsets. Hangers shall be adjusted to line up groups of pipes at the proper grade for drainage and venting, as close to ceilings or roofs as possible, without interference with other work.

3.06 FABRICATION

- A. Quality Control: Pipe hangers and supports shall be fabricated and installed by experienced welders and fitters, using the best welding procedures available. Fabricated supports shall be neat in appearance without sharp corners, burrs, and edges.

3.07 CONNECTION TO EXISTING WATER LINES

- A. Shutdown Request: The Contractor shall submit a written request to the Goleta Water District a minimum of ten (10) working days before the time of any desired shutdown of existing waterlines or services. The written request shall include the date of the proposed shutdown and the estimated number of hours required to complete the work. The District will review the request and determine the actual time and date of the shutdown based on the availability of District staff.
- B. Authorization: Connections shall be made only by the Goleta Water District. No connection work shall be performed prior to authorization by the District.
- C. Time Schedule: Work which will require disruption of service in water mains shall be planned and executed so that it will not disrupt service before 8:30 A.M. and ensure restoration of service before 4:00 P.M. each day, unless an exception in writing is obtained from the District prior to the shutdown. To comply with this schedule the Contractor must consider the time required to:



1. Turn off customer services and isolation valves;
2. Drain and dispose the water from the isolated section of the water line to be cut;
3. Perform cut-in operations; and
4. Flush the water line prior to service restoration.

Note: If the District determines that the disruption of service may exceed the time limitations, the Contractor shall re-plan the work for more than one day of operation to ensure service is restored by 4:00 P.M. each day.

- D. **Material:** The Contractor shall provide the Goleta Water District with verification that all materials are on hand a minimum of five working days in advance of the proposed shutdown date. The Contractor shall furnish all pipe and materials as may be required for connections the day before of the shutdown date the Contractor shall be fully prepared for the planned work with all required materials, tools, equipment, dewatering equipment, lights, barricades, permits, skilled personnel, and supervision. If adequate preparations have not been made by the Contractor, the District will cancel the shutdown and the Contractor shall be responsible for all costs associated with the cancelled shutdown.
- E. **Inadequate Progress:** If progress is inadequate during the connection operations to complete the connection in the time specified, the Goleta Water District shall order necessary corrective measures. All costs for corrective measures shall be paid by the Contractor.
- F. **Connections:** New mains shall be connected to existing in-service mains against a closed valve prior to disinfection, flushing and pressure testing of the new mains. The Contractor shall not operate the closed valve. Only Goleta Water District field personnel shall operate and/or open existing system valves and valves connecting new mains to the existing in-service mains. Connections shall be made with as little change as possible in the grade of new main. If the grade of the existing pipe is below that of the new pipeline, a sufficient length of the new line shall be deepened so as to prevent the creation of any high spot or abrupt changes in grade of the new line. Where the grade of the existing pipe is above that of the new pipeline, the new line shall be laid at specified depth, except for the first joint adjacent to the connection, which shall be deflected as necessary to meet the grade of the existing pipe. If sufficient change in direction cannot be obtained by the limited deflection of the first joint, a fitting of the proper angle shall be installed. Where the connection creates a high or low spot in the line, a combination air valve or blowoff assembly shall be installed as directed by the District.
- G. **Testing:** The new pipeline shall be disinfected and pressure tested in accordance with Section 02643 – Waterline Disinfection & Testing.

3.08 REMOVAL OF EXISTING MAINS AND APPURTENANCES FROM SERVICE



- A. General: Existing waterlines, conduits, or structures shall be abandoned and removed from service at the locations shown on the Construction Drawings or as directed by the Goleta Water District, in accordance with the District 's Standards & Specifications. At all locations where new waterlines are to be connected to existing waterlines and where portions of the existing waterlines are to be abandoned, the existing waterlines to be abandoned shall be removed for a minimum distance of five feet clear from any waterlines to remain in service. Conduits to be abandoned in place shall be plugged with concrete to form a 2 foot long plug at all openings. Existing valves removed from service due to the abandonment of a waterline shall be closed, the valve can removed, and the hole backfilled with concrete slurry and patched with asphalt.
- B. Removed Material: Removed pipe and appurtenances may be temporarily stockpiled on the job in a location that will not disrupt traffic or be a safety hazard per restrictions and requirements of the County of Santa Barbara. Materials from abandoned facilities shall be salvaged as shown on the Construction Drawings or as indicated in the District's Standards & Specifications. Removed appurtenances to be salvaged shall be delivered to the District's storage yard as directed by the District. Removed pipe shall be disposed of by the Contractor in accordance with State and local regulations.
- C. Maintenance of Service: Before excavating for laying mains that are to replace existing pipes and/or services, the Contractor shall make provisions for maintaining continuous service as directed by the City or Goleta Water District.

END OF SECTION



SECTION 33 05 31.16

PVC GRAVITY PIPE (AWWA C900, MODIFIED)

PART 1 – GENERAL

1.01 REQUIREMENTS

- A. The Contractor shall provide 305 psi or Class 235 polyvinyl chloride (PVC) pressure pipe, complete in place, in accordance with the Contract Documents.

1.02 RELATED WORK SPECIFIED ELSEWHERE

Section 31 23 16 – Trenching, Backfill and Compaction

Section 33 01 10 – Waterline Disinfection

Section 33 05 09 – Piping, General

Section 33 12 16 – Valves and Appurtenances

Section 33 14 17 – Service Connections

1.03 REFERENCE SPECIFICATIONS, CODES, AND STANDARDS

A. Commercial Standards:

ANSI/AWWA C104/A21.5 Cement-Mortar Lining for Ductile-Iron Pipe and Fittings for Water

ANSI/AWWA C110/A21.10 Ductile-Iron and Gray-Iron Fittings 3-inch Through 48-inch for Water and Other Liquids

ANSI/AWWA C111/A21.11 Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings

ANSI/AWWA C153/A21.53 Ductile-Iron Compact Fittings, 3 in. Through 12 in. for Water and Other Liquid

ANSI/AWWA C600 Installation of Ductile-Iron Water Mains and Appurtenances

ANSI/AWWA C900 Polyvinyl Chloride (PVC) Pressure Pipe and Fabricated Fittings, 4-inch (100 mm) Through 60-inch (1,500 mm)

AWWA Manual M23 PVC Pipe - Design and Installation

ASTM D 2584 Test Method for Ignition Loss of Cured Reinforced Resins

PPI Technical Report TR 3 Policies and Procedures for Developing Hydrostatic Design Basis (HDB), Pressure Design Basis (PDB) Strength Design Basis (SDB),



and Minimum Required Strength (MRS) Ratings for Thermoplastic Piping Materials or Pipe

PPI Technical Report TR 4 PPI Listing of Hydrostatic Design Basis (HDB), Strength Design Basis (SDB), Pressure Design Basis (PDB) and Minimum Required Strength (MRS) Ratings for Thermoplastic Piping Materials or Pipe

AWWA Manual M23 PVC Pipe - Design and Installation

1.04 CONTRACTOR SUBMITTALS

- A. Furnish submittals in accordance with Section 013300 - Contractor Submittals.
- B. Shop Drawings: Design calculations to demonstrate compliance of pipe and fittings with this Section. Manufacturer's literature for metallic locating tape.
- C. Certifications: A certified affidavit of compliance for pipe and other products or materials under this Section and the following supplemental requirements:
 - 1. Hydrostatic proof test reports.
 - 2. Sustained pressure test reports.
 - 3. Burst strength test reports.
- D. The Contractor shall be responsible for performing and paying for sampling and testing as necessary for the certifications.

PART 2 – PRODUCTS

2.01 GENERAL

- A. All PVC pressure pipe (4-inch through 12-inch) shall be Class 200, and shall conform to the applicable requirements of ANSI/AWWA C900 subject to additional requirements herein. All large diameter PVC pressure pipe (14-inch through 36-inch) shall be Class 235, and shall conform to the applicable requirements of AWWA C900 and the additional requirements herein. Materials used in manufacture of the pipe shall be tested in accordance with the requirements of this Section and the referenced standards, as applicable.

2.02 PIPE DESIGN CRITERIA

- A. General: PVC pressure pipe shall be designed in accordance with the requirements of Appendix A of ANSI/AWWA C900, Large PVC pressure pipe shall be designed in accordance with the requirements of Manual M23, as applicable, and the supplemental requirements in this Section.



- B. Pipe Wall Thickness for Internal Pressure: The pipe shall be designed with a minimum thickness (t) or dimension ratio (DR) in accordance with paragraph A.3 of the above referenced Appendix A.
- C. Determination of External Loads: Instead of the equations in paragraph A.4 of the above referenced Appendix A, the dead (earth) loads shall be computed using the following 2 equations for trench or embankment conditions as applicable:
- D. In lieu of the equations in the Manual, the dead (earth) loads shall be computed using the following 2 equations for trench or embankment conditions as applicable:

1. Trench Condition:

$$W_d = C_d w B_d^2$$

Where: W_d = Earth load in pounds per linear foot
 C_d = Calculation coefficient
 Ku' = [0.13]
 w = [130] lb/ft³
 B_d = Trench width at top of pipe, feet

2. Positive Projecting Embankment Condition:

$$W_c = C_c w B_c^2$$

Where: W_c = Earth load in pounds per linear foot
 C_c = Calculation coefficient (based on r_{sdP} of 0.75)
 C_c = Calculation coeff. for lg dia. (based on $r_{sdP} = 0.25$)
 Ku = [0.19]
 w = [130] lb/ft³
 B_c = Outside diameter of pipe, feet

- E. Instead of the equations in paragraph A.4, the truck live loads shall be determined using the method recommended by AASHTO in "Standard Specifications for Highway Bridges." For depths of cover less than 10 feet HS-20 live loads shall be added to the earth loads to determine the total load. For depths of cover 3 feet or less, HS-20 live load plus impact shall be included.
- F. Pipe Deflection: With reference to paragraph A.5, the deflection of the pipe after installation shall not exceed 0.03 times the outside diameter.

2.03 PIPE

- A. The pipe shall be Class 200 or 235 (diameter 14 inch and greater) and of the diameter specified or shown, shall be furnished complete with rubber gaskets, and all specials and fittings shall be provided as required in the Contract Documents. The dimensions and



pressure classes for PVC pressure pipe with CastIron Pipe Equivalent O.D.'s shall conform to the requirements of AWWA C900.

- B. Additives and Fillers: Unless otherwise allowed in alternate qualification procedures of PPI-TR3, compounds which have a Hydrostatic Design Basis (HDB) of 4000 psi at 73.4 degrees F and for water shall not contain additives and fillers that exceed the recommended values in Table 1, Part Y of PPI-TR3 (e.g., allowable content range for calcium carbonate is 0.0-5.0 parts per hundred of resin). If requested by the Goleta Water District, the additive and filler content shall be determined using the pyrolysis method as specified in ASTM D 2584.
- C. Joints and Deflection: Joints for the buried PVC pipe shall be integral bell and spigot push-on joints employing a rubber gasket. The bell and coupling shall be the same thickness as of the pipe barrel, or greater thickness. Deflection at the joint shall not exceed 1.5 degrees or the maximum deflection recommended by the manufacturer. No deflection of the joint shall be allowed for joints which are over-belled or not belled to the stop mark.

2.04 FITTINGS

- A. Fittings shall be ductile iron and shall conform to the requirements of ANSI/AWWA C153/A21.53 or ANSI/AWWA C110/A21.10 for diameters 3-inch through 48-inch and shall have a minimum pressure rating of 250 psi. PVC pipe fittings shall be mechanical joint or flanged as indicated on the plans. Each fitting shall be clearly labeled to identify its size and pressure class.
- B. All fittings shall be lined and coated in accordance with AWWA Standards and the requirements of Section 099000 - Protective Coatings.
- C. All mechanical joint fittings shall be supplied with restraining glands for thrust restraint unless otherwise specified on the Construction Drawings.
- D. Couplings shall be Romac 501 straight, Romac XR501, or Smith-Blair.

PART 3 – EXECUTION

3.01 GENERAL

- A. Installation shall conform to the requirements of AWWA M23, instructions furnished by the pipe manufacturer, and to the supplementary requirements herein. Wherever the provisions of this Section and the aforementioned requirements are in conflict, the more stringent provision shall apply.



- B. Laying, jointing, testing for defects and for leakage shall be performed in the presence of the Goleta Water District, and shall be subject to approval before acceptance. Material found to have defects will be rejected and the Contractor shall promptly remove such defective materials from the Site.
- C. The Contractor shall determine the location of existing underground utility structures in the vicinity of proposed pipe installation prior to excavation. All existing above and below ground structures within the work area shall be protected in place unless indicated otherwise on the Construction Drawings.
- D. Whenever the work is not actively in progress, the open ends of all installed pipe shall be plugged or capped with bulkhead mechanical joint end cap to prevent the entry of animals, water, or other undesirable substances.

3.02 HANDLING AND STORAGE

- A. Handling: Pipe, fittings and accessories shall be carefully inspected before and after installation and those found defective will be rejected. Pipe and fittings shall be free from fins and burrs. Before being placed in position, pipe, fittings, and accessories shall be cleaned, and shall be maintained in a clean condition. Proper facilities shall be provided for lowering sections of pipe into trenches. Under no circumstances shall pipe, fittings or any other material be dropped or dumped into trenches.
- B. Storage: Pipe should be stored, if possible, at the Site in unit packages provided by the manufacturer. Caution should be exercised to avoid compression damage or deformation to bell ends of the pipe. Pipe should be stored in such a way as to prevent sagging or bending and be protected from exposure to direct sunlight by covering with an opaque material while permitting adequate air circulation above and around the pipe. Gaskets should be stored in a cool, dark place out of the direct rays of the sun, preferably in original cartons.

3.03 TRENCHING AND BACKFILL

- A. Trench excavation and backfill shall conform to the requirements of Section 312316 – Trenching, Backfill and Compaction.

3.04 INSTALLATION

- A. Bell-and-spigot pipe shall be laid with the bell end pointing in the direction work is progressing. Pipe shall be graded in straight lines, taking care to avoid the formation of any dips or low points. Pipe shall not be laid when the conditions of trench or weather are unsuitable. Pipe shall be laid uphill on grades 10% or greater.



- B. Pipe shall be supported at its proper elevation and grade, care being taken to secure firm and uniform support. Wood support blocking will not be permitted. The full length of each section of pipe and fittings shall rest solidly on the pipe bed, with recessed excavation to accommodate bells, joints, and couplings. Anchors and supports shall be provided where indicated and where necessary for fastening work into place. Fittings shall be independently supported.
- C. Short lengths of pipe shall be used in and out of each rigid joint or rigid structure. Piping that does not allow sufficient space for proper installation of jointing material shall be replaced by one of proper dimensions. Blocking or wedging between bells and spigots will not be permitted. Pipe alignment shall be checked after each length of pipe is installed to insure the downstream pipe did not deflect. Pipe shall not deflect at the joints more than 75% of manufacturer's printed recommendations. Trench shall not be backfilled prior to pipeline inspection by the Goleta Water District. Any pipeline buried prior to inspection shall be uncovered by the Contractor, at his own expense, for the District to inspect.
- D. Joints shall be installed according to manufacturer's recommendations. The surfaces of the pipe spigot end, bell and gasket shall be cleaned just prior to joining pipes. The spigot end of the pipe shall be beveled and checked for proper fit in the bell end without causing damage to the gasket. A lubricant, approved by the pipe manufacturer, shall be applied to the spigot end prior to joining pipes. The spigot shall penetrate bell completely as indicated by penetration line. Trenches shall be kept free of water until joints have been properly made. The maximum combined deflection at any coupling shall be in accordance with the manufacturer's recommendations.
- E. Pipe shall be cut by means of saws, power driven abrasive wheels, or pipe cutters, which will produce a square cut. No wedge-type roller cutters will be permitted. After cutting, the end of the pipe shall be beveled using a beveling tool, portable type sander, or abrasive disc. The pipe shall be remarked with a penetration line at the required penetration depth.
- F. Work Stoppage: At the end of each working day, Contractor shall plug or cap the open ends of all unfinished pipelines with securely bolted mechanical joint plugs, mechanical joint end caps, or blind flanges. If pipe is subject to flooding, pipe shall be anchored as precaution against flotation. Trenches shall be backfilled in accordance with the City Standards and Specifications.

3.05 SERVICE CONNECTIONS

- A. Service Connections: Direct tapping will not be permitted. Bronze service clamps shall be used for all service connections. Service clamps shall have a bearing area of sufficient width along the axis of the pipe, so that the pipe will not be distorted when the saddle is made tight. An internal shell cutter shall be used to drill through the corporation stop to



minimize PVC shavings, retain the coupon, and reduce stress. Single fluted shell cutters or twist drills are not acceptable. Lubricate the cutting and tapping edges of the tool with cutting lubricant. Make the cuts slowly and use the follower very lightly - do not force cutter through pipe wall. Shell cutter shall have sufficient throat depth to handle the heavy wall PVC pipe. Maximum outlet size permitted with service clamps or saddle is 2 inches.

- B. Tapping sleeves and valves shall be used for all outlet sizes greater than 2 inches in diameter. Tapping sleeves shall be assembled and installed in accordance with the manufacturer's recommendations.

3.06 CONNECTIONS TO EXISTING PIPELINES

- A. The Contractor shall locate all underground improvements and install the pipelines to the depths indicated. Where the new work is to be connected to existing pipelines, the Contractor shall make its arrangements with the Goleta Water District well in advance of the connections, to allow adequate time for dewatering of the existing line, if necessary, and shall expedite the work to minimize water outages to the users. Where sections of existing distribution mains are taken permanently out of service and abandoned in place, the cut ends shall be plugged solid with concrete to a depth of not less than two pipe diameters.

3.07 FIELD TESTING AND DISINFECTION

- A. Field testing and disinfection and water mains shall conform to the requirements of Section 330110 - Waterline Disinfection & Testing.

END OF SECTION



SECTION 33 05 31.11

PVC GRAVITY PIPE

PART 1 – GENERAL

1.01 GENERAL

- A. This section applies to the requirements for unplasticized PVC plastic pipe for sanitary sewers, storm drains, and house connection sewers.

1.02 TEST REQUIREMENTS

- A. Pipe, fittings, and couplings shall meet the requirements of the section titled “Requirements” of ASTM D3034, or F679 (“T-1” wall only). During production of the pipe, the manufacturer shall perform the specified tests for each pipe marking. A Certificate of Compliance by the manufacturer indicating compliance with specification requirement shall be delivered with the pipe. This Certificate of Compliance shall include the test result data.
- B. The basis for acceptance will be the inspection of pipes, fittings, and couplings, and compliance with the Specifications. When the pipe is delivered to the work site, the Engineer may require additional testing to determine conformance with the requirements of pipe flattening, impact resistance, pipe stiffness, and extrusion quality.
- C. When testing is required by the Engineer, one test pipe shall be selected at random by the Engineer from each 1,200 ft or fraction thereof of one test pipe per lot. A lot shall be defined as pipe having the same identification marking. The length of specimen for each selected pipe shall be a minimum of 8 feet.
- D. Chemical Resistance and Physical Testing: PVC shall conform to table below:

Property	ASTM Test Method	Values (Initial and After 112-Day Exposure)		
		Cell Classification		
		12454	13343	13364
Tensile stress at yield, psi, min.	D638	7000	6000	6000
Impact Strength ft-lbs /inch of notch, min,	D256 Method A Size ½ x 1/8 x 2-1/2”	0.65	1.5	1.5



Weight Change Unconditioned Conditioned	D543			+/- 1.5% max
		+/- 1.5% max +/- 1.0 % max	+/- 1.5% max +/- 1.0 % max	+/- 1.0 % max

PART 2 – PRODUCTS

2.01 MANUFACTURING REQUIREMENTS

- A. Pipe shall be made of PVC plastic having a cell classification of 12454 or 13364 as defined in ASTM D1784. The fittings shall be made of PVC Plastic having a cell classification of 12454 or 13343. Additives and fillers, including but not limited to stabilizers, antioxidants, lubricants, colorants, etc. shall not exceed 10 parts by weight per 100 of PVC resin in the compound.
- B. Joints for sanitary sewers, except house connection sewers, shall be gasketed joints.
- C. Pipe fittings, couplings, and joints for solid wall pipe shall conform to the requirements shown below:

Nominal Size (in)	ASTM	Wall Thickness Min.
4 – 15	D3034	SDR 35
18- 30	F679	“T-1” only

2.02 IDENTIFICATION MARKS

- A. All pipes, fitting, and couplings shall be clearly marked at intervals not to exceed 5 feet as follows:
 1. Nominal pipe diameter
 2. PVC cell classification
 3. Company, plant, shift, ASTM, SDR, and date designation
 4. Service designation or legend

For fittings and couplings, the SDR designation is not required.

2.03 JOINING SYSTEMS

- A. General:
 1. All pipe shall have a home mark on the spigot end to indicate proper penetration when the joint is made. The socket and spigot configurations for the fittings and couplings shall be compatible to those used for the pipe.



B. Elastomeric Gasket Joints

1. Pipe with gasketed joints shall be manufactured with a socket configuration which will prevent improper installation of the gasket and will ensure that the gasket remains in place during the joint operation. The gasket shall be manufactured from a synthetic elastomer.

C. Solvent Cement Joints

1. Pipe with solvent cement joints shall be joined with PVC cement conforming to ASTM D2564.

D. Injection Sealed Joints

1. Pipe with injection sealed joints shall be sealed with a PVC adhesive compound. The compound shall conform to the requirements of ASTM D2564 and shall have a minimum viscosity of 50,000 centipoises. The internal diameter of the socket shall be uniform with a locking taper at the base and an outer seal ring attached to the end. The socket shall have an injection port to inject the adhesive and an exhaust port on the opposite site to allow air to escape from the annular space.

PART 3 – EXECUTION

3.01 GENERAL

- A. Installation shall conform to the instructions furnished by the pipe manufacturer, and to the supplementary requirements herein. Wherever the provisions of this Section and the aforementioned requirements are in conflict, the more stringent provision shall apply.
- B. The CONTRACTOR shall determine the location of existing underground utility structures in the vicinity of proposed pipe installation prior to excavation. All existing above and below ground structures within the work area shall be protected in place unless indicated otherwise on the Construction Drawings.

3.02 TRENCHING AND BACKFILL

- A. Trench excavation and backfill shall conform to the requirements of Section 31 23 16 –Trenching, Backfill and Compaction.

END OF SECTION



SECTION 33 05 33.13

HDPE GRAVITY PIPE

PART 1 – GENERAL

1.01 GENERAL

- A. These specifications apply to high density polyethylene, annular corrugated pipe and applicable fittings and coupling systems intended for use in the construction of gravity flow storm drains, culverts, and subsurface drains. The size, type, and material properties of the pipe to be furnished shall be shown on the Plans.

1.02 TEST REQUIREMENTS

- A. For testing purposes, a production lot size shall consist of all pipe having the same lot marking number, but shall not exceed a total of 50 lengths per day.
- B. A minimum of 3 pipe specimens per production run shall be tested for pipe stiffness and pipe flattening in accordance with ASTM D2412 modified as follows:
1. The test specimens shall be a minimum of one diameter length.
 2. Position the first specimen in the loading machine with an imaginary line connecting the two seams formed by the corrugation mold (end view) parallel to the loading planes, when applicable. The specimen shall lie flat on the plate within 1/8 inch. The specimen may be straightened by hand bending at room temperature to accomplish this. The first location shall be used as a reference point for rotation and testing of the other two specimens. Rotate the other specimens 45 and 90 degrees, respectively, from the reference point. Each specimen shall be tested in one position only.
 3. The deflection indicator shall be readable and accurate to plus or minus 7.9×10^{-4} inches.
 4. The beginning point for deflection measurement shall be at a load of 4.5 plus or minus 1.1 pounds. This point shall be considered as the origin of the load deflection curve.
 5. The specimens shall be flattened until the vertical inside diameter is reduced by 20 percent. The loading shall conform to the same rate as above. The specimens shall not exhibit any cracking, splitting or delamination. Wall buckling is indicated by reverse curvature in the pipe wall accompanied by a decrease in the load carrying ability of the pipe. And decrease or downward deviation in the pipe stiffness test curve shall be considered a wall buckling point.



C. Brittleness

1. Test pipe specimens shall be tested in accordance with ASTM D2444, except 6 specimens shall be tested, or 6 impacts shall be made on one specimen. In the latter case, successive impacts shall be separated by 120 plus or minus 10 degrees for impacts made on one circle, or at least 12 inches longitudinally for impacts made on one element. Impact points shall be at least 6 inches from the end of the specimen. A tup (type B) shall be used, with a mass of 10 pounds. The height of drop shall be 10 feet. A flat plate specimen holder shall be used. Specimens shall be conditioned for 24 hours at a temperature of 24.8 plus or minus 1.8 deg F, and all tests shall be conducted within 60 seconds of removal from this atmosphere. The center of the falling tup shall strike on a corrugation crown for all impacts.

D. Environmental Stress Cracking of Finished Pipe

1. Pipe shall be tested for environmental stress cracking in accordance with ASTM D1693 as follows:
 - a. Three specimens shall be tested.
 - b. Each specimen shall consist of a 90-degree arc length of pipe.
 - c. Bend the specimens to shorten the inside chord length 20 plus or minus 1 percent and retain in this position using a suitable holding device. Determine the arc chord measurement (B) of the specimen under test as follows:
 - i. Place the bent specimen in a container of suitable size and cover completely with a preheated wetting agent at 122 plus or minus 1.8 deg F. Maintain this temperature for 24 hours, and then remove the sample and inspect immediately. The wetting agent used in this test shall be 100 percent nonylphenoxy poly (ethyleneoxy) ethanol.

E. Slow Crack Growth Resistance

1. Basic resin compounds shall be tested for stress crack resistance in accordance with ASTM F2136 modified as follows:
 - a. The applied stress for the NCLS test shall be 600 pounds per square inch.
 - b. The notched depth shall be 20 percent of the nominal thickness of the specimen.
 - c. The average failure time of the 5 test specimens shall not be less than 24 hours with no single test specimen's failure time less than 17 hours.



1.03 PIPE ACCEPTANCE OR REJECTION

- A. Pipe shall be free of cracks, holes, delaminations, foreign inclusions, blisters, or other defects that would, due to their nature, degree or extent, have a deleterious effect on pipe performance as determined by the Engineer. Prior to installation, damaged pipe shall either be repaired or field cut to remove the damaged portion as approved by the Engineer and in accordance with the manufacturer’s recommendations.

PART 2 – PRODUCTS

2.01 MARKINGS

- A. Pipes and fittings shall be clearly marked at intervals of 11.5 feet or less. Markings shall display the manufacturer’s name and/or trademark, nominal size, plant design code and date of manufacture.

2.02 MATERIALS

- B. Pipes and fittings shall be made of HDPE that conforms to the requirements of AASHTO M294. The residue for ignition shall not exceed 30 percent as determined by ASTM 2584 except that the furnace temperature shall be 840 degrees F plus or minus 40 degrees F.
- C. Nominal Diameter, Wall Thickness and Pipe stiffness

- 1. The inside diameter, minimum wall thickness, and minimum pipe stiffness shall be as specified in the table below:

Diameter (in)	Minimum Wall thickness (in)	Minimum Pipe Stiffness (psi)
12	0.035	50
15	0.039	42
18	0.050	40
24	0.059	34
30	0.059	28
36	0.069	22
42	0.070	20
48	0.070	18
60	0.080	14

- 2. The nominal diameter for each pipe shall be determined in accordance with ASTM D2122. The diameter shall not vary from a true circle by more than 2 percent of the nominal diameter. The wall thickness and inside diameter for each production pipe shall be determined in accordance with AASHTO M294. Wall thickness of Type S corrugated polyethylene pipe shall be the thickness of the inner liner measured between corrugated valleys.



2.03 JOINTS, FITTINGS, AND CONNECTIONS

A. Water-Tight Joints

1. Pipes shall be joined with bell and spigot joints and unless otherwise shown on the Plan. Pipe shall incorporate a gasket. Water-tight joints shall be tested at a pressure of at least 11 psi in conformance with ASTM D3212. The manufacturer shall clearly identify watertight joints on the pipe delivered to the work site.

B. Silt-Tight Joints

1. Pipe shall be joined with bell and spigot joints and shall at a minimum be silt tight and leak resistant. Silt-tight joints shall conform to ASTM D3212, modified to a test pressure of at least 2 pounds per square inch.

C. Fittings

1. Corrugated fittings include in-line joint fittings, such as couplings and reducers, and branch or complimentary assembly fittings such as tees, whyes, and end caps. Fittings shall be installed in accordance with the Plans.
 - a. Fittings shall not reduce or impair the overall integrity or function of the pipe.
 - b. Fittings shall not reduce the inside diameter of the pipe being joined by more than ½ inch. Reducer fittings shall not reduce the cross-sectional area of the smaller size.
 - c. Fabricated fittings shall be welded on the interior and exterior of all junctions.
 - d. Fittings shall be silt tight and leak resistant, and shall conform to ASTM D3212, modified to a test pressure of at least 2 pounds per square inch.

D. Joint integrity shall be tested in accordance with the following:

1. Each fitting or coupling shall be assembled in accordance with the manufacturer's recommendations. Use pipe samples at least 12 inches in length. Assemble a specimen at least 21 inches in length with the connection at the center.
2. Load the connected pipe and fitting between parallel plates at the rate of ½ inch per minute until the vertical inside diameter is reduced by at least 20 percent of the nominal diameter of the pipe.
3. Inspect for damage while at the specified deflection and after removal of the load.
4. Measure the maximum radial distance between pipe and fittings or between bell and spigot, during the test and after the load is removed.



5. Pipe connections shall not separate to create a gap exceeding 2/16 inch when measure in the radial direction between pipe and coupling or between bell and spigot portions of the pipe. The gap measurement shall be taken at the gasket or hinge point. The test shall be conducted on a fully assembled joint, including the gasket. Fittings shall not crack or delaminate.

PART 3 – EXECUTION

3.01 GENERAL

- A. Installation shall conform to the instructions furnished by the pipe manufacturer, and to the supplementary requirements herein. Wherever the provisions of this Section and the aforementioned requirements are in conflict, the more stringent provision shall apply.
- B. The CONTRACTOR shall determine the location of existing underground utility structures in the vicinity of proposed pipe installation prior to excavation. All existing above and below ground structures within the work area shall be protected in place unless indicated otherwise on the Construction Drawings.

3.02 TRENCHING AND BACKFILL

- A. Trench excavation and backfill shall conform to the requirements of Section 312316 – Trenching, Backfill and Compaction.

END OF SECTION



SECTION 33 12 13

BACKFLOW PREVENTION DEVICES

PART 1 – GENERAL

1.01 REQUIREMENTS

- A. The Contractor shall furnish and install all lead-free backflow prevention devices with associated valves, piping, instrumentation, and controls as shown on the Construction Drawings and specified herein, complete and operable, for backflow prevention. For fire lines, a double check detector assembly shall be used unless there is secondary source of pressurized water or recycled water on site, in which case a Reduced Pressure (RP) Zone Backflow device shall be used.

1.02 RELATED WORK SPECIFIED ELSEWHERE

Section 33 05 09 – Piping, General

Section 33 14 23 – Manholes, Vaults, & Meter Boxes

Section 33 14 17 – Service Connections

1.03 REFERENCE SPECIFICATIONS, CODES, AND STANDARDS

- A. Codes: All codes, as referenced herein, are specified in Section 014200 - Reference Standards.
- B. Commercial Standards:

ISA - S 5.1 Instrumentation Symbols and Identification

ANSI - B16.1 Cast Iron Pipe Flanges and Flanged Fittings, Class 25, 125, 250, and 800

ANSI/AWWA C207 Steel Pipe Flanges for Waterworks Service - Sizes 4 In through 144 In

ANSI/AWWA C510 Double Check Valve Backflow Prevention Assembly

ANSI/AWWA C511 Reduced Pressure Principle Backflow Prevention Assembly

1.04 CONTRACTOR SUBMITTALS

- A. The Contractor shall submit complete shop drawings of backflow prevention devices for review in accordance with Section 013300 - Contractor Submittals. With the shop drawings, the Contractor shall also furnish certified curves indicating flow versus differential pressure.



PART 2 – PRODUCTS

2.01 BACKFLOW PREVENTION DEVICES

- A. Approved devices shall be lead-free and shall be as outlined in Part III of these Standards & Specifications. Devices shall conform to the requirements of the Goleta Water District, the County of Santa Barbara Environmental Health Services Division, the State of California Department of Drinking Water, and AWWA Standards C510 and C511.

PART 3 – EXECUTION

3.01 INSTALLATION

- A. The Contractor shall assemble and install all equipment specified herein, in strict accordance with the manufacturer's published instructions, under the supervision of the manufacturer's representative, under the general review of the Goleta Water District. All installations shall be accomplished by competent craftsmen in a workmanlike manner. At a minimum testing and certifications shall be completed after meter installation and before it is unlocked for permanent use. Ongoing testing shall be performed on an annual basis.

3.02 BACKFLOW PREVENTION DEVICES

- A. Backflow Prevention devices shall be installed as required by the signed Plans, the Goleta Water District's Standards & Specifications and the County of Santa Barbara Environmental Health Services Division.

3.03 TESTING

- A. Equipment shall be prepared for operational use in accordance with manufacturer's instructions, including bench test and calibration, where required. Each item shall be subjected to an operating test over the total range of capability of the equipment. Where applicable, tests shall be conducted in accordance with the Test Code of the Standards of the Hydraulic Institute.

3.04 ACCEPTANCE BY AGENCY

- A. Final acceptance of the equipment is contingent on satisfactory operation after installation and certification of backflow prevention device.

END OF SECTION



SECTION 33 12 16

VALVES AND APPURTENANCES

PART 1 – GENERAL

1.01 DESCRIPTION

- A. This section describes the materials and installation procedures gate valves, butterfly valves, ball valves, combination air valves (CAV), pressure reducing valves, pressure relief valves, check valves, stainless steel tapping sleeves, pressure gauges, and appurtenances (valve cans, extensions, CAV enclosures).

1.02 REQUIREMENTS

- A. The Contractor shall provide all valves, actuators, valve cans, and appurtenances, complete and operable, in accordance with the Contract Documents.
- B. The provisions of this Section shall apply to all valves and valve actuators except where otherwise indicated. Valves and actuators in particular locations may require a combination of units, sensors, limit switches, and controls indicated in other Sections of the Specifications.
- C. Where a valve is to be supported by means other than the piping to which it is attached, the Contractor shall obtain from the valve manufacturer a design for support and foundation. The design, including drawings and calculations sealed by the Project Engineer, shall be submitted with the Shop Drawings. When the design is approved, the support shall be provided.
- D. Unit Responsibility: A single manufacturer shall be made responsible for coordination of design, assembly, testing, and furnishing of each valve, sleeve, and actuator; however, the Contractor shall be responsible to the District for compliance with the requirements of each valve section or sleeve. Unless indicated otherwise, the responsible manufacturer shall be the manufacturer of the valve or sleeve.
- E. Single Manufacturer: Where two or more valves of the same type and size are required, the valves and actuators shall be furnished by the same manufacturer. Where indicated, valves may be provided with actuators manufactured by the valve manufacturer. Where actuators are furnished by different manufacturers, the Contractor shall coordinate selection to have the fewest number of manufacturers possible. Where two or more tapping sleeves of the same type or size are required, the sleeves shall be produced by the same Manufacturer.



1.03 RELATED WORK SPECIFIED ELSEWHERE

- Section 03 3 000 – Cast-in-Place Concrete
- Section 31 23 16 – Trenching, Backfill and Compaction
- Section 33 01 10 – Waterline Disinfection & Testing
- Section 33 05 09 – Piping, General
- Section 09 90 00 – Protective Coatings

1.04 CONTRACTOR SUBMITTALS

- A. General: Submittals shall be furnished in accordance with Section 013300 – Contractor Submittals.
- B. Submit shop drawings. Submit manufacturer's catalog data. Show dimensions, materials of construction by ASTM reference and grade, and coatings. A cavitation study shall be submitted for pressure reducing valves.
- C. Shop Drawings of all tapping sleeves and service saddles shall be submitted as a completed package. Shop Drawings shall contain the following information:
 - 1. Valve name, size, Manufacturer, model number, pressure rating, identification number (if any), and specification section number.
 - 2. Assembly drawings with part nomenclature, materials, dimensions, and weights.
 - 3. Tapping Sleeve Labeling: A schedule of sleeves to be labeled, indicating in each case the sleeve location and the proposed wording for the label.
- D. Shop Drawings. The Contractor shall submit complete Shop Drawings of butterfly valves and actuators, with drawings showing valve port diameter complete with dimensions, part numbers and materials of construction. Certification of proof-of-design test from the valve manufacturer shall also be provided.
- E. Manufacturer's Certification that the valve complies with all applicable provisions of AWWA C504 – Rubber-Seated Butterfly Valves.
- F. Technical Manual: The Technical Manual shall contain the required information for each valve.

1.05 QUALITY ASSURANCE



- A. Valves shall be subjected to performance, leakage, and hydrostatic tests in accordance with procedures and acceptance criteria established by AWWA C504.

PART 2 – PRODUCTS

2.01 GENERAL

- A. General: Valves and actuators shall be new and of current manufacture. Shut-off valves 6-inches and larger within vaults and above ground shall have actuators with position indicators. Buried valves shall be provided with valve cans and lids, and valve stem extensions.
- B. Protective Coatings: The exterior surfaces of all valves and the wet interior surfaces of ferrous valves of sizes 4 inches and larger shall be coated in accordance with Section 099000- Protective Coatings. The valve Manufacturer shall certify in writing that the required coating has been applied and tested in the manufacturing plant prior to shipment, in accordance with these Specifications.
- C. Valve Labeling: Except when such requirement is waived by the Goleta Water District in writing, a label shall be provided on all shut-off valves and control valves except for hose bibs. The label shall be of 1/16-inch plastic or stainless steel, minimum 2 inches by 4 inches in size, and shall be permanently attached to the valve or on the wall adjacent to the valve as directed by the Goleta Water District.
- D. Valve Testing: As a minimum, unless otherwise indicated or recommended by the reference Standards, valves 3 inches in diameter and smaller shall be tested in accordance with manufacturer's standard and 4 inches in diameter and larger shall be factory tested as follows:
 - 1. Hydrostatic Testing: Valve bodies shall be subjected to internal hydrostatic pressure equivalent to twice the water rated pressure of the valve. Metallic valves rating pressures shall be at 100 degrees F and plastic valves shall be 73 degrees, or at higher temperature according to type of material. During the hydrostatic test, there shall be no leakage through the valve body, end joints, or shaft seals, nor shall any part of the valve be permanently deformed. The duration shall be sufficient time to allow visual examination for leakage. Test duration shall be at least 10 minutes.
 - 2. Seat Testing: Valves shall be tested for leaks in the closed position with the pressure differential across the seat equal to the water rated pressure of the valve. The duration of test shall be sufficient time to allow visual examination for leakage. Test duration shall be at least 10 minutes. Leakage past the closed valve shall not exceed 1 fluid ounce per hour per inch diameter for metal seated valves and drop-tight for resilient seated valves.



3. Performance Testing: All valves shall be shop operated from fully closed to fully open position and reverse under no-flow conditions in order to demonstrate the valve assembly operates properly.
- E. Certification: Prior to shipment, the Contractor shall submit for valves over 12 inches in size, certified, notarized copies of the hydrostatic factory tests, showing compliance with the applicable standards of AWWA, ANSI, or ASTM.
- F. Valve Marking: Valve bodies shall be permanently marked in accordance with MSS SP25 - Standard Marking Systems for Valves, Fittings, Flanges, and Unions.

2.02 MATERIALS

- A. General: Materials shall be suitable for the intended application. Materials not indicated shall be high-grade standard commercial quality, free from defects and imperfections that might affect the serviceability of the product for the purpose for which it is intended. Actuators shall be current models of the best commercial quality materials and liberally-sized for the required torque. Unless otherwise indicated, valve and actuator bodies shall conform to the following requirements:
 1. Cast Iron: Close-grained gray cast iron, conforming to ASTM A 48 - Gray Iron Castings, Class 30, or to ASTM A 126 - Gray Iron Castings for Valves, Flanges, and Pipe Fittings.
 2. Ductile Iron: ASTM A 536 - Ductile Iron Castings, or to ASTM A 395 - Ferritic Ductile Iron Pressure-Retaining Castings for Use at Elevated Temperatures.
 3. Bronze: ASTM B 62 - Composition Bronze or Ounce Metal Castings, and valve stems not subject to dezincification shall conform to ASTM B 584 - Copper Alloy Sand Castings for General Applications.
 4. Stainless Steel: Stainless steel valve and operator bodies and trim shall conform to ASTM A 351 - Steel Castings, Austenitic, for High-Temperature Service Pressure-Containing Parts, Grade CF8M, or shall be Type 316 stainless steel.
 5. NSF Standard 61: All materials shall be listed for use in contact with potable water.

2.03 VALVE CONSTRUCTION

- A. Bodies: Valve bodies shall be cast, molded (in the case of plastic valves), forged, or welded of the materials indicated, with smooth interior passages. Wall thicknesses shall be uniform in agreement with the applicable standards for each type of valve, without casting defects, pinholes, or other defects that could weaken the body. Welds on welded bodies shall be done by certified welders and shall be ground smooth. Valve ends shall be



as indicated, and be rated for the maximum temperature and pressure to which the valve will be subjected.

- B. Bonnets: Valve bonnets shall be clamped, screwed, or flanged to the body and shall be of the same material, temperature, and pressure rating as the body. The bonnets shall have provision for the stem seal with the necessary glands, packing nuts, or yokes.
- C. Stems: Valve stems shall be of the materials indicated, or, if not indicated, of the best commercial material for the specific service, with adjustable stem packing, O-rings, Chevron V-type packing, or other suitable seal. Where subject to dezincification, bronze valve stems shall conform to ASTM B 62, containing not more than 5 percent of zinc or more than 2 percent of aluminum, with a minimum tensile strength of 30,000 psi, a minimum yield strength of 14,000 psi, and an elongation of at least 10 percent in 2 inches. Where dezincification is not a problem, bronze conforming to ASTM B 584 may be used, except that zinc content shall not exceed 16 percent.
- D. Internal Parts: Internal parts and valve trim shall be as indicated for each individual valve. Where not indicated, valve trim shall be of Type 316 stainless steel or other best suited material.
- E. Operating Nuts: Buried operating nuts shall comply with AWWA C500 - Metal-Seated Gate Valves for Water Supply Service.
- F. Nuts and Bolts: Nuts and bolts on valve flanges and supports shall be in accordance with Section 05500 - Miscellaneous Metalwork.

2.04 ACTUATORS

- A. General: Unless otherwise indicated, valves and gates shall be furnished with manual actuators. Valves in sizes up to and including 4 inches shall have direct acting lever or handwheel actuators of the Manufacturer's best standard design. Larger valves and gates shall have gear- assisted manual actuators, with an operating pull of maximum 60 pounds on the rim of the handwheel. Buried and submerged gear-assisted valves, valves 30 inches in diameter and larger, and where so indicated, shall have worm-gear actuators, hermetically-sealed and grease-packed, where buried or submerged. All other valves 6 inches to 24 inches in diameter may have traveling-nut actuators, worm-gear actuators, spur- or bevel-gear actuators, as appropriate for each valve. The Contractor shall furnish actuators complete and operable with mounting hardware, handwheels, levers, and extensions, as applicable. Actuators shall have the torque ratings equal to or greater than required for valve seating and dynamic torques, whichever is greater and shall be capable of holding the valve in any intermediate position between fully-open and fully-closed without creeping or fluttering.



- B. Mounting: Actuators shall be securely mounted by means of brackets or hardware specially designed and sized for this purpose and of ample strength. The word "open" shall be cast on each valve or actuator with an arrow indicating the direction to open in the counter-clockwise direction. Non-buried gear and power actuators shall be equipped with position indicators.
- C. Manual Worm-Gear Actuator: The actuator shall consist of a single or double reduction gear unit contained in a weather-proof cast-iron or steel body with cover and minimum 12-inch diameter handwheel. The actuator shall be capable of 90-degree rotation and shall be equipped with travel stops capable of limiting the valve opening and closing. The actuator shall consist of spur or helical gears and worm-gearing. The spur or helical gears shall be of hardened alloy steel and the worm-gear shall be alloy bronze. The worm-gear shaft and the handwheel shaft shall be of 17-4 PH or similar stainless steel. All gearing shall be accurately cut with hobbing machines. Ball or roller bearings shall be used throughout. Actuator output gear changes shall be mechanically possible by simply changing the exposed or helical gearset ratio without further disassembly of the actuator. All gearing shall be designed for a 100 percent overload.
- D. Traveling-Nut Actuator: The actuator shall consist of a traveling-nut with screw (Scotch yoke) contained in a weather-proof cast-iron or steel housing with spur gear and minimum 12-inch diameter handwheel. The screw shall run in 2 end bearings, and the actuator shall be self-locking to maintain the valve position under any flow condition. The screw and gear shall be of hardened alloy steel or stainless steel, and the nut and bushings shall be of alloy bronze. The bearings and gear shall be grease-lubricated by means of grease nipples. All gearing shall be designed for a 100 percent overload.

2.05 VALVE CANS AND LIDS

- A. Unless otherwise indicated, buried valves shall be in cast iron valve cans with lids permanently labeled "WATER" for potable waterlines and "RW" for recycled waterlines. Valves shall have extension stems with square nuts or floor stands, position indicators, and PVC pipe extensions for valve cans. Size and type of valve cans and lids shall match existing valve cans and lids so as to be interchangeable. Valve cans shall be the 3-piece adjustable type. All materials used in manufacturing shall conform to ASTM 48-30. Frame and Cover shall exceed H-20 wheel loading. Castings shall be dipped in black bituminous coating. Valve cans shall be Parkson "Buffalo" style, South Bay Foundry, Sigma, or approved equal.

2.06 VALVE STEM EXTENSIONS AND ACCESSORIES

- A. Extensions: Unless otherwise indicated, buried valves shall be furnished complete with valve stem extensions and other accessories required to provide a functional system. Buried valves shall have valve stem extensions extending to 12 inches below finished grade. Valve stem extensions shall be fabricated steel or fiberglass as indicated in GWD



Standard Detail 3-08. The maximum length of fiberglass valve stem extensions shall be 8 feet. Fiberglass valve stem extensions shall be manufactured by Pipeline Products, San Marcos, CA, or approved equal.

- B. Stem Guides: Stem guides shall be provided, spaced 10-feet on centers unless the manufacturer can demonstrate by calculation that a different spacing is acceptable. Submerged stem guides shall be 304 stainless steel.

2.07 SPARE PARTS

- A. The Contractor shall furnish the required spare parts suitably packaged and labeled with the valve name, location, and identification number. The Contractor shall also furnish the name, address, and telephone number of the nearest distributor for the spare parts of each valve. Spare parts are intended for use by the Goleta Water District, after expiration of the warranty period.

2.08 SPARE PARTS

- A. CAV's 3-inches and smaller shall have ½-inch threaded outlets with bronze plugs in the top cover and near the bottom of the valve body. Valves larger than 3-inches shall have a 1-inch threaded drain outlet with bronze plug near the bottom of the valve body and a 1-inch threaded outlet with bronze plug on the side of the valve body above the minimum water level in the valve which forces the float against the valve seat. Valves shall be designed for an operating pressure of 250 psi.
- B. Valves smaller than 3-inches shall have threaded ends. Valves 3-inches and larger shall have flanged ends. Flanges for Class 250 valves shall comply with AWWA Class E250. Threaded ends shall comply with ANSI B1.20.1. The minimum CAV size shall be 1-inch.

Valves manufacturer shall be:

APCO, Model 143C or 145C
Valmatic, Model 201C or 202C
Crispin, Model UL10 or UL20
Cla-Val, Model 361CAV or 362CAV, or equal.

- C. CAV's shall be equipped with schedule 40 PVC venting system and insect screen as shown in GWD Standard Detail 3-03. Insect screen shall be Northtown Company, Hytech Air Vac Screen, McMaster-Carr, Suction Screen with Nylon Base, or approved equal.

2.09 TAPPING SLEEVES



- A. Stainless steel tapping sleeves shall be new and of current manufacture. Where a sleeve is to be supported by means other than the piping to which it is attached, obtain from the sleeve manufacturer a design for support and foundation. Tapping sleeves shall be of full sleeve type capable of containing pressure within the full volume of the sleeve. Weld-on “nozzle” type steel tapping sleeves and mechanical joint tapping sleeves shall only be allowed when approved by the Goleta Water District. Tapping procedures shall be in accordance with the Manufacturer’s published recommendations for tapping of pipes 4 inches or larger. Furnish tapping valve that is coordinated with tapping sleeve and conforming in every respect with this Section.
- B. Protective Coatings: The exterior surfaces of the tapping sleeve shall be double wrapped with 35 mil Polyken tape wrap.
- C. Tapping Sleeve Testing: As a minimum, unless otherwise indicated, each sleeve body 4 inches and larger shall be tested hydrostatically to 1.5 times its rated design water-working pressure, for a period of 5 minutes, without showing any leaks or loss of pressure. In addition, each valve 4 inches and larger shall undergo a functional test to demonstrate satisfactory operation throughout its operating cycle, and a closure test at rated water-working pressure for a period of 5 minutes to demonstrate tight seal during shut-off.
- D. Certification: Prior to shipment, the Contractor shall submit for all tapping sleeves over 12 inches in size; certified, notarized copies of the hydrostatic factory tests showing compliance with the applicable standards of AWWA, ANSI and ASTM.

2.10 MATERIALS FOR TAPPING SLEEVES

- A. General: Materials shall be suitable for the intended application. Materials not indicated shall be high-grade standard commercial quality, free from defects and imperfections that might affect the serviceability of the product for the purpose for which it is intended. Unless otherwise indicated, tapping sleeves and gaskets shall conform to the following requirements:
 - 1. Stainless Steel: 316 stainless steel, outlet flange conforming to AWWA C207 Class D, ANSI 150 lb. Drilling shall be recessed for tapping valve.
 - 2. Gasket: Red rubber SBR grade 30 or equal. Gaskets should conform with section AWWA C111 Rubber Gasket Joints for Ductile Iron Pressure Pipe and Fittings and contain only 100 percent new rubber suitable for mild acids, water, and salt media.
 - 3. Tapping Sleeve: Outlet flange conforming to AWWA C207 with an ANSI 150 lb. flange bolt pattern for the tapping valve. Tapping sleeve shall fit AWWA standards; Class AB-CD cast iron pipe.



2.11 TAPPING SLEEVE CONSTRUCTION

- A. Bodies: Sleeve bodies shall be cast, forged, or welded of the materials indicated with smooth interior passages. Wall thicknesses shall be uniform in agreement with the applicable standards for each type of sleeve, without casting defects, pinholes, or other defects that could weaken the body. Welds on welded bodies shall be done by certified welders and shall be ground smooth. Sleeve ends shall be as indicated, and be rated for the maximum pressure to which the sleeve will be subjected.
- B. Nuts and Bolts: Nuts and bolts on sleeve flanges and supports shall have stainless steel bolts, nuts, and washers of Type 316 stainless steel, class 2, conforming to ASTM A 193 for bolts and ASTM A 194 for sleeves with stainless nuts.
- C. Branches: The inside diameter of each branch shall be oversized to permit entry and exit of tapping machine cutters. Each shall have a recess to center a tapping valve. Flange dimensions and drilling shall meet the requirements of ANSI B16.1. Sleeve length shall be a minimum of twice the diameter of the pipe being tapped such that the sleeves will not leak when installed on cast iron, ductile iron, or polyvinyl chloride pipe (PVC) with outside diameters shown in AWWA Standards.

2.12 MANUFACTURERS OF TAPPING SLEEVES

- A. Manufacturer's Qualifications: Sleeve manufacturers shall have a successful record of not less than 5 years in the manufacture of the sleeves indicated.
- B. Manufacturers, or Equal: Ford; Dresser Industries; Romac; KOPPL; Powerseal; and SmithBlair.

2.13 RUBBER SEATED BUTTERFLY VALVES 25 TO 150 PSI (AWWA)

- A. General: Butterfly valves for steady-state water working pressures and steady-state differential pressure up to 150 psi and for fresh water service having a pH range from 6 to 10 and temperature range from 33 to 125 degrees F shall conform to AWWA C504 and be as indicated.
- B. Valves shall be of the body type, pressure class, end joint, and actuator indicated. The valve actuators shall be equipped with counter-clockwise opening stems. Valves shall be marked with manufacturers name, size, pressure rating, and year manufactured.
- C. Construction: Unless otherwise indicated, all materials of construction shall be in accordance with AWWA C504, suitable for the service. The seats shall be positively clamped or bonded into the disc or body of the valve, but cartridge-type seats which rely on a high coefficient of friction for retention shall not be acceptable.



Description	Material Standards
Valve Bodies	[ASTM A 48, Class 40] or [Cast iron, ASTM A 126, Class B], or [Ductile iron, ASTM A 536, grade 65-45-12 or 70-50-05] [Alloy cast iron, ASTM A 436, Type 1 or 2], or [ASTM A 439, Type D2, with minimum lead content of 0.003 percent]
End flanges	The same material as the valve bodies
Valve shafts	Stainless steel ASTM A 276, Type 316
Valve discs	The same material as for the valve bodies.
Rubber sets	New natural or synthetic rubber
Seat mating surfaces	Stainless steel, ASTM A 276, Type 316
Clamps and retaining rings	Type 316 retaining rings and cap screws.
Valve bearings	Self-lubricating materials per AWWA C504
Shaft seals	Resilient non-metallic materials suitable for service
Painting and coating	Refer to Section 09800 – Protective Coatings

D. Manufacturers, or Equal

De Zurik Corporation
 Clow Valve Company
 M & H Valve Company
 Mueller Company
 Henry Pratt Company
 Rodney Hunt Company (24 inches and larger)

2.14 RUBBER SEATED BUTTERFLY VALVES, 250 PSI (AWWA)

- A. General: Butterfly valves for steady-state water working pressures and steady-state differential pressure up to 250 psi and for fresh water service having a pH range from 6 to 10 and temperature range from 33 to 125 degrees F shall conform to AWWA C504. Valves shall be designed and manufactured in accordance with the intent of AWWA C504 except valves shall be suitable for 250 psi service and as indicated herein.
- B. Valves shall be of the body type, pressure class, end joint, and actuator indicated.
- C. One prototype valve for each size of valve required by the project shall be subjected to proof of design test in accordance with the procedures established by AWWA C504. Certificate of proof-of-design test shall be submitted to the DISTRICT prior to delivery of the valves.



- D. Construction: Unless otherwise indicated, all materials of construction shall be in accordance with AWWA C504, suitable for the service. The seats shall be positively clamped or bonded into the disc or body of the valve, but cartridge-type seats, which rely on a high coefficient of friction for retention, shall not be acceptable.

Description	Materials Standards
Valve Bodies	[ASTM A 48, Class 40] or [Cast iron, ASTM A 126, Class B], [Ductile iron, ASTM A 536, grade 65-45-12 or 70-50-05] [Alloy cast iron, ASTM A 436, Type 1 or 2], or [ASTM A 439, Type D2, with minimum lead content of 0.003 percent]
End flanges	The same material as the valve bodies
Valve shafts	Stainless steel ASTM A 276, Type 316
Valve discs	The same material as for the valve bodies.
Rubber sets	New natural or synthetic rubber
Seat mating surfaces	Stainless steel, ASTM A 276, Type 316
Clamps and retaining rings	Type 316 retaining rings and cap screws.
Valve bearings	Self lubricating materials per AWWA C504
Shaft seals	Resilient non-metallic materials suitable for service
Painting and coating	Refer to Section 09800 – Protective Coatings

- E. Manual Actuators: Unless otherwise indicated, all manually-actuated butterfly valves shall be equipped with a handwheel and 2-inch square actuating nut and position indicator. Screw-type (traveling nut) actuators will not be permitted for valves 30 inches in diameter and larger.
- F. Worm Gear Actuators: Valves, 30 inch and larger, as well as all submerged and buried valves, shall be equipped with worm-gear actuators, lubricated and sealed to prevent entry of dirt or water into the housing.
- G. Manufacturers, or Equal

De Zurik Corporation
Henry Pratt Company
Rodney Hunt Company (24 inches and larger)

2.15 PRESSURE AND VACUUM GAUGES



- A. General: Pressure gauges shall be provided on suction and discharge connections to pumps as indicated in the pump specifications; on discharge connections from blowers and compressors; each side of pressure reducing valves; and wherever indicated. Vacuum gauges shall be provided for vacuum pumps and wherever indicated. In all locations (such as certain pump suction connections) where pressures may vary from below to above atmospheric head, compound gauges shall be installed.
- B. Gauge Construction: Gauges shall be industrial quality type with Type 316 stainless steel movement and stainless steel or alloy case. Unless otherwise indicated, gauges shall have a 3-1/2inch dial, 1/4-inch threaded connection, a Type 316 stainless steel snubber adapter, and a shut-off valve. Gauges shall be calibrated to read in applicable units, with an accuracy of plus and minus 1 percent, to 150 percent of the working pressure or vacuum of the pipe or vessel to which they are connected. All gauges shall be vibration and shock resistant.
- C. Diaphragm Seal: Gauges attached to systems involving chemical solutions, corrosive fluids, sludge, sewage, or other liquids containing solids at less than 1 percent dry solids shall be equipped with diaphragm seals, or equal protective pressure or vacuum sensing devices.
- D. Gauge Manufacturers, or Equal: Marsh Instrument Company; Ashcroft Industrial Instruments (Dresser); Foxboro; Marshalltown Instruments, Inc.; and U.S. Gauge Div. of Ametek.
- E. Snubber Manufacturers, or Equal: Weksler Instruments, Corp.

2.16 SWING CHECK VALVES (3-INCH AND LARGER)

- A. General: Swing check valves for water, sewage, sludge, and general service shall be of the outside lever and spring or weight type, in accordance with ANSI/AWWA C508 - Swing-Check Valves for Waterworks Service, 2 in. through 24 in. NPS, unless otherwise indicated, with full-opening passages, designed for a water-working pressure of 150 psi. They shall have flanged ends and a flanged cover piece to provide access to the disc.
- B. Body: The valve body and cover shall be of cast iron conforming to ASTM A 126 - Gray Iron Castings for Valves, Flanges, and Pipe Fittings, with flanged ends conforming to ANSI/ASME B 16.1 - Cast Iron Pipe Flanges and Flanged Fittings, Class 25, 125, 250, and 800, or mechanical joint ends, as indicated.
- C. Disc: The valve disc shall be of cast iron, ductile iron, or bronze conforming to ASTM B 62 - Composition Bronze or Ounce Metal Castings.
- D. Seat and Rings: The valve seat and rings shall be of bronze to conforming ASTM B 62 or B 148 - Aluminum-Bronze Castings, or of Buna-N.
- E. Hinge Pin: The hinge pin shall be of bronze or stainless steel.



F. Manufacturers, or Equal

American Flow Control (Darling)
APCO (Valve and Primer Corporation)
Kennedy Valve
Mueller Company (Grinnell Corporation)
Stockham Valves and Fittings

2.17 SWING CHECK VALVES (2-1/2-INCH AND SMALLER)

- A. General: Swing 2check valves for steam, water, oil, or gas in sizes 2-1/2-inch and smaller shall be suitable for a steam pressure of 150 psi and a cold water pressure of 300 psi. They shall have screwed ends, unless otherwise indicated, and screwed caps.
- B. Body: The valve body and cap shall be of bronze conforming to ASTM B 61 - Steam or Valve Bronze Castings, or ASTM B 62 with threaded ends conforming to ANSI/ASME B1.20.1 - Pipe Threads, General Purpose (inch).
- C. Disc: Valves for steam service shall have bronze or brass discs conforming to ASTM B 16 - Free-Cutting Brass Rod, Bar, and Shapes for Use in Screw Machines, and for cold water, oil, and gas service replaceable composition discs.
- D. Hinge Pin: The hinge pins shall be of bronze or stainless steel.

E. Manufacturers, or Equal

Crane Company
Milwaukee Valve Company
Stockham Valves and Fittings
Wm. Powell Company

2.18 INTERNAL SPRING-LOADED CHECK VALVES (GLOBE STYLE)

- A. General: Internal spring-loaded check valves for water pumps, compressors, gas, air, and steam shall be of the full-flow internal spring-loaded poppet type. The valves shall be designed for a water-working pressure of not less than 150 psi unless otherwise indicated.
- B. Body: The bodies of all valves in sizes 3-inch and larger shall be of cast iron conforming to ASTM A 126 with 125-lb flanged ends conforming to ANSI/ASME B 16.1 unless otherwise indicated. Where necessary, there shall be a positive, watertight seal between the removable seat and the valve body. The stem guide shall be integrally cast with the body or screwed into the body.



- C. Valves smaller than 3 inches shall have bronze bodies with screwed ends conforming to ANSI/ASME B 1.201, suitable for a minimum working pressure of 200 psi, and a temperature of 250 degrees F, unless otherwise indicated. The type of bronze shall be suitable for the intended service.
- D. Disc and Stem: The disc and stem of all valves in sizes 3-inch and larger shall be of bronze conforming to ASTM B 584 - Copper Alloy Sand Castings for General Applications or stainless steel. The stem shall have two-point bearings. The downstream bearing shall have a bronze or other suitable bushing, to provide a smooth operation.
- E. Valves smaller than 3 inches shall have discs and retaining rings of Teflon, nylon, or other suitable material, and stems of bronze, brass, or stainless steel, suitable for the intended service.
- F. Stem Guide: The stem guide shall be either firmly fixed in the valve body to prevent it from sliding into the adjacent pipe and damaging the pipe lining, or the valve manufacturer shall furnish each valve with one matching flange compatible with the adjacent pipe and its lining to prevent damage to the lining. The compatible flange shall be part of the Shop Drawing submittal.
- G. Seat: Valves for general service at temperatures up to 250 degrees F shall have bubble-tight shut-off with resilient seats of Buna-N, Teflon, or other suitable material. Valves for steam service and temperatures over 250 degrees F shall have metal-to-metal seating of bronze or stainless steel, as recommended by the manufacturer for the specific service condition. Resilient seats shall be firmly attached to the seating ring by compression-molding or other acceptable method.
- H. Spring: Valves in sizes 3-inch and larger shall have Type 316 stainless steel springs, and valves smaller than 3-inch shall have stainless steel or beryllium copper springs, as suitable for the service. The spring tension of the valves shall be designed for the individual pressure condition of each valve.
- I. Manufacturers, or Equal

APCO (Valve and Primer Corp.)
CPV (Combination Pump Valve Company)
Miller Valve Co., Inc.
VAL-MATIC (Valve and Manufacturing Corporation)

2.19 METAL BALL VALVES (4-INCH AND SMALLER)

- A. General: Unless otherwise indicated, general purpose metal ball valves in sizes up to 4-inch shall have direct acting lever actuators in accordance with this Specification.
- B. Body: Ball valves up to 1-1/2-inch (incl.) in size shall have bronze or carbon steel 2-or 3piece bodies with screwed ends for a pressure rating of not less than 600 psi WOG. Valves 2-inch to 4-



inch in size shall have bronze or carbon steel 2-or 3-piece bodies with flanged ends for a pressure rating of ANSI 125 psi or 150 psi unless otherwise indicated.

- C. Balls: The balls shall be solid chrome plated brass or bronze, or stainless steel, with standard port (single reduction) or full port openings.
- D. Stems: The valve stems shall be of the blow-out proof design, of bronze, stainless steel, or other acceptable construction, with reinforced Teflon seal.
- E. Seats: The valve seats shall be of Teflon or Buna-N, for bi-directional service and easy replacement.
- F. Manufacturers, or Equal

Conbraco Industries, Inc. (Apollo)
ITT engineered Valves
Neles-Jamesbury, Inc.
NIBCO, Inc.
Watts Regulator
Worcester Controls

2.20 RESILIENT-SEATED GATE VALVES – GENERAL

- A. Buried valves shall be of the inside screw, non-rising stem type. The valve actuators shall be as indicated, with counter-clockwise opening stems, shall be marked with manufacturers name, size, pressure rating, and year manufactured.

2.21 RESILIENT-SEATED GATE VALVES (4 to 6-inch)

- A. General: All gate valves shall be resilient-wedge gate valves unless directed otherwise by the DISTRICT.
- B. Construction: Resilient-wedge gate valves shall conform to ANSI/AWWA C509 – Resilient- Seated Gate Valves for Water and Sewerage Systems. The valves shall be suitable for a design working water pressure of 200 psig, with flanged, bell and spigot, or mechanical joint ends. The valve body, bonnet, and disc shall be of cast iron or ductile iron and the disc or body shall be rubber-coated. Body and bonnet wall thickness shall be equal to or greater than the minimum wall thickness as listed in Table 2 of ANSI/AWWA C509. The stem, stem nuts, glands, and bushings shall be of bronze, with the stem seal per ANSI/AWWA C 509. Valves shall be internally coated in accordance with AWWA C550.
- C. Actuators: Unless otherwise indicated, resilient-wedge gate valves shall have manual actuators in accordance with this Section.



D. Manufacturers, or Equal

American Flow Control
American AVK Company
Clow Valve Co.
M & H Valve Company
Mueller Company (Grinnell Corp.)
Stockham Valves and Fittings

2.22 HIGH-PRESSURE GATE VALVES (2- TO 12-INCH)

- A. Construction: High-pressure gate valves, except for buried valves, shall have cast iron bodies and flanged bonnets conforming to ASTM A 126 - Gray Iron Castings for Valves, Flanges, and Pipe Fittings, with 250 psi flanged ends. The valves shall have outside screw & yoke rising stems, or non-rising stems as indicated on the Construction Drawings. The valves shall be rated for 250 psig steam and 500 psig cold water working pressure. The solid wedges shall be of bronze or cast iron, bronze fitted and the stem shall be of bronze with non-asbestos fiber packing.
- B. Actuators: Unless otherwise indicated, high-pressure gate valves shall have cast iron or ductile iron handwheels with 2-inch square operating nuts, in accordance with Section 15201 - Valve & Gate Actuators.
- C. Manufacturers, or Equal

American AVK Company
Crane Company
Milwaukee Valve Company
Wm. Powell Company
Stockham Valves and Fittings
Walworth Company

2.23 TAPPING VALVES (4- TO 24-INCH)

- A. Construction: Tapping valves shall meet the requirements of ANSI/AWWA C500 or C509 and shall have flanged ends. Double disc gate valve gates, gate rings, and body-seat rings shall be oversized to permit entry and exit of tapping machine cutters.
- B. Valve end connecting to tapping sleeve shall have a flange for bolting to the sleeve. The flange shall have a tongue, which fits a recess in the sleeve. The flanged and bolt pattern of the tapping valve shall match the flange and bolt pattern of the tapping sleeve. Resilient-wedge gate valves having a port diameter equal to or exceeding $\frac{1}{4}$ inch over nominal diameter shall not require a tongue. Flange dimensions and drilling shall meet



the requirements of ANSI B16.1. Nuts, bolts, and gaskets for flange joints shall meet the requirements of ANSI/AWWA C110. Nuts and bolts shall be 316 stainless steel. A full nominal diameter cutter shall be used for tapping.

- C. Tapping valve coating and lining shall be applied per Section 099000 – Protective Coatings and shall be System 103 Fusion Bonded Epoxy, unless otherwise directed by the DISTRICT.

2.24 PRESSURE REDUCING VALVES, GENERAL

- A. Function: Pressure reducing valves shall reduce a higher upstream pressure to a pre-set, lower, constant pressure, regardless of fluctuations in the upstream pressure.
- B. Operation: The valves shall be hydraulically operated, with diaphragm direct action, pilot controlled, per paragraph 2.2, and shall be of the globe or angle pattern as indicated. All necessary repairs shall be possible without removing the valves from the pipeline. The smaller direct-acting valves with threaded ends per paragraph 2.3, shall be suitable for water or air service and shall be of the globe patterns.

2.25 FLANGED PRESSURE REDUCING VALVES, SIZES 1 ½ INCHES THROUGH 24 INCHES

- A. Valve Body: The valve body shall be of cast iron to ASTM A 48 - Gray Iron Castings, or ASTM A 126 - Gray Iron Castings for Valves, Flanges, and Pipe Fittings, with [125 lb] [250 lb] flanged ends to ANSI/ASME B 16.1 - Cast Iron Pipe Flanges and Flanged Fittings, Class 25, 125, 250, and 800, or the body shall be of ductile iron to ASTM A 536 - Ductile Iron Castings, with [150 lb] [300 lb] flanged ends to ANSI/ASME B 16.42 - Ductile Iron Pipe Flanges and Flanged Fittings. The valve cover shall be flanged and be the same material as the body.
- B. Valve Trim: The valve stems with position indication, springs, body seat rings, and all bolts, nuts, and washers shall be of Type 302, 303, or 316 stainless steel. The valve stems shall have top and bottom guides. All rubber parts shall be of Buna-N. The diaphragms shall be of Nylon-reinforced BunaN, supported firmly between body and valve cover.
- C. Valve Controls: The valve shall be provided with a complete, externally mounted control system, including speed control needle valves, strainers, check valve, isolation valves, and all necessary copper or stainless steel connecting tubing and fittings. The controls shall be capable of achieving all the flow and speed adjustment indicated.
- D. Factory Tests and Warranty: All valves shall be factory tested with a hydrostatic test and a functional test and a test certificate shall be submitted to the DISTRICT prior to delivery of the valve. The valve shall be warranted for a period of 3 years from the date of shipment to be free of defects in materials and workmanship.



E. Operating Conditions: The valve shall be designed to operate under the following conditions, or as stated on the construction drawings:

- 1. Maximum inlet pressure (psi) - []
- 2. Minimum inlet pressure (psi) - []
- 3. Minimum outlet pressure (psi) - []
- 4. Maximum flow (gpm) - []
- 5. Minimum flow (gpm) - []
- 6. Valve size (inches) - []
- 7. Size of pipeline (inches diameter) - []

F. Spare Parts: The following spare parts shall be furnished in accordance with Section 15200 - Valves, General:

- 1. One set of all resilient seals and discs
- 2. One diaphragm

G. Manufacturer shall be Cla-Val Company, or equal.

2.26 FLANGED PRESSURE RELIEF VALVES, SIZES 1-1/2 INCHES THROUGH 24 INCHES

A. Valve Characteristics: The pressure relief valve shall open when the inlet pressure exceeds a set maximum level. It shall maintain that level and gradually close as the inlet pressure drops below the maximum pressure. The valve shall be a hydraulically operated, adjustable, pilot controlled, diaphragm or piston type globe or angle valve as indicated. All necessary repairs shall be possible without removing the valve from the pipeline.

B. Valve Body: The valve body shall be of cast iron, ASTM A 48 - Gray Iron Castings, or ASTM A 126 - Gray Iron Castings for Valves, Flanges, and Pipe Fittings, with [125 lb] [250 lb] flanged ends to ANSI/ASME B 16.1 - Cast Iron Pipe Flanges and Flanged Fittings, Class 25, 125, 250, and 800, or the body shall be of ductile iron to ASTM A 536 - Ductile Iron Castings, with [150 lb] [300 lb] flanged ends to ANSI/ASME B 16.42 - Ductile Iron Pipe Flanges and Flanged Fittings. The valve cover shall be flanged and be of the same material as the body.

C. Valve Trim: The valve stems, springs, body seat rings, and all bolts, nuts, and washers shall be of Type 302, 303, or 316 stainless steel. The valve stems shall have top and bottom guides. All rubber parts shall be of Buna-N. The diaphragms shall be of Nylon-reinforced Buna-N, supported firmly between body and valve cover.

D. Valve Controls: The valve shall be furnished with a complete, externally mounted control system, including adjustable speed control needle valves, strainer, and all necessary copper or stainless steel connecting tubing and fittings. The controls shall be capable of achieving all the flow and speed adjustment indicated.



- E. **Factory Tests and Warranty:** Valves shall be factory tested with a hydrostatic test and a functional test and a test certificate shall be submitted to the Goleta Water District prior to delivery of the valve. The valve shall be warranted for a period of 3 years from the date of shipment to be free of defects in materials and workmanship.
- F. **Operating Conditions:** The valve shall be designed to operate under the following conditions, or as stated on the construction drawings:
 - 1. Total flow from pump station [gpm] - []
 - 2. Maximum inlet pressure (psi) - []
 - 3. Maximum flow through valve (gpm) - []
 - 4. Valve size (inches) - []
 - 5. Size of pipeline (inches diameter) - []
- G. **Spare Parts:** The following spare parts shall be furnished in accordance with Section 15200:
 - 1. 1 set of all resilient seals, and discs
 - 2. 1 diaphragm
- H. **Manufacturer shall be Cla-Val Company, or equal.**

2.27 **HARDWARE AND MISCELLANEOUS MATERIALS**

- A. **Indoor Use:** Bolts and nuts for flanged valves located indoors shall be carbon steel, ASTM A 307, Grade B.
- B. **Exposed Use:** Bolts and nuts for flanged valves located outdoors above ground and flanges located in underground vaults and structures shall be Type 316 stainless steel conforming to ASTM A 193, Grade B8M, for bolts and ASTM A 194, Grade 8M, for nuts.
- C. **Washers:** Washers shall be provided for each nut. Washers shall be of the same material as the nuts.
- D. **Gaskets for flanged end valves shall be as specified in Section 330509 – Piping, General.**

2.28 **COATING AND LINING OF CAV**

- A. **Combination Air Valves shall be coated in accordance with Section 099000 – Protective Coatings.** Prime coat shall be applied at the place of manufacture. The interior surfaces of CAV’s shall be epoxy coated. Seating areas and plastic, bronze, stainless steel, or other high alloy parts shall not be coated.



2.29 STEEL ENCLOSURE FOR CAV

- A. The vented steel pipe vertical enclosure shall be manufactured and constructed as detailed on the DISTRICT's Standard Detail 3-03 and shall be hot dip galvanized after fabrication. The door on the cover shall be equipped with a handle and have the ability to be locked using a standard pad lock. Manufacturer shall be Groeniger & Co or approved equal.

2.30 PRESSURE AND VACUUM GAUGES

- A. General: Pressure gauges shall be provided on suction and discharge connections to pumps as indicated in the pump specifications; on discharge connections from blowers and compressors; each side of pressure reducing valves; and wherever indicated. Vacuum gauges shall be provided for vacuum pumps and wherever indicated. In all locations (such as certain pump suction connections) where pressures may vary from below to above atmospheric head, compound gauges shall be installed.
- B. Gauge Construction: Gauges shall be industrial quality type with Type 316 stainless steel movement and stainless steel or alloy case. Unless otherwise indicated, gauges shall have a 3-1/2-inch dial, 1/4-inch threaded connection, a Type 316 stainless steel snubber adapter, and a shut-off valve. Gauges shall be calibrated to read in applicable units, with an accuracy of plus and minus 1 percent, to 150 percent of the working pressure or vacuum of the pipe or vessel to which they are connected. All gauges shall be vibration and shock resistant.
- C. Diaphragm Seal: Gauges attached to systems involving chemical solutions, corrosive fluids, sludge, sewage, or other liquids containing solids at less than 1 percent dry solids shall be equipped with diaphragm seals, or equal protective pressure or vacuum sensing devices.
- D. Gauge Manufacturers, or Equal: Marsh Instrument Company; Ashcroft Industrial Instruments (Dresser); Foxboro; Marshalltown Instruments, Inc.; and U.S. Gauge Div. of Ametek.
- E. Snubber Manufacturers, or Equal: Weksler Instruments, Corp.

PART 3 – EXECUTION

3.01 VALVE INSTALLATION

- A. General: Valves, actuating units, stem extensions, valve cans, and accessories shall be installed in accordance with the Manufacturer's written instructions and as indicated. Contractor shall carefully inspect valves and operate valves before installation to verify



- all parts are in proper working order. If a valve is found to be defective no attempt shall be made to repair it. The defective valve shall be returned to the manufacturer and replaced with a new properly working valve.
- B. Access: Valves shall be installed with easy access for actuation, removal, and maintenance and to avoid interference between valve actuators and structural members, handrails, or other equipment. Valves shall be firmly supported to avoid undue stresses on the pipe. Mainline valves shall be set plumb and securely braced into place using concrete anchor blocks as shown in Std. Detail 2-08. Non-buried actuators shall be located to be readily accessible for operation and maintenance, and shall not be mounted where shock or vibrations will impair their operation, nor shall the support systems be attached to handrails, process piping, or mechanical equipment.
 - C. Valve Accessories: All buried valves shall be provided with valve cans as indicated in GWD Standard Detail 2-06. Valve cans shall be installed centered and plumb over the operating nut. Valve cans shall be supported on bonnet of valve. In areas where road construction is not completed, set PVC sleeve to pavement subgrade level to prevent damage during construction of road base and AC pavement. After road construction is complete, Contractor is to return and set cans to grade.
 - D. Corrosion Protection: All nuts and bolts on valves for buried service shall be tape wrapped, after valve installation is completed Trenton Wax Tape #1, in accordance with Section 330509 – Piping General.

3.02 SERVICES OF MANUFACTURER

- A. Field representatives of manufacturers of valves with pneumatic, hydraulic, or electric actuators shall adjust actuator controls and limit-switches in the field for the required function.

3.03 INSTALLATION OF GATE VALVES

- A. Care shall be taken when installing valves on plastic pipe. Valve shall be supported at each end of the valve.

3.04 INSTALLATION OF BUTTERFLY VALVES

- A. All exposed butterfly valves shall be installed with a means of removing the complete valve assembly without dismantling the valve or operator. The installation shall be in accordance with Section 331216 – Valves, General.

3.05 INSTALLATION OF CAV



- A. Combination Air Valves shall be installed as shown on the plans and the District's Standard Detail 3-03. The tap for the air valves shall be made in a level section of pipe no closer than 24-inches to a bell, coupling, joint, or fitting. CAV's shall be located a minimum of five feet clear of any obstruction such as trees and fences.
- B. Flanged Connections: Flanges shall be cleaned by wire brushing before installing flanged valves. Flange bolts and nuts shall be cleaned by wire brushing, and threads lubricated with oil and graphite. Nuts shall be tightened uniformly and progressively. If flanges leak under pressure testing, nuts and bolts shall be loosened or removed, the gasket reseated or replaced, the bolts and nuts reinstalled or re-tightened, and joints re-tested. Joints shall be watertight.
- C. Threaded Connections: Threaded joints shall be cleaned by wire brushing or swabbing. Teflon joint compound or Teflon tape shall be applied to pipe threads before installing threaded valves. Joints shall be watertight.

3.06 VALVE PRESSURE TESTING OF CAV

- A. CAV's shall be tested at the same time that the connecting pipelines are pressure tested.

3.07 APPLICATION

- A. Install tapping sleeves and valves at locations and of sizes shown on Drawings. Size-on-size taps shall not be performed without the prior approval of the Goleta Water District.
- B. Clean tapping sleeve, tapping valve, and pipe prior to installing and in accordance with Manufacturer's instruction.
- C. Inspect sleeve for leaks, and remedy leaks prior to tapping operation.

3.08 INSTALLATION

- A. Hot tap connections to existing waterlines shall be made only after proper blocking has been installed under the pipe, the sleeve of the tapping tee, and the tapping equipment to prevent cracking of the existing pipe. At no time before, during, or after completion of the hot tap shall the tapping tee bear the weight of the pipe or tapping equipment.
- B. There should be a minimum of two feet from the end of the sleeve to any joint. When multiple taps occur on the same length of pipe there should be a minimum of five feet of space between the sleeves and should be located in slightly different planes unless otherwise approved by the Goleta Water District.
- C. Tighten bolts in proper sequence so that undue stress is not placed on pipe.



- D. Align and mount tapping valve tapping sleeve to achieve a good watertight connection. Make tap with sharp, shell cutter:
 - 1. For 12-inch and smaller tap, use minimum cutter diameter one-half inch less than nominal tap size.
 - 2. For 16-inch and larger tap, use Manufacturer's recommended cutter diameter.
- E. Withdraw coupon and flush cuttings from newly made tap.
- F. Wrap completed tapping sleeves and valves in accordance with Section 099000 – Protective Coatings, except for stainless steel sleeves and valves.
- G. Place concrete thrust block behind tapping sleeve (not over tapping sleeve and valve) or encase existing pipe or appropriate restraint system as directed by the Goleta Water District.
- H. Goleta Water District's construction supervisor shall inspect installation of tapping sleeve and valve prior to backfilling.
- I. Backfill in accordance with Section 312316 –Trenching, Backfill and Compaction.

3.09 INSTALLATION OF GAUGES

- A. Gauges shall be installed with the face in the vertical position, at the locations indicated and in strict accordance with the manufacturer's printed instructions. Gauges shall be attached to a thread-olet. Tapping the wall of the pipe for a threaded connection is not acceptable unless approved by the District. Care shall be taken to minimize the effect of water hammer or vibrations on the gauges.

3.10 SERVICES OF MANUFACTURERS FOR PRESSURE REDUCING OR RELIEF VALVES

- A. Inspection, Startup, and Field Adjustment: The service representative of the valve manufacturer shall be present at the Site for one work day, to assist the Contractor in the installation and adjustment of the valve(s). For the purpose of this paragraph, a work day is defined as an eight hour period, excluding travel time.

END OF SECTION



SECTION 33 12 19

FIRE HYDRANTS & END DRAINS

PART 1 – GENERAL

1.01 REQUIREMENTS

- A. The Contractor shall provide fire hydrants and end drains, complete and operable, including all appurtenances and accessories, in accordance with the Contract Documents.

1.02 RELATED WORK SPECIFIED ELSEWHERE

Section 03 30 00 – Cast-in-Place Concrete

Section 33 05 09 – Piping, General

Section 33 13 16 – Valves and Appurtenances

Section 09 90 00 – Protective Coatings

PART 2 – PRODUCTS

2.01 WET-BARREL FIRE HYDRANTS

- A. Unless shown otherwise, all fire hydrants shall be of the wet-barrel type, in accordance with ANSI/AWWA C503.
- B. Where a hydrant is installed it shall have the number, size and type of pumper connections required by the County of Santa Barbara Fire Department. The hydrant head shall have a minimum of one 4-inch pumper connection and one 2-1/2-inch hose connection. Operating nuts and caps shall be 1-1/8 inch pentagonal nuts measured “point to flat”. Caps shall be bronze and shall be attached to hydrant with chains. Cap shall have 1/8-inch diameter weep hole drilled through its center adjacent to operating nut. The hydrant inlet shall be 6-inch in diameter. Hydrant shall be isolated by a buried gate valve. Hydrant bury shall be 6inch diameter ductile iron conforming to the requirements of AWWA C502 with a 6-inch diameter flanged break-away spool connected to the hydrant head. Breakaway spool shall be 12-inch minimum length, 125pound class, cast iron, 6 bolt-breakaway spool with breakaway (hallow) bolts on top flange. All bolts, nuts, and washers shall be 307A zinc plated steel with standard HEX head and machined per ASTM A325.
- C. The hydrants shall be tested to 300 psig and they shall be suitable for a working pressure of 150 psig. All interior and exterior surfaces shall be coated in accordance with AWWA C550 and Section 099000 - Protective Coatings. Color of finish coat shall be Goleta



Water District approved “Safety Yellow” on fire hydrants in the public right of way while fire hydrants not in the public right of way (e.g., on private property) shall be factory painted red in accordance with Santa Barbara County requirements. Prior to final inspection of the water system improvements, the Contractor shall conduct fire flow tests at all new hydrants in accordance with section 3.02.03, Fire Hydrant Flow Tests.

D. Unless otherwise specified, hydrant bury shall be 6-inch diameter, 6-hole wet barrel fire hydrant bury with mechanical joint.

E. Fire Hydrant Manufacturers, or Equal:

MANUFACTURER	SINGLE FAMILY RESIDENCE		MULTI-FAMILY RESIDENCE, COMMERCIAL & INDUSTRIAL	
	Size	Model	Size	Model
Jones	6”x4”x2 ½ “	J-3700	6”x4”x2 ½”x2 ½”	J-3765R
	6”x4”x2 ½”x2 ½”	J-3765R		
Clow	6”x4”x2 ½ “	2050	6”x4”x2 ½”x2 ½”	2060
	6”x4”x2 ½”x2 ½”	2060		
American AVK Co	6”x4”x2 ½ “	2442	6”x4”x2 ½”x2 ½”	2452
	6”x4”x2 ½”x2 ½”	2452		

F. Bury Manufacturers, or Equal:

Clow Valve Company
 US Pipe and Foundry
 Star
 Sigma/Napco
 South Bay Foundry

2.02 END DRAINS

A. End drains shall have a 2-1/2-inch hose connection. Operating nuts and caps shall be 1-1/8 inch pentagonal nuts measured “point to flat”. Caps shall be bronze and shall be



attached to end drain with chains. The end drains shall be tested to 250 psig and they shall be suitable for a working pressure of 150 psig.

- B. Manufacturers, or Equal: James Jones, J-342.

PART 3 – EXECUTION

3.01 INSTALLATION

- A. All fire hydrants shall be installed in strict accordance with the manufacturer's published recommendations, applicable sections of AWWA Standard C600, AWWA Manual M17, and GWD Standard Detail 3-01. Hydrants shall be installed plumb and shall be installed before the construction of curb and gutter, and sidewalk where possible. All installations shall be to the satisfaction of the Goleta Water District and the County of Santa Barbara Fire Department.
- B. Hydrants located on roads where no sidewalk exists or where sidewalk and curb are separated by a parkway, shall be located 18 inches from the back of the curb to the fire hydrant centerline. Hydrants located on roads with sidewalk at the back of curb shall be located 18 inches from the back of sidewalk to the fire hydrant centerline and shall comply with the requirements of the Americans with Disabilities Act. Hydrants located where no curb exists shall be located a minimum of 36 inches from the edge of pavement and shall be protected by guard posts as shown in GWD Standard Detail 4-03.
- C. A minimum of 18 inches and a maximum of 24 inches clearance shall be maintained between finished grade and the lowest operating nut on the hydrant. The center of the breakaway spool shall be at grade with the top of curb unless the hydrant is set in concrete in which case a 3-inch minimum clearance shall be maintained between the finished sidewalk surface and the top flange of the breakaway spool. Breakaway bolts shall be installed with tips pointing up and filled with silicone caulking. Hydrant isolation valve shall be connected to the hydrant piping by means of a retainer gland. Hydrant shall be installed with a concrete thrust block, calculated for the maximum expected water pressure.
- D. All end drains shall be installed in accordance with GWD Standard Detail 2-12 and applicable sections of AWWA Standards. End drains shall be installed before the construction of curb and gutter, and sidewalk where possible. End drains located on roads where no sidewalk exists or where sidewalk and curb are separated by a parkway, shall be located 18 inches from the back of the curb. End drains located on roads with sidewalk at the back of curb shall be located per the Santa Barbara County Department of Public Works requirements. End drains located where no curb exists shall be located a minimum of 36 inches from the edge of pavement.



Department of Neighborhood Services and Public Safety
GOLETA TRAIN DEPOT PROJECT

END OF SECTION



SECTION 33 12 33

METERS LARGE AND SMALL

PART 1 – GENERAL

1.01 REQUIREMENTS

- A. Contractors shall furnish and install DCDA fire meters. Goleta Water District shall furnish and install all domestic, irrigation, and associated, service laterals, valves, piping, and boxes as shown on the Construction Drawings and specified herein, complete and operable, for flow measurement of water.

1.02 RELATED WORK SPECIFIED ELSEWHERE

Section 33 0 509 – Piping, General

Section 33 14 23 – Manholes, Vaults, & Meter Boxes

Section 33 14 17 – Service Connections

1.03 REFERENCE SPECIFICATIONS, CODES, AND STANDARDS

- A. Codes: All codes, as referenced herein, are specified in Section 014200 - Reference Standards.
- B. Commercial Standards:

ISA - S 5.1 Instrumentation Symbols and Identification

ANSI - B16.1 Cast Iron Pipe Flanges and Flanged Fittings, Class 25, 125, 250, and 800

ANSI/AWWA C207 Steel Pipe Flanges for Waterworks Service - Sizes 4 In through 144 In

ANSI/AWWA C510 Double Check Valve Backflow Prevention Assembly

ANSI/AWWA C703 Cold-Water Meters – Fire Service Type

AWWA C704 Cold-Water Meters - Propeller Type for Main Line Applications

ASME REPORT Fluid Meters, Sixth Edition, 1971

1.04 CONTRACTOR SUBMITTALS

- A. The Contractor on applicant projects isolated from the distribution during construction shall submit complete shop drawings of meters for review in accordance with Section 013300 -



Contractor Submittals. Each meter shall be identified with its equipment number and property number, as shown or specified.

PART 2 – PRODUCTS

2.01 METERS

- A. Meters 1-inch and smaller shall be Mach 10 Ultrasonic Meters manufactured by Neptune Technology Group. Meters 1-inch and 1-1/2"-inch shall be E-Series Ultrasonic Meters manufactured by Badger Meter. Meters 3-inch and larger shall be Octave Ultra Sonic Meters manufactured by Master Meter. Meters shall measure in units of one hundred cubic feet. The lay length of solid spacer shall match the lay length of the meter.

PART 3 – EXECUTION

3.01 INSTALLATION

- A. Goleta Water District shall assemble and install all service laterals and meters specified herein.
- B. For private projects isolated from the District distribution system during construction, the Contractor shall assemble and install all service laterals excluding the meters in strict accordance with Goleta Water District standard details, under the general review and observation of the District. All installations shall be accomplished by competent craftsmen in a workmanlike manner.

3.02 METERS

- A. All meters shall be installed by the Goleta Water District. When the Contractor installs the service, the Contractor shall install a temporary solid PVC spacer in conjunction with installation of the service.
- B. Per Senate Bill No. 7, approved September 25, 2016, Section 1954.203, all multi-unit rental property constructed after January 1, 2018 must provide residents with info on volume and cost of their water use through their own individual submeters. The submeter shall be capable of being accessed and read by the tenant of the dwelling unit and read by the landlord without entering the dwelling unit. A submeter installed before January 1, 2018 may be read by the landlord after entry into the unit, in accordance with this chapter and Section 1954. Per this section, the Goleta Water District is not required to assume responsibility for ensuring compliance with any law or regulation governing installation, certification, maintenance, and testing of submeters and associated onsite plumbing



3.03 ACCEPTANCE BY THE DISTRICT

- A. Final acceptance and unlocking the meter stop to use the meter is contingent on satisfactory operation after installation, certification of backflow prevention device, receipt and Goleta Water District approval of record drawings, and the project dedication process.

END OF SECTION



SECTION 33 14 17

SERVICE CONNECTIONS

PART 1 – GENERAL

1.01 REQUIREMENTS

- A. The Contractor shall provide water service connections, complete and in place, in accordance with the Contract Documents. The requirements of Section 330509 - Piping, General apply to the work of this Section.

1.02 RELATED WORK SPECIFIED ELSEWHERE

Section 01 55 26 – Traffic Control & Access

Section 31 23 16 – Trenching, Backfill and Compaction

Section 33 01 10 – Waterline Disinfection & Testing

Section 33 05 09 – Piping, General

Section 33 14 23 – Manholes, Vaults, & Meter Boxes

PART 2 – PRODUCTS

2.01 COPPER WATER TUBE

- A. Copper water tube shall conform to the requirements of ASTM B 88 - Seamless Copper Water Tube. All 1” copper water tube for buried locations shall be soft temper tube in rolls. All above ground installations, and 2” copper water tube for buried locations shall be hard drawn lengths. Unless otherwise indicated, all copper water tube shall be of Type K wall thickness. The minimum copper service size shall be 1 inch. Copper service size for service run-outs of 50 feet or greater, for ¾-inch and 1-inch meters, shall be increased to 2 inches. Service connections 4 inches in diameter and larger shall be constructed of C900 PVC DR-18 pressure rated to 235 psi in accordance with AWWA C900.
- B. Joints: Copper water tube shall have either brazed joints, or flared ends and fittings. Brazed joints shall be made with silver brazing alloy metal filler. Brazing alloy metal filler shall contain a minimum of 15% silver and no lead. Brazing alloy metal filler shall be STAY SILV 15 Brazing Metal Filler manufactured by The Harris Products Group, SIL-CAN 15 manufactured by Canfield Technologies, or approved equal.



- C. Fittings: Brazed fittings shall conform to ANSI/ASME B 16.18 - Cast Copper Alloy Solder Joint Pressure Fittings, or to ANSI/ASME B 16.22 - Wrought Copper and Copper Alloy Solder - Joint Pressure Fittings. The brazing flux shall be the Manufacturer's approved type for the fitting and brazing used. Compression fittings shall conform to ANSI/ASME B 16.26 - Cast Copper Alloy Fittings for Copper Tubes. Cast copper alloy flanges and flanged fittings shall be in accordance with ANSI/ASME B 16.24 - Cast Copper Alloy Pipe Flanges and Flanged Fittings, and ASTM B 62 - Standard Specification for Composition Bronze or Ounce Metal Castings, with 150 lb ratings, or as indicated.

2.02 SERVICE FITTINGS

- A. Saddles and Tapping Sleeves: Saddles shall be bronze with female iron pipe threads. On PVC pipe, saddles shall be secured by single flat strap. On steel and ductile iron pipe, service saddles shall be with two flat straps up to 2-inches. On all service connections 4-inch and larger, tapping sleeves shall be used. Manufacturer shall be as indicated on Goleta Water District Approved Materials List.
- B. Corporation Stops: Corp stops shall be bronze with male iron pipe threads to match saddle threads. Connection to service line shall be compression fitting (pack joint) outlet connection. Manufacturer shall be as indicated on Goleta Water District Approved Materials List.
- C. Angle Ball Meter Stops: Angle ball meter valves shall be bronze, equipped with padlock wings, and provide for 360 degree rotation of the tee head. Padlock wings for dedicated firelines shall have the ability be locked off in the open position Angle ball meter valves for ¾-inch and 1-inch meters shall have 1-inch compression fitting (pack joint) copper inlet and meter swivel nut outlet to match meter size. Angle ball meter valves for 1-1/2-inch and 2-inch meters shall have compression fitting (pack joint) copper inlets and flanged meter connection outlets. Angle ball meter valve manufacturers and model numbers shall be as indicated on Goleta Water District Approved Materials List.
- D. Curb Stops: Ball valve curb stops shall be bronze. Size, connection type and manufacturer shall be as indicated on Goleta Water District Approved Materials List.
- E. Couplings and Adapters: Manufacturers of couplings and adapters shall be as indicated on Goleta Water District Approved Materials List.
- F. Other Brass Fitting: Manufacturers of couplings and adapters shall be as indicated on Goleta Water District Approved Materials List.

PART 3 – EXECUTION



3.01 INSTALLATION

- A. General: Service runouts shall be installed perpendicular to the waterline. The configuration of the services shall be as shown on the applicable Goleta Water District standard details. Meters shall be installed in accordance with Goleta Water District Standards & Specifications. All copper tubes shall be installed in a neat and workmanlike manner, properly aligned, and cut from measurements taken at the site, to avoid interferences with structures or equipment. Exposed tubing shall afford maximum access to equipment, and where necessary all tubing shall be installed with sufficient slopes for venting or drainage of liquids. For 1-inch copper tubing, tubing may be curved around a minimum radius of 12 inches. For 1-1/2-inch and 2-inch copper tubing, copper fittings shall be silver brazed where bends are required. All installations shall be acceptable to the District. There shall be a minimum of two feet in spacing between service saddles.
- B. Valves and Unions: Unless otherwise indicated, tubing to fixtures, groups of fixtures, and equipment shall be provided with a shutoff valve and union, unless the valve has flanged ends. Low points in water systems shall have drainage valves. Unions shall be provided at threaded valves, equipment, and other devices requiring occasional removal or disconnection.

3.02 PREPARATION

- A. Prior to installation, each tube length shall be carefully inspected, flushed clean of any debris or dust, and be straightened, if not true. Ends of tubes shall be reamed and filed smooth. All fittings shall be equally cleaned before assembly.

3.03 JOINTS

- A. Brazed and Soldered Joints: Brazed and soldered joints shall conform to the Manufacturer's recommendations and to the specifications and recommendations of ANSI/ASME B 31.1 - Power Piping. All brazing shall be done by skilled and qualified welders per Section 330509 - Piping, General. Prior to the application of flux, the end of all tubes shall be thoroughly dried and cleaned.

3.04 INSPECTION AND FIELD TESTING

- A. Inspection: All finished installations shall be carefully inspected for proper joints and supports, anchoring, interferences, and damage to tubing, fittings, and coating. Damage shall be repaired to the satisfaction of the Goleta Water District.
- B. Field Testing: When constructed independent of the District distribution system, all copper service connections shall be pressure tested in conjunction with new water mains for a period of not less than two hours, without exceeding the following tolerance: pipes shall show zero leakage for unburied pipe, and not more than 0.02 gallons per hour per



inch diameter per 100 feet of buried pipe. Copper pipe shall be subject to 100 psi or 1-1/2 times the maximum working pressure, whichever is greater. The Contractor shall furnish all test equipment, labor, materials, and devices at no extra cost to the Goleta Water District. For additional testing requirements refer to Section 330110 – Waterline Disinfection & Testing.

- C. Leakage is determined by the change in incremental volume markings on the site reservoir on the test pressure pump. All fixtures, devices, or other accessories which are to be connected to the lines and which would be damaged if subjected to the test pressure shall be disconnected and ends of the branch lines be plugged or capped as required during the testing procedures.
- D. Leaks shall be repaired to the satisfaction of the District, and the system shall be re-tested until no leaks are found.

END OF SECTION



SECTION 33 14 23

MANHOLES, VAULTS & METER BOXES

PART 1 – GENERAL

1.01 REQUIREMENTS

- A. The Contractor shall provide precast concrete manholes, vaults, meter boxes, complete and in place, in accordance with the Contract Documents.

1.02 RELATED WORK SPECIFIED ELSEWHERE

Section 31 23 16 – Trenching, Backfill and Compaction.

Section 33 05 09 – Piping, General.

1.03 SPECIFICATIONS, CODES AND STANDARDS

- A. Commercial Standards

ASTM A 48 Gray Iron Castings

ASTM C 150 Portland Cement

ASTM C 478 Circular Precast Reinforced Concrete Manhole Sections

ASTM C 923 Resilient Connectors Between Reinforced Concrete Manhole Structures, Pipes, and Laterals

1.04 CONSTRUCTOR SUBMITTALS

- A. General: Furnish submittals for manholes and vaults in accordance with Section 013300 - Contractor Submittals

- B. Shop Drawings

1. Show dimensions, locations, lifting inserts, reinforcement, and joints.

1.05 QUALITY ASSURANCE



- A. Inspection: After installation, the Contractor shall demonstrate that manholes and vaults have been properly installed, level, with tight joints, at the correct elevations and orientations, and that the backfilling has been carried out in accordance with the Contract Documents.

PART 2 – PRODUCTS

2.01 MANHOLES

- A. The Contractor shall provide precast manhole sections and conical sections conforming to ASTM C 478 and the requirements of this Section. Adjusting rings shall be standard items from the manufacturer of the manhole sections. Minimum wall thickness of rings shall be 4 inches if steel reinforced and 6 inches if not reinforced.
- B. Axial length of sections shall be selected to provide the correct total height with the fewest joints.
- C. Conical sections shall be designed to support cast iron frames and covers under an H-20 loading, unless indicated otherwise.
- D. Where the manhole barrel diameter is greater than 48 inches, an eccentric flat slab transition shall be used to transition to 48-inch diameter riser sections. Underside of the transition shall be at least 7 feet above the top of the bench.
- E. Design Criteria: Manhole walls, transitions, conical sections, and base shall be designed per ASTM C 478 for the depths indicated and the following:
 - 1. AASHTO H-20 loading applied to the cover.
 - 2. Unit weight of soil of 120 pcf located above all portions of the manhole.
 - 3. Lateral soil pressure based on saturated soil producing 100 pcf acting on an empty manhole.
 - 4. Internal fluid pressure based on unit weight of 63 pcf with manhole filled from invert to cover with no balancing external soil pressure.
 - 5. Dead load of manhole sections fully supported by the base and transition.
 - 6. Additional reinforcing steel in walls to transfer stresses at openings.
 - 7. The minimum clear distance between the edges of any 2 wall penetrations shall be 12 inches or one-half of the diameter of the smaller penetration, whichever is greater.



- F. Joints shall be sealed with o-ring gaskets conforming to ASTM C 443.
- G. Concrete for base and channel formation shall be 4000 psi concrete conforming to Section 033000 - Cast-In-Place Concrete.
- H. Barrel section to sewer pipe connections shall be sealed with resilient connectors complying with ASTM C 923. Mechanical devices shall be stainless steel.
- I. Manhole steps shall be comprised of 1/2-inch grade 60 steel reinforcement rod encased in polypropylene copolymer plastic. Steps shall have tread width of 14-inches. Furnish test results demonstrating step capability to resist a pull out force of 2200 pounds. Provide PS2-PF Manhole Step by M.A. Industries, or equal.
- J. Manhole Manufacturers, or Equal

2.02 FRAMES AND COVERS

- A. Castings: Castings for manhole frames and covers shall be non-rocking and shall conform to the requirements of ASTM A 48, Class 30. Unless otherwise indicated, cast iron covers and frames shall be heavy traffic type, 30 inches in diameter, with embossed lettering saying "Goleta Water District". Frame and cover shall be designed for H-20 traffic loading.
- B. Castings Manufacturers, or Equal

Alhambra Foundry Co., Ltd.
Neenah Foundry Co.
East Jordan Iron Works

2.03 VAULTS

- A. The Contractor shall provide precast vaults designed for the indicated applications and of the sizes indicated.
- B. The minimum structural member thickness for vaults shall be 5-inches. Cement shall be Type V Portland cement as specified in ASTM C 150. The minimum 28-day concrete compressive strength shall be 4,000 psi. All reinforcing steel shall be embedded in the concrete with a minimum clear cover as recommended by ACI 318.
- C. Design Loading: Vaults in areas subject to vehicular traffic shall be designed for H-20 traffic loading. Vaults in other areas shall be designed for a vertical live load of 300 psf. Lateral loads on vaults in all areas shall be calculated from:



$L = 90 h$ (+ surcharge of 240 psf in areas of vehicular traffic),

where L = loading in psf, and h = depth of fill in feet.

- D. Where joints are designed in pre-cast concrete vaults, such joints shall be interlocking to secure proper alignment between members and prevent migration of soil through the joint. Structural sections at joints shall be sized sufficiently to reinforce the section against localized distress during transportation and handling and against excess contact bearing pressures through the joint.
- E. Where openings for access to the vault are required, the full clear space opening indicated shall be provided, without obstructions from brackets or supports. For large openings where brackets or supports are designed to protrude into the opening for support of required covers, such brackets or supports shall be designed to be easily removed and replaced with a minimum of effort and without cutting or welding.
- F. Covers for access openings shall be provided. Frames for lids shall be fabricated from steel (galvanized after fabrication) or aluminum, and shall be integrally cast into the vault concrete sections. Vault lids shall be fabricated from plate aluminum with stainless steel hardware. Aluminum plate (vault lids) shall incorporate an anti-slip aluminum surface permanently bonded to the plate with a minimum coefficient of friction of 0.6, and shall be UL listed as slip resistant. The anti-slip aluminum surface shall be "SlipNOT" Grade 2 Medium as manufactured by W.S. Molnar Company or approved equal. All lids shall be tight fitting to prevent the entrance of dirt and debris. Where edge seams are permitted, no gaps greater than 1/16-inch between edges will be accepted.
- G. All covers, except round, heavy-weight, cast iron manhole covers, shall have securing mechanisms to hold the covers firmly in place against the effects of repetitious live loads such as pedestrian or vehicle traffic. All vaults shall have spring assisted or torsional lids. Hinges for lid sections shall run parallel to centerline of meter. Reading lids shall be fabricated in the field to align with meter register as approved by the GWD Inspector. All vault covers for vaults containing meters shall be provided with appropriate hole for Touch-Read device.
- H. Where penetration of the pre-cast concrete vault are required for piping, conduit, or ducts, such penetrations shall be accommodated through pre-cast openings or thin-wall knock-out sections. All openings for penetrations shall be smooth and free of surface irregularities and without exposed steel reinforcing. Vaults need not be designed to resist thrust from piping passing through the vault.
- I. All hardware, nuts, and bolts used inside vaults shall be stainless steel unless otherwise specified.



2.04 BLOW-OFF VAULTS

- A. The Contractor shall provide precast or prefabricated circular vaults designed for the indicated application and of the size indicated. Blow-off vaults shall be reinforced concrete or fiber reinforced polymer.
- B. Design Loading: Vaults in areas subject to vehicular traffic shall be designed for H-20 traffic loading. Vaults in other areas shall be designed for a vertical live load of 300 psf.
- C. The full clear space opening indicated shall be provided, without obstructions from brackets or supports, and covers for access openings shall be provided. Covers shall be cast iron or reinforced polymer. All lids shall be tight fitting to prevent the entrance of dirt and debris. All covers, except round, heavy-weight, cast iron manhole covers, shall have securing mechanisms to hold the covers firmly in place against the effects of repetitious live loads such as pedestrian or vehicle traffic.

2.05 WARNING SIGNS

- A. The entrance to every manhole and vault shall be fitted with a permanently affixed, plastic warning sign, located above and centered on the top step. The size and wording of each sign shall be as directed by the Goleta Water District.
- B. Sign Manufacturer, or Equal

W. H. Brady Company
Seton Nameplate Corporation

2.06 METER BOXES

- A. The Contractor shall provide meter boxes for the indicated applications and of the sizes indicated. Meter boxes and vaults shall be sized in accordance with the table below. All replacement and retrofit meters shall be located in the appropriate meter box or vault as shown. Any exceptions shall be approved in advance by the District. Meter box and vault manufacturers and product numbers shall be as indicated on District approved materials list.
- B. Where specified by the District, meter boxes shall be provided with single piece polymer concrete cover with appropriate hole for an Invensys (Sensus) Touch-Read device.

PART 3 – EXECUTION

3.01 GENERAL



- A. Pre-cast concrete sections shall be transported and handled with care in accordance with the manufacturer's written recommendations. Where lifting devices are provided in pre-cast sections, such lifting devices shall be used as intended. Where no lifting devices are provided, the Contractor shall follow the manufacturer's recommendations for lifting procedures to provide proper support during lifting.
- B. Meter Boxes shall be assembled and placed in excavations on properly compacted soil foundations as indicated. Meter boxes shall be set to grade and oriented to provide the required dimensions and clearances from pipes and other structures.
- C. Prior to backfilling, all cracks and voids in meter boxes shall be filled with non-shrink grout. Around pipe and conduit penetrations, openings shall be sealed with non-shrink grout.

END OF SECTION



SECTION 33 40 00 STORM DRAINAGE UTILITIES

PART 1 - GENERAL

1.01 SUMMARY

- A. This Section includes storm drainage piping; sub-surface drains; metal covers, grates and frames; catch basins; box culverts; manholes, and BMPs.
 - 1. Best Management Practices (BMPs):
 - a. Proprietary Detention BMPs - Precast Concrete.
 - b. Cartridge Media Filters.
 - c. Hydrodynamic Separation Devices.
 - d. Catch Basin Inserts.
 - e. Downspout Filters.
 - f. Stormwater Interceptors.
 - g. Proprietary Retention/Infiltration BMPs – Polypropylene or Polyethylene.
 - h. Proprietary Retention/Infiltration BMPs – Precast Concrete.
 - i. Proprietary Biotreatment Devices.
 - 2. Closed-circuit television inspection of storm drain lines.

1.02 RELATED REQUIREMENTS

- A. Division 01 - General Requirements.
- B. Section 01 3593 - Off-site Improvement Procedures.
- C. Section 01 7416 - Storm Water Pollution Prevention Plan.
- D. Section 01 7417 – BMP Implementation Plan.
- E. Section 01 7418 – Water Pollution Control.
- F. Section 22 1000 - Plumbing.
- G. Section 31 2300 - Earthwork.



- H. Section 31 2316 – Trenching Backfill and Compaction.
- I. Section 32 0117 – Asphalt Pavement Repair.
- J. Section 32 1313 – Portland Cement Concrete Paving (Pedestrian).

1.03 DEFINITIONS

- A. AASHTO: American Association of State Highway and Transportation Officials.
- B. ASME: American Society of Mechanical Engineers.
- C. ASTM: American Society for Testing and Materials.
- D. BMP: Stormwater Best Management Practice.
- E. CBC: California Building Code.
- F. CCTV: Closed-Circuit Television.
- G. DET: Detention BMP.
- H. DWV: Drain, Waste, and Vent.
- I. FILT: Filter BMP.
- J. GS: Gravity Separator.
- K. HDPE: High Density Polyethylene.
- L. IAPMO: International Association of Plumbing and Mechanical Officials.
- M. IOR: Inspector of Record.
- N. NPS: Nominal Pipe Size.
- O. OAR: OWNER's Authorized Representative.
- P. PE: Polyethylene.
- Q. Post Construction BMP: Devices installed by the CONTRACTOR for storm water management to be left on site after construction completion.
- R. PP: Polypropylene.
- S. PVC: Poly Vinyl Chloride.
- T. RET: Retention.
- U. SDR: Standard Dimensions Ratio.



- V. VEG: Vegetative.
- W. OWNER: City of Goleta.
- X. SWPPP: Storm Water Pollution Prevention Plan.

1.04 REFERENCES

- A. American Association of State Highway and Transportation Officials (AASHTO):
 - 1. ASHTO M 252: Geotextile Specification for Highway Applications.
 - 2. AASHTO M 294: Standard Specification for Corrugated Polyethylene Pipe, 300- to 1500-mm (12- to 60-in.) Diameter.
 - 3. AASHTO M 330: Standard Specification for Polypropylene Pipe, 300- to 1500-mm (12- to 60-in.) Diameter.
- B. American Society for Testing and Materials International (ASTM):
 - 1. ASTM A888: Standard Specification for Hubless Cast Iron Soil Pipe and Fittings for Sanitary and Storm Drain, Waste, and Vent Piping Applications.
 - 2. ASTM C14: Standard Specification for Nonreinforced Concrete Sewer, Storm Drain, and Culvert Pipe.
 - 3. ASTM C443: Standard Specification for Joints for Concrete Pipe and Manholes, Using Rubber Gaskets.
 - 4. ASTM C564: Standard Specification for Rubber Gaskets for Cast Iron Soil Pipe and Fittings.
 - 5. ASTM C76: Standard Specification for Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe.
 - 6. ASTM C857: Standard Practice for Minimum Structural Design Loading for Underground Precast Concrete Utility Structures.
 - 7. ASTM C858: Standard Specification for Underground Precast Concrete Utility Structures.
 - 8. ASTM C891: Standard Practice for Installation of Underground Precast Concrete Utility Structures.
 - 9. ASTM D2564: Standard Specification for Solvent Cements for Poly (Vinyl Chloride) (PVC) Plastic Piping Systems.
 - 10. ASTM D2665: Standard Specification for Poly (Vinyl Chloride) (PVC) Plastic Drain, Waste, and Vent Pipe and Fittings.



11. ASTM D2855: Standard Practice for the Two-Step (Primer and Solvent Cement) Method of Joining Poly (Vinyl Chloride) (PVC) or Chlorinated Poly (Vinyl Chloride) (CPVC) Pipe and Piping Components with Tapered Sockets.
12. ASTM D3034: Standard Specification for Type PSM Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings.
13. ASTM D3212: Standard Specification for Joints for Drain and Sewer Plastic Pipes Using Flexible Elastomeric Seals.
14. ASTM D448: Standard Classification for Sizes of Aggregate for Road and Bridge Construction.
15. ASTM F1866: Standard Specification for Poly (Vinyl Chloride) (PVC) Plastic Schedule 40 Drainage and DWV Fabricated Fittings.
16. ASTM F2306: Standard Specification for 12 to 60 in. [300 to 1500 mm] Annular Corrugated Profile-Wall Polyethylene (PE) Pipe and Fittings for Gravity-Flow Storm Sewer and Subsurface Drainage Applications.
17. ASTM F2418: Standard Specification for Polypropylene Corrugated Wall Stormwater Collection Chambers.
18. ASTM F2764: Standard Specification for 6 to 60 in. [150 to 1500 mm] Polypropylene (PP) Corrugated Double and Triple Wall Pipe and Fittings for Non-Pressure Sanitary Sewer Applications.
19. ASTM F2787: Standard Practice for Structural Design of Thermoplastic Corrugated Wall Stormwater Collection Chambers.
20. ASTM F2881: Standard Specification for 12 to 60 in. [300 to 1500 mm] Polypropylene (PP) Dual Wall Pipe and Fittings for Non-Pressure Storm Sewer Applications.
21. ASTM F2922: Standard Specification for Polyethylene Corrugated Wall Stormwater Collection Chambers.
22. ASTM F477: Standard Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe.
23. ASTM F656: Standard Specification for Primers for Use in Solvent Cement Joints of Poly (Vinyl Chloride) (PVC) Plastic Pipe and Fittings.
24. ASTM F794: Standard Specification for Poly (Vinyl Chloride) (PVC) Profile Gravity Sewer Pipe and Fittings Based on Controlled Inside Diameter.

C. Cast Iron Soil Pipe Institute (CISPI):

1. CISPI 301: Hubless Cast Iron Soil Pipe and Fittings for Sanitary and Storm Drain, Waste, and Vent Piping Applications.



2. CISPI 310: Coupling for Use in Connection with Hubless Cast Iron Soil Pipe and Fittings for Sanitary and Storm Drain, Waste, and Vent Piping Applications.
- D. The International Association of Plumbing and Mechanical Officials (IAPMO):
1. IAPMO IS 6: Hubless Cast Iron Sanitary and Rainwater Systems - Installation Standards.
- E. Standard Specifications for Public Works Constructions (Greenbook):
1. Section 202: Masonry Materials.
 2. Section 206: Miscellaneous Metal Items.
 3. Section 207: Pipe.
 4. Section 208: Pipe Joint Types and Materials.
 5. Section 210: Paint and Protective Coatings.
 6. Section 306: Underground Conduit Construction.

1.05 SUBMITTALS

- A. Shop Drawings: Submit site plan denoting locations of lines, valves, and appurtenances.
- B. Product Data: Manufacturer's catalog data for all required materials. Include technical data for accessories, information concerning gaskets, joints and couplings.
- C. Certificates: Certificates attesting that tests set forth in referenced publication have been performed and the results required by design have been met.
- D. Closeout Documents: At Substantial Completion submit to the OAR two CD's and one hard copy of the documents indicated in paragraphs 1 through 5 below:
 1. Maintenance Log: Provide Microsoft Excel Spreadsheet including the following information:
 - a. Maintenance log and upkeep records of the installed Post Construction BMPs. Include the following headers as a minimum: "Date of Service", "Location of BMP", "Type of Maintenance or Service", "Notes", "Next Scheduled Preventive Maintenance Due", and "Inspector Signature".
 - b. Maintenance Requirements: Include the following headers as a minimum: "BMP Description", "Location of BMP and Map Grid Location" and "Type of Maintenance or Service Needed", i.e.; weekly, monthly, quarterly, etcetera. "Stock No.", "Manufacturer Contact



- Information”, along with “Frequency” namely: weekly, monthly, quarterly, etcetera and “Special Instructions”.
2. Maintenance Manuals: Provide Maintenance Manual for storm drainage BMP components installed along with requirements, replacement or maintenance schedule and plans with the location of each BMP component. This manual shall include product information cut sheet, shop drawings, vendor information for each component and warranty.
 3. Record drawings: ‘As-Built’ site plan(s) showing Post Construction BMP. Provide a copy of marked record set with red pencil identifying any variations from design documents.
 4. Training Documentation:
 - a. OWNER attendees sign off training sheet.
 - b. Two DVD’s of materials covered in the training and components installed.
 5. Post-Construction BMP Maintenance Plan: Submit complete Plan per Attachment “A”, edit per As-Built conditions and provide missing information.
 6. Records of Closed-Circuit Television Inspection: At Substantial Completion submit to the OAR three DVD’s of Closed-circuit television inspections performed. Include the following information:
 - a. Electronic Media Recordings: Visual and audio record of the entire length of pipe. For existing laterals identify problem areas, such as roots, cracks, fractures, broken pipe, and other unusual conditions found.
 - b. Digital Photographs of the pipe condition, connections, points of interest and defects found. Indicate distance of defects to a point of reference such as face of building or mainline. Provide the Digital Photographs after fixing the defective pipes.
 - c. Inspection Log: Provide written report including:
 - 1) Date and time of inspection.
 - 2) Name of School, Project, CONTRACTOR, and operator name.
 - 3) Location, material and size of pipe.
 - 4) Description of defects found and attempts to fix them.

1.06 QUALITY ASSURANCE



- A. Comply with the following as a minimum requirement: Standard Specifications for Public Works Construction, current edition.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Do not store plastic products, pipes, and fittings in direct sunlight.
- B. Protect pipe, pipe fittings, and seals from dirt and damage.
- C. Handle all products according to manufacturer's written rigging instructions.

1.08 TRAINING OF OWNER PERSONNEL

- A. At Substantial Completion and when the storm drainage system is fully operational, knowledgeable representatives from the CONTRACTOR and manufacturer(s) of the components specified and installed at the site shall provide up to 8 hours of training. Date, time and location for the training shall be coordinated through the project OAR. Have OWNER attendees sign off training sheet and provide a copy to the OAR.
- B. Training period shall cover but not be limited to the following:
 - 1. Explain the operation of storm drainage system and its design intent.
 - 2. Explain the maintenance requirements of every component of the system.
 - 3. Provide recommendations of practices to minimize or eliminate negative impact on the system.
 - 4. Provide maintenance schedule as recommended by the manufacturers for every component and review it with OWNER's Maintenance and Operations staff.
 - 5. Conduct a site walk, identify every component of the system and demonstrate its operation.
 - 6. Training shall be conducted with the use of Maintenance log and Maintenance manual.

1.09 SURPLUS MATERIALS

- A. Provide enough additional materials for each component of BMP that requires replacement or service during the first year.

1.10 ATTACHMENTS

- A. The following attachments are included at the end of Section 33 4000:
 - 1. Attachment "A" - Post-Construction BMP Maintenance Plan.
 - 2. Attachment "B" – Post-Construction Water Balance Calculator.



PART 2 – MATERIALS AND PRODUCTS

2.01 PIPING MATERIALS

- A. General: Minimum 5 feet away from building boundaries. For piping within 5 feet from building boundaries, and interior piping refer to Division 22 plumbing sections. Provide piping system in conformance with Section 207 - Pipe and Section 208 - Pipe Joint Types and Materials of the Standard Specifications for Public Works Construction. All Soil-tight pipes shall be provided with joints that are function of opening size, channel length, and backfill particle size. A backfill material containing a high percentage of fine-graded soils requires investigation for the specific type of joint to be used to guard against soil infiltration, including the requirement for fabric-wrapped joints.
- B. Nonreinforced Concrete Pipe (CP): ASTM C14, with bell-and-spigot ends and gasketed joints with ASTM C443 rubber gaskets.
- C. Reinforced Concrete Pipe (RCP): ASTM C76, with bell-and-spigot ends and gasketed joints with ASTM C443 rubber gaskets.
 - 1. Approved manufacturers: Thompson Pipe Group, or equal.
- D. Cast Iron Soil Pipe (CIP):
 - 1. Hubless, service weight, ASTM A888, CISPI 301, conforming to CISPI 310 and installed in accordance to IAPMO IS 6.
 - 2. Cast iron soil coupling: Hubless, heavy-duty with neoprene gaskets, stainless steel corrugated shields, and 4 bands of stainless-steel clamps. IAPMO, ASTM C564 and CISPI 310.
 - 3. Approved manufacturers: American Foundry, Mission Rubber Company, Tyler, or equal.
- E. Corrugated, Dual Wall, High Density Polyethylene Drainage Pipe (HDPE):
 - 1. Corrugated PE Drainage Pipe and Fittings NPS 4 to NPS 10: AASHTO M 252, Type S (double-wall) with smooth waterway for coupling joints.
 - 2. Corrugated PE Pipe and Fittings NPS 12 to NPS 60: AASHTO M 294 or ASTM F2306, Type S (double-wall) with smooth waterway for coupling joints.
 - 3. Approved manufacturer: ADS, Hancor, JM Eagle, or equal.
- F. Corrugated, Dual or Triple Wall, Polypropylene Pipe (PP):
 - 1. Corrugated PP Drainage Pipe and Fittings NPS 12 to NPS 60: ASTM F2764, ASTM F2881, or AASHTO M 330, Type S (double-wall) or Type D (triple-wall), for respective diameters. Provide coupling joints with smooth waterway.



2. Approved manufacturers: ADS, Prinsco, or equal.
- G. PVC (Poly Vinyl Chloride) Schedule 40 DWV Pipe:
1. Conform to ASTM D2665, ASTM F794, and ASTM F1866.
 2. Installer of PVC Schedule 40 DWV piping system shall carry ASTM D2855 and ASME B31.3 qualification. Installer shall provide proof of these qualifications to IOR prior to commencing work.
 3. Containers for solvent and primer shall be clearly marked with manufacturer's data. Solvent and primer shall not be more than one year old. The safety placards must be visible.
 4. Blue or red-hot glue shall not be used.
 5. Approved manufacturers and products:
 - a. Pipe: Charlotte pipe and foundry, Harvel Plastics Inc., JM Eagle, Spears Manufacturing Company, or equal.
 - b. Primer: Weld-On P-70 by IPS, Conforming to ASTM F656.
 - c. Cement: Weld-On 711 (gray) by IPS, Conforming to ASTM D2564.
- H. PVC (Poly Vinyl Chloride) SDR-35 Pipe, 6" through 15":
1. Conform to ASTM D3034.
 2. Gasketed Joints: Elastomeric gasket joints conforming to ASTM D3212.
 3. Gaskets: Chloroprene conforming to ASTM F477.
 4. Approved manufacturers: Charlotte pipe and foundry, Harvel Plastics Inc., JM Eagle, Spears Manufacturing Company, or equal.
- 2.02 BEDDING MATERIAL FOR PIPE
- A. General: Conform to the requirements of Section 31 2313 - Excavation and Fill or Section 31 2323 - Excavation and Fill for Utilities, as required.
- B. Approved manufacturers and products:
1. Propex Fabrics, Inc.: Geotex 451.
 2. TenCate Geosynthetics Americas: Mirafi 140N.
 3. US Fabrics, Inc.: 120NW.
 4. Equal products.



2.03 PERFORATED SUBSURFACE DRAIN PIPE

- A. Perforations shall be symmetrically located within a maximum arc of 160 degrees. Perforations shall provide a total open area of at least 0.3 square inches per linear foot of pipe, with a minimum of one perforation per linear foot, except for joint areas. Perforation shall be either holes or slots. Hole diameters of ¼-inch minimum to ½-inch maximum. Width of slots of 1/8-inch minimum to 5/16-inch maximum with slot length not exceeding 5 inches.
- B. Aggregate Around Perforated Pipe shall be 6 inches of gravel containing no particles finer than a 1/2-inch to 3/4-inch sieve opening size.

2.04 STORMWATER TREATMENT SYSTEMS /BMPS

- A. DET-1: Proprietary Detention BMPs – Reinforced Precast Concrete, approved manufacturers and products:
 - 1. Jensen Precast: Precast-Concrete-Detention-Reservoir.
 - 2. Oldcastle Precast Inc.: Storm Capture-Detention.
 - 3. Storm Trap: Single-Trap-Detention.
 - 4. Equal products.
- B. FILT-2: Cartridge Media Filters, approved manufacturers and products:
 - 1. Baysaver Technologies Inc.: Bayfilter.
 - 2. Contech: Storm Filter.
 - 3. OldCastle Precast Inc.: Perk Filter.
 - 4. Equal products.
- C. GS-1: Hydrodynamic Separation Devices, approved manufacturers and products:
 - 1. ADS-Baysaver Technologies Inc.: Barracuda S Series.
 - 2. Contech: CDS.
 - 3. Hydro International: First Defense HC (High Capacity).
 - 4. Jensen Precast: JDS.
 - 5. Oldcastle Precast Inc.: DVS.
 - 6. Equal products.
- D. GS-2: Catch Basin Inserts, approved manufacturers and products:



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1. AbTech Industries: UUF DI-DO.
 2. ADS-FlexStorm: FlexStorm Pure or Catch-it.
 3. Aquashield Inc.: Aqua-Guardian.
 4. Ecosense International: EcoSense International's Catch Basin Insert.
 5. EnviroPod Inc.: LittaTrap.
 6. Oldcastle Precast Inc.: FLoGard, or GISB.
 7. UltraTech International Inc.: Ultra-Drain Guard.
 8. Equal products.
- E. GS-3: Downspout Filters, approved manufacturers and products:
1. Oldcastle Precast Inc.: FLoGard +Plus.
 2. Equal products.
- F. GS-5: Stormwater Interceptors, approved manufacturers and products:
1. Jensen Precast: JPHV-stormwater-interceptors-with-bypass.
 2. Oldcastle Precast Inc.: Storm Capture Detention.
 3. Oldcastle Precast Inc.: NSBB, Nutrient Separating Baffle Box.
 4. Storm Trap: Single-Trap-Detention.
 5. Equal products.
- G. RET-4: Drywells
1. Pre-Cast Liner: Reinforced 4000 PSI concrete. 48" I.D., 54" O.D.
 2. Overflow/Riser Pipe: Minimum 6" I.D. Schedule 40 Poly Vinyl Chloride (PVC) solid wall with debris shield.
 3. Drainage Screen: Minimum 6" I.D., Schedule 40 PVC slotted screen with 0.120-inch slots continuous, with a minimum of 160 slots per foot.
 4. Rock: Clean washed rock uniformly graded between 3/8" and 1-1/2".
 5. Absorbent: Hydrophobic petrochemical sponge with minimum four (4) quart capacity used in all chambers.
 6. Approved manufacturers and products:



- a. Torrent Resources: MaxWell.
 - b. Equal products.
- H. RET-7a: Proprietary Retention/Infiltration BMPs – Polypropylene or Polyethylene
1. Molded PP or PE with open bottom. Thermoplastic Corrugated Wall Chambers (Chambers): Provide in conformance with ASTM F 2418 “Standard Specification for Polypropylene Corrugated Wall Stormwater Collection Chambers”, ASTM F 2922 “Standard Specification for Polyethylene Corrugated Wall Stormwater Collection Chambers”, and ASTM F 2787 “Standard Practice for Structural Design of Thermoplastic Corrugated Wall Stormwater Collection Chambers”.
 2. Filtering Material: ASTM.D448, washed, crushed stone or ¾” to 2” gravel. For more information refer to plans, and manufacturer installation manual.
 3. Filter Mat, applicable to isolator/main row: Geotextile woven or spun filter fabric, in one or more layers. For more information refer to plans, and manufacturer installation manual.
 4. Provide non-woven geotextile fabric around the entire system to prevent migration of fines into the rock voids. For more information refer to plans, and manufacturer installation manual.
 5. Pipe Systems: Perforated manifold, header, and lateral piping complying with AASHTO M 252 for NPS 10 and smaller, AASHTO M 294 for NPS 12 to NPS 60. Include proprietary fittings, couplings, seals, and filter fabric.
 6. Approved manufacturers and products:
 - a. ADS - Storm Tech: MC3500, MC4500, SC740 or DC780.
 - b. Contech: ChamberMaxx.
 - c. NDS: StormChambers SC34 or SC44.
 - d. Prinsco: HydroStor HS180 or HS75.
 - e. Triton: S22 or S29.
 - f. Equal products.
- I. RET-7b: Proprietary Retention/Infiltration BMPs – Reinforced Precast Concrete, approved manufacturers and products:
1. Jensen Precast: Precast-Concrete-Arches.
 2. Oldcastle Precast Inc.: Storm Capture Infiltration.



3. StormTrap: Single-Trap-Infiltration.
 4. Equal products
- J. VEG-6: Proprietary Biotreatment Devices, approved manufacturers and products:
1. BioClean: Modular Wetlands System.
 - a. Infiltration media shall be ARCOSA.
 2. Contech: Filterra Bioretention Systems.
 - a. Infiltration media shall be Filterra Media consist of a combination of natural sand, gravel, and organic materials.
 3. DeepRoot Urban Landscape: Silva Cell 2.
 4. Oldcastle: BioPod Underground.
 - a. Infiltration media shall be StormMix.
 5. StormTree: Tree Filter System.
 - a. Grates shall be Hot-dip galvanize steel.
 - b. Infiltration media shall be CocoGro Coir Fiber.
 6. Equal products.

2.05 MANHOLES

- A. Provide round reinforced concrete manhole with an H-20 traffic rated hatch & solid cover of minimum 30-inch in diameter with holes of maximum ½-inch in diameter.

2.06 MISCELLANEOUS MATERIALS

- A. Metal Covers, Grates, Frames and Accessories:
1. Conform to Section 206 - Miscellaneous Metal Items of the Standard Specifications for Public Works Construction.
 2. Hot-dip galvanize steel parts after fabrication in accordance with Section 210 - Paint and Protective Coatings of the Standard Specifications for Public Works Construction.
 3. Grates and Frames:
 - a. Vandal-proof design and construction.
 - b. ADA compliant, in conformance to CBC 11B-302.3.



- c. Rated for vehicular traffic on areas intended for use by motor vehicles.
- d. Hot-dip galvanized.
- B. Concrete, Mortar and Related Materials: Conform to Section 32 1313 - Site Concrete Work.
- C. Manhole Brick Mortar, Grout, and Plaster: Conform to Standard Specifications for Public Works Construction, Section 202 - Masonry Materials.
- D. Underground Concrete Structures: Shall be precast and rated for H-20 traffic loading and applicable soil loads. The materials and structural design of the devices shall be per ASTM C857 and ASTM C858.

2.07 NAMEPLATES

- A. Stainless steel or aluminium nameplate permanently fastened to BMP showing the following information:
 - 1. BMP ID number and BMP type.
 - 2. Next service day followed by a 1-inch by 4-inch long blank space.
 - 3. Manufacturer name, model number, telephone number and stock ID number.
 - 4. Installation or production date.
 - 5. 1-inch by 4-inch blank space for OWNER's use.

PART 3 – EXECUTION

3.01 GENERAL INSTALLATION REQUIREMENTS

- A. CONTRACTOR shall arrange for a preconstruction meeting with the manufacturer's representative to review the basic principles for proper installation of Underground BMP type products prior to any installation.
- B. Underground Concrete modules shall be installed in accordance with manufacturer's instructions and the current ASTM C891 procedures.

3.02 EXCAVATION, BACKFILLING AND COMPACTING

- A. Conform to the requirements of Section 31 2313 - Excavation and Fill or Section 31 2323 - Excavation and Fill for Utilities, as required.

3.03 INSTALLATION OF PIPE



- A. Conform to Section 306 - Underground Conduit Construction of the Standard Specifications for Public Works Construction.
- B. Non-ferrous drainpipe installed with less than 12 inches of cover to finish grade shall be provided with a 4-inch thick concrete pipe encasement.

3.04 DRAINAGE APPURTENANCES

- A. Catch basins, junction chambers, manholes, box culverts, outlet chambers and other drainage structures: Construct as indicated on Drawings and as specified in Section 32 1313 - Site Concrete Work, and in compliance with the Standard Specifications for Public Works Construction, Section 303 - Concrete and Masonry Construction.
- B. Ensure that Post Construction BMP have a visible identifying manufacturer tag with product identification, manufacturer contact information, date of last service and date of next service due.
- C. Provide storm drain stencil per City or County requirements as applicable.

3.05 STORMWATER TREATMENT SYSTEMS/BMPs

- A. (Shall be completed by design team.)

3.06 ABANDONED DRAINAGE LINES AND STRUCTURES

- A. Cap or plug existing drain lines that are cut and abandoned and remove existing drainage structures that are abandoned.

3.07 CLEANUP

- A. Remove rubbish, debris, and waste materials and legally dispose of off the Project site.
- B. Maintain Post Construction BMP after installation and keep a maintenance log to be turned over to OAR at Substantial Completion.

3.08 PROTECTION

- A. Protect the Work of this section until Substantial Completion.

END OF SECTION



ATTACHMENT "A"

***POST-CONSTRUCTION BMP MAINTENANCE
PLAN***

Project:

**Goleta Train Depot Project
(City of Goleta)**

(Facility Location)

Date Prepared: (Date of Submission)

Prepared for:

Landowner Name

Address

Telephone Number

Prepared by:

Name of person(s)

Address

Telephone Number



I. INTRODUCTION

A. Project Description

The proposed train depot will be constructed on an approximately 2.2 acre site. The majority of this new school site is in a flat area and initially covered with _____.

B. Site Conditions

Groundwater

Per the geotechnical evaluation prepared by _____, groundwater [*was/ was not*] encountered [*at _____ft.*] The borings were drilled to a maximum depth of _____ ft.

Soils

Slopes

The proposed project site is at approximately _____ feet above mean sea level and has a general slope of approximately ____%. There is a difference in elevation of about _____ feet across the site.

Drainage Patterns (onsite/offsite)

The drainage generally flows in a _____ direction towards _____ [*street/avenue*]. The [*north/south/east/west*] adjacent property has drainage patterns directed towards the school site.



II. STORMWATER TREATMENT STRATEGY

A. Description of Proposed Site Drainage

B. Site Drainage Areas, Land Uses and Proposed BMP Table

Drainage Area	Land Use	BMP Selected	Treatment Type
A	Buildings/Roofs and Associated Landscaped Areas; Playfield	GS-1 Hydrodynamic Separator; GS-2 Catch Basin Inserts	Pre-Treatment
		RET-7a Retention/Infiltration BMPs-Thermoplastic or RET-7b Retention/Infiltration BMPs-Precast Concrete	Highly Recommended Structural Treatment BMP
B	Buildings/Roofs and Associated Landscaped Areas	VEG-6 Modular Wetland Systems	Recommended Structural Treatment BMP
D	Roadway, Driveways and Parking Lot	Permeable Interlocking Concrete Pavement – Refer to guide specification section 32 1415	Highly Recommended Structural Treatment BMP



IV. MONITORING AND MAINTENANCE

See Appendix 3 for additional BMP monitoring and maintenance information. At a minimum:

- The drainage system and the associated structures and BMP shall be maintained according to manufacturer's specification and to ensure maximum pollutant removal efficiencies as needed.
- Debris and other water pollutants removed from BMP during cleanout shall be contained and disposed of in a proper manner as needed.

V. NON-STRUCTURAL BMP

Source Control BMP used at this site include:

- SC-1 Landscaping Maintenance and Integrated Pest Management (IPM)
- SC-3 Parking Area Maintenance
- SC-4 Sidewalk and Plaza Maintenance
- SC-5 Leaking Vehicles
- SC-6 Vehicle and Equipment Cleanup
- SC-7 Outdoor Storage of Equipment and Materials
- SC-9 Storm Drainage Signage/ Stenciling
- SC-8 Fire Sprinkler Test Water
- SC-9 Miscellaneous Drain or Wash Water
- SC-10 Safer Alternative Products
- SC-11 Spill Prevention Control and Cleanup
-

VI. OTHER INFORMATION

VII. APPENDIXES



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APPENDIX 1 - VICINITY MAP

APPENDIX 2 - SCHEMATIC OF POST CONSTRUCTION BMP

APPENDIX 3 - BMP MONITORING AND MAINTENANCE

APPENDIX 4 - BMP MAINTENANCE LOGS



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APPENDIX 1: VICINITY MAP



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APPENDIX 2: SCHEMATIC OF POST CONSTRUCTION BMP:



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APPENDIX 3 - BMP MONITORING AND MAINTENANCE



APPENDIX 4 BMP MAINTENANCE LOGS (Sample Provided Below):



Los Angeles Unified School District
 Facilities Services Division
**CONTRACTOR BMP INSTALLATION
 AND MAINTENANCE LOG**

BMP (MANUFACTURER/MODEL#): _____
BMP LOCATION: _____
DATE INSTALLED: _____
ID TAG (ID#/SERIAL#/LOCATION): _____
 (ATTACH SITE PLAN AND PICTURE(S) SHOWING BMP LOCATION AND ID TAG)

BMP PROTECTION/ MAINTENANCE INSTRUCTIONS

MAINTENANCE

DATE MAINTENANCE PERFORMED	NEXT SCHEDULED DATE	COMMENTS/ SUMMARY OF MAINTENANCE PERFORMED

OAR NAME _____	CONTRACTOR NAME _____
SIGNATURE _____	SIGNATURE _____
DATE _____	DATE _____



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END OF ATTACHMENT “A”



Department of Neighborhood Services and Public Safety
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ATTACHMENT "B"

***POST-CONSTRUCTION WATER BALANCE
CALCULATOR***



**SOUTH LA PATERA LANE IMPROVEMENT PROJECT
27 SOUTH LA PATERA LANE,
GOLETA, CALIFORNIA 93117**

STREETSCAPE SPECIFICATIONS
100% Submittal - Not for Construction



SECTION 26 05 00

COMMON WORK RESULTS FOR ELECTRICAL

PART 1 - GENERAL

1.01 SUMMARY

- A. This Section specifies the basic requirements for electrical installations and includes requirements common to more than one section of Division 26. It expands and supplements the requirements specified in sections of Division 01.
- B. Related Requirements:
1. Division 01 – General Requirements.
 2. Section 03 30 00 – Cast-in-Place Concrete (Train Depot Package).
 3. Section 09 90 00 – Painting and Coating (Train Depot Package).
 4. Division 26 – Electrical.
 5. Division 31 – Earthwork.
 6. Division 32 – Exterior Improvements.
 7. Division 33 – Site Improvements.
- C. Related Industry Standards: The most current version of the following industry standards.
1. ASTM D 709 – Laminated Thermosetting materials.
 2. ANSI/NEMA FB-1 – Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit, Electrical Metallic Tubing, and Cable.
 3. ANSI/NEMA 250 – Enclosures for Electrical Equipment (1000 Volts Maximum).
 4. California Electrical Code (CEC).
 5. IEEE C57.12.28 – Standard for Pad-Mounted equipment Enclosure Integrity.
 6. IEEE 1584 – Performing Arc-Flash Hazard Calculations.
 7. UL/ANSI 1 – Standard for Flexible Metal Conduit.
 8. UL/ANSI 1242 – Standard for Electrical Intermediate Metal Conduit.



9. UL/ANSI 506 – Standard for Specialty Transformers.
10. UL/ANSI 6 – Electrical Rigid Metal Conduit-Steel.
11. UL/ANSI 6A – Electrical Rigid Metal Conduit-Aluminum, Red Brass, and Stainless Steel.
12. UL 797 – Electrical Metallic Tubing-Steel.
13. UL/ANSI 870 – Standard for Wireways, Auxiliary Gutters, and Associated Fittings.
14. UL/ANSI 891 – Standard for Safety Switchboards.

1.02 BASIC ELECTRICAL REQUIREMENTS

A. Quality Assurance:

1. Work shall be performed by CONTRACTOR'S personnel possessing the skills and experience obtained in performing work of similar scope and complexity.
2. Refer to related division(s) specifications for other requirements.

B. Drawings and Specifications Coordination:

1. For purposes of clearness and legibility, Drawings are essentially diagrammatic, and the size and location of equipment is indicated to scale whenever possible. Verify conditions, dimensions, indicated equipment sizes, and manufacturer's data and information as necessary to install the Work of this Division. Coordinate location and layout with other Work.
2. Verify final locations for rough ins with field measurements and with the requirements of the equipment to be connected.
3. Drawings indicate required size and points of termination of conduits, number and size of conductors, and diagrammatic routing of conduits. Install conduits with minimum number of bends to conform to structure, avoid obstructions, preserve headroom, keep openings and passageways clear, and comply with applicable code requirements.
4. Routing of conduits may be changed provided that the length of any conduit run is not increased more than 10 percent of length indicated on the Drawings.
5. Outlet locations shall be coordinated with architectural elements prior to start of construction. Locations indicated on the Drawings may be distorted for clarity; CONTRACTOR shall coordinate in the field prior to rough-in work.



6. Coordinate electrical equipment and materials installation with building components and the Work of other trades.
 7. Equipment disconnects shall be readily accessible and free of obstructions.
 8. When extending or intercepting existing electrical facilities, CONTRACTOR shall Coordinate and verify existing conditions.
- C. Terminology:
1. Signal Systems: Applies to clock, bell, fire alarm, annunciator, sound, public address, buzzer, telephone, television, inter-communication, elevator access controls, lighting control systems and security systems.
 2. Low Voltage: Applies to signal systems operating at 120 volts and less, and power systems operating at less than 600 volts. Medium voltage: Applies to power systems operating at more than 600 volts.
 3. UL: Underwriter's Laboratories Inc, Nationally Recognized Testing Laboratory (NRTL), or equal.
- D. Regulations: Work shall comply with the requirements of authorities having jurisdiction and the California Electrical and Building Codes. Material shall conform to regulations of the National Board of Fire Underwriters for electrical wiring and apparatus. Materials shall be new and listed by UL, or another NRTL.
- E. Structural Considerations for Conduit Routing:
1. CONTRACTOR shall provide calculations and drawings as necessary for any construction and/or alterations requiring conduits to pass through or interfere with any structural members, or where notching, boring or cutting of the structure is necessary, or where special openings through walls, floors, footings, or other buildings elements, or where notches and bored holes in wood or steel are required. All work shall conform to CBC, Part 2, Title 24 requirements.
 2. Concrete encasement for underground conduits that abuts a foundation wall or underground structure shall rest on a haunch integral with wall or structure, or shall extend down to footing projection, or shall be doweled into structure unless otherwise indicated. Underground structures shall include maintenance holes; pull boxes, vaults, and buildings.



- F. Power Distribution System Reports: For fault current, coordinatization and Arc-Flash system report requirements refer to applicable electrical distribution equipment sections. for specific requirements.
- G. Protection of Materials:
 - 1. Protect materials and equipment from damage and provide adequate and proper storage facilities during progress of the Work. Damaged materials and/or equipment shall be replaced.
- H. Cleaning:
 - 1. Exposed parts of Work shall be left in a neat, clean, usable condition. Finished painted surfaces shall be unblemished and metal surfaces shall be polished.
 - 2. Thoroughly clean parts of apparatus and equipment. Exposed parts to be painted shall be thoroughly cleaned of cement, plaster, and other materials. Remove grease and oil spots with solvent. Such surfaces shall be wiped, and corners and cracks scraped out. Exposed rough metal shall be smooth, free of sharp edges, carefully steel brushed to remove rust and other spots, and left in proper condition to receive finish painting.
 - 3. Remove rubbish, debris, and waste materials and legally dispose of off the Project site.
- I. WARRANTIES
 - 1. Provide one-year warranty on all material and labor performed, unless noted otherwise in specific sections.

PART 2 - PRODUCTS - NOT USED

PART 3 - EXECUTION

3.01 GENERAL REQUIREMENTS

- A. Advise the Inspector before starting the Work of this Division.
- B. Exposed conduits shall be painted to match the surfaces adjacent to installation.
- C. Salvaged materials removed from buildings shall be removed from the Project site as required by the OAR.



- D. Trenches outside of barricade limits shall be backfilled and paved within 24 hours after being inspected by the Inspector. Provide traffic plates during the time that trenches are open in traffic areas and in areas accessible to the public.
- E. Electrical equipment shall be braced and anchored for CBC Seismic Design requirements, or as otherwise indicated on the Drawings.

3.02 DELIVERY STORAGE AND HANDLING

- A. Deliver products to project site with proper identification, which shall include names, model numbers, types, grades, compliance labels, and similar information needed for District identification; all products and materials shall be adequately packaged and protected to prevent damage during shipment, storage, and handling.
- B. Coordinate deliveries of electrical materials and equipment to minimize construction site congestion.

3.03 CUTTING AND PATCHING

- A. Cutting and patching of electrical equipment, components, and materials shall include the removal and legal disposal of selected materials, components, and equipment.
- B. Do not endanger or damage installed Work through procedures and processes of cutting and patching.
- C. Repair or restore other work or surfaces damaged as a result of the work performed under this contract.

3.04 CLEANUP

- A. Remove rubbish, debris and waste materials and legally dispose off the Project site.
- B. Remove equipment and implements of service, and leave entire work area neat and clean, to the satisfaction of the OWNER Authorized Representative.

3.05 PROTECTION

- A. Protect the Work of this section until Substantial Completion.

END OF SECTION – 26 0500



SECTION 26 05 13

BASIC ELECTRICAL MATERIALS AND METHODS

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

1. Boxes, enclosures, keys and locks.
2. Identifications and signs.

B. Related Requirements:

1. Division 01 - General Requirements.
2. Division 26 – Electrical.

PART 2 - PRODUCTS

2.01 BOXES, ENCLOSURES, KEYS AND LOCKS

A. Junction and Pull boxes:

1. Junction and pull boxes, in addition to those indicated, shall only be used in compliance with codes, recognized standards, and Contract Documents.
2. Interior and non-weatherproof boxes shall be constructed of blue or galvanized steel with ample laps, spot welded, and shall be rigid under torsion and deflecting forces. Boxes shall be furnished with auxiliary angle iron framing where necessary to ensure rigidity.
3. Covers shall be fastened to box with enough machine screws to ensure continuous contact all around. Flush type boxes shall be drilled and tapped for cover screws if boxes are not installed plumb. Surfaces of pull and junction boxes and covers shall be labeled in black marker ink designating system, panelboard and circuit designation contained in box. In exposed Work, designation shall be installed on inside of pullbox or junction box cover.
4. Weatherproof NEMA 3R pull and junction boxes shall conform to foregoing for interior boxes with following modifications:
 - a. Cover of flush mounting boxes shall be furnished with a weather-tight gasket cemented to, and trimmed even with, cover all around.



- b. Surface or semi-flush mounting pull and junction boxes shall be UL, or another Nationally Recognized Testing Laboratory (NRTL) listed as rain-tight and shall be furnished complete with threaded conduit hubs.
 - c. Exposed portions of boxes shall be galvanized and finished with one prime coat and one coat of baked-on gray enamel, unless already furnished with factory baked-on finish.
5. Junction and pull boxes shall be rigidly fastened to structure and shall not depend on conduits for support.
6. Underground Concrete Pull Boxes:
- a. Pre-cast concrete pull boxes. Concrete pull boxes shall be traffic type, reinforced for H-20 wheel loading, pre-cast concrete. Pull boxes with inside dimensions of 2 feet by 3 feet by 3 feet deep shall consist of a base section, top ring, and cover. Base section shall be furnished with 2 knockouts measuring 10 inches by 10 inches in each 3 feet side, and one 20 inches by 20 inches knockout in each 2-foot side. Pull boxes with inside dimension 4 feet by 4 feet by 4 feet deep shall consist of a base section, midsection, topping, and cover. Base section shall be furnished with 2 knockouts measuring 8-inch by 16-inch on each of two opposite sides, and one 20-inch by 20-inch knockout on each of other two opposite sides. Pull boxes shall be furnished with a minimum of 6-inch diameter sump knockout and one-inch diameter ground rod knockout. In pull boxes, furnish and install cable racks on walls. Racks shall be furnished with 3 porcelain cable holders on vertical steel mounting bars. Pull boxes shall be furnished with 3/4-inch diameter pull irons. Covers shall be traffic-type consisting of steel safety plate bolted to frame. Covers shall be marked as electrical, power, or signal as required.
 - b. Provide end bells in duct entrances. Terminate each metal conduit with insulated bushing provided with a grounding terminal.
 - c. Provide 6-inch deep sand base under pull boxes.
 - d. Identify power and signal cables by tagging in manholes and pull boxes. Tie securely to cables with nylon cord.
 - e. Top of steel plate shall provide a minimum coefficient of static friction of 0.5 for either wet or dry locations, when tested for any shoe sole material. Test shall comply with ASTM D 1047 or F 489 or F 609 standards. Submit manufacturer's test results for Architect's review as part of materials and equipment submittals.
 - f. The use of underground extension boxes shall be limited to not more than 1 times the original depth of pull box.



1. Install identification markings to surface-mounted starters, switches, disconnect switches, contactors, and other devices controlling motors and appliances. Provide abbreviations required along with an identifying number. Markings to be provided with locking type stencils using paint of a contrasting color. Figures shall be 3/8 inch high unless otherwise indicated. Dymo Industries Inc., self-sticking plastic labels, with embossed characters made with a typewriter may be installed instead of stencils and paint; p-touch self adhesive plastic, or Brother P-Touch self sticking laminated plastic labels may be installed.
2. High Voltage: High voltage switchboards, cabinets, boxes, and conduits exposed in accessible locations, including under buildings and in attics, are required to be marked "WARNING-HIGH VOLTAGE – ABOVE 600 VOLTS". Markings for switchboards shall consist of 18 gage steel, porcelain enamel sign of standard manufacture. Markings for boxes, cabinets, and conduits shall be by means of stenciling or printed self-adhesive markers, Westline Tel-A-Pipe, or equal. Provide letters of black on orange background and not less than 1-7/8 inches high. On conduit runs, install markings at intervals not exceeding 10 feet in any individual area. Markings shall be installed after other painting Work is complete.

C. Warning Signs:

1. Provide a warning sign on outside of each door or gate to rooms or enclosures containing high voltage equipment. Signs required reading, "WARNING - HIGH VOLTAGE - KEEP OUT". Provide 2-inch high lettering.
2. Provide a warning sign on each high-voltage non-load break disconnect and fused cutout (not oil filled). Signs required reading, "DO NOT OPEN UNDER LOAD". Provide 2-inch-high lettering.
3. Provide signs of standard manufacture, 18 gage steel, with porcelain enamel finish. Provide red lettering on a white background.

PART 3 - EXECUTION

3.01 INSTALLATION AND SUPPORT OF BOXES

- A. Install outlet boxes flush with finished surface of wall or ceiling. Install plumb and securely fastened to structure, independent of conduit. Except where otherwise indicated, provide factory-fabricated adjustable attachment bar hangers between studs to support outlet boxes. When installation is performed in fire rated walls, maintain the wall's rating integrity by means of approved fire stop methods.

3.02 IDENTIFICATION OF CIRCUITS AND EQUIPMENT

- A. Provide descriptive nameplates or tags permanently attached to switchboards, motor control centers, transformers, panelboards, circuit breakers, disconnect switches, starters, pushbutton control stations and other apparatus installed for operation or control



of circuits, appliances, fire alarm control panel(s), fire alarm annunciator(s), power supplies, terminal cabinets, energy management control units, and Information technology system backbone and distribution equipment points.

- B. Provide nameplates of engraved laminated plastic, or etched metal. Submit Shop Drawings denoting dimensions and format to Architect before installation. Fasten to equipment with escutcheon pins, rivets, self-tapping screws, or machine screws. Self-adhering or adhesive backed nameplates are not permitted.
- C. Fasten tags to feeder wiring in conduits at every point where runs are broken or terminated, including pull wires in empty conduits. Indicate circuit, phase, and function. Tag branch circuits in panel boards and motor control centers. Tags may be manufactured of pressure-sensitive plastic or embossed self-attached stainless steel or brass ribbon.
- D. Provide circuit identification cards and cardholders in all panel boards. Cardholders shall consist of metal frame retaining a clear plastic cover permanently attached to inside of panel door. List of circuits shall be typewritten on a card. Circuit description shall include name or number of circuit's area and connected load.
- E. Junction and pull boxes shall have covers stenciled with box number when indicated on Drawings, or circuit numbers according to panel schedules. Data shall be lettered in a conspicuous manner with a color contrasting with finish.
- F. Name shall be correctly engraved, with a legend indicating function or areas, when required by codes or indicated on Drawings.

3.03 PROTECTION

- A. Protect Work of this section until Substantial Completion.

3.04 CLEANUP

- A. Remove rubbish, debris, and waste materials and legally dispose of off Project site.

END OF SECTION – 26 0513



SECTION 26 05 26

GROUNDING AND BONDING

PART 1 - GENERAL

1.01 SUMMARY

- A. Provide and install an effective grounding and bonding system.
- B. Related Requirements:
 - 1. Refer to related sections for their system grounding requirements.
 - 2. Division 01 - General Requirements.
 - 3. Division 26 – Electrical.

1.02 QUALITY ASSURANCE

- A. Reference Standards:
 - 1. IEEE 142 Green Book.
 - 2. Underwriter's Laboratories (UL).
 - 3. California Electrical Code.
 - 4. Building Industry Consultant Services International (BICSI).
 - 5. EIA/TIA (Signal and power).
 - 6. Nationally Recognized Testing Laboratory (NRTL).

1.03 SYSTEM DESCRIPTION

- A. Equipment, components, or materials that enclose electrical conductors, or are likely to be energized by electrical currents shall be effectively grounded.
- B. Metal equipment parts such as switchboards, panelboards, metal enclosures, raceways, equipment grounding conductors, and earth grounding electrodes shall be effectively bonded into a continuous grounding path.
- C. Metallic systems or electrically conductive materials shall be effectively bonded to the building's grounding electrode system.



- D. A separately derived AC system shall be grounded to the equipment grounding conductor and to a separate “made” electrode of building grounding electrode system.
- E. Provide effective electrical equipment bond continuity to all metal raceways and enclosures. Grounding shall be achieved through a code sized green insulated grounding conductor provided within each raceway.
 - 1. Each flexible conduit over six feet in length shall be provided with a green insulated grounding conductor of required size.
 - 2. Provide code sized equipment grounding conductor in all flexible conduits as required by CEC.
 - 3. The length of flexible conduit installations shall not be less than six feet.
 - 4. Effectively ground metal raceways and enclosures at each end.
- F. Cold water, or other utility piping systems, shall not be utilized as grounding electrodes. In addition to bonding to cold water pipe provide at least one of the following made grounding electrodes:
 - 1. A dedicated “made” electrode, fabricated of at least 20 feet of uncoated galvanized 1/2 inch diameter rebar encased by at least two inches of concrete, and placed next to the bottom of a concrete foundation, or footing in direct contact with earth A welded extended portion shall surface at the location of the common grounding electrode bus bar and be extended by a 3/0 exothermic welded bare copper cable, or be welded directly to the bus. The exothermic weld shall be at least four inches above finished floor in a dry location. The main grounding electrode and associated grounding conductors shall be in an enclosure and in conduit.
 - 2. Concrete enclosed electrode, fabricated of at least 20 feet of No. 2 AWG, minimum size, bare copper conductor, encased by at least two inches of concrete, located within or near bottom of a concrete foundation, or footing, which is in direct contact with earth. Footing rebar shall be connected to copper wire with approved connectors.
 - 3. An external grounding electrode, as specified hereafter or as required by the CEC shall be installed and connected to foundation or footing rebar.
 - 4. Extend the ground connections to the reinforcing steel of the concrete pads. Connect ground connections to 20 feet minimum of one or more of concrete pad reinforcing steel bars not less than 1/2 inch diameter. Provide a concrete encased electrode consisting of 20 feet of bare copper conductor not smaller than No. 4 AWG.



5. Ground metal sheathing and any exposed metal, vertical structural elements of buildings. Ground metal fences enclosing electrical equipment. Bond any metal equipment platforms which support electrical equipment to that equipment. Provide good electrical contact between metal frames and railings supporting push button stations, receptacles, instrument cabinets, etc., and raceways carrying circuits to those devices.

- G. Non-current carrying metal parts of high-voltage (1000 Volts or more) equipment enclosures, signal and power conduits, switchboard and panelboard enclosures, motor frames, equipment cabinets, and metal frames of buildings shall be permanently and effectively bonded to the grounding system. Provide a CEC sized equipment grounding conductor in every raceway.

- H. Metallic or semi-conducting shields and lead sheaths of cables operating above 1000 Volts shall be permanently and effectively grounded at each splice and termination.

- I. Neutral of service conductors shall be grounded as follows:
 1. Neutral shall be solidly grounded at only one point within the Project site for that particular service. Preferable location of grounding point shall be at the service switchboard, or main switch.
 2. Equipment and conduit grounding conductors shall be bonded to that grounding point.
 3. If other buildings or structures on the Project site are served from a switchboard or panelboard in another building, power supply is classified as a feeder and not as a service.
 4. Equipment grounding conductor shall be installed from switchboard to each individual building. At building, grounding conductor shall be bonded with power equipment enclosures, metal frames of building, etc., to “made” electrode for that building.
 5. Feeder neutrals shall be bonded at service entrance point only; neutrals of separately derived systems shall be bonded at the source only.

- J. If there is a distribution transformer at a building the secondary neutral conductor shall be grounded to “made” electrode serving the building.

1.04 SUBMITTALS

- A. Provide in accordance with Division 01.



PART 2 - PRODUCTS

2.01 MATERIALS

- A. Furnished yard boxes shall be precast concrete and shall be approximately 14 inches wide by 19 inches long by 12 inches deep or larger.
 - a. Boxes shall be furnished with bolt-down, checkered, cast iron covers and cast-iron frames cast into the yard boxes.
 - b. Provide yard boxes with hinged Frame Locking Cover.
 - c. Approved products include Brooks No. 36 HFL, Jensen Precast, Oldcastle Precast, Western Precast, Kistner, or equal.
- B. External ground electrodes shall be copper-clad steel ground rods, minimum 3/4-inch diameter by ten feet long.
- C. Clamps and fittings used in ground boxes below grade shall be listed for direct burial.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Grounding electrodes shall be installed in the nearest suitable planting area, where not otherwise indicated on Drawings, and each electrode shall terminate within a concrete yard box installed flush with finish grade. In planting areas, finish elevation of concrete yard boxes shall be two inches above planting surfaces.
- B. If concrete enclosed electrode is provided, grounding wire shall be terminated to a suitable copper plate with grounding lugs and must be enclosed in a raceway or box.
- C. Grounding rods shall be driven to a depth of not less than eight feet. Permanent ground enhancement material, (GEM) as manufactured by Erico Electrical Products, Loresco Powerset, Tessco Ultrafil or equal, shall be installed at each ground rod to improve grounding effectiveness. Install in accordance with manufacture's installation instructions.
- D. Grounding electrodes shall provide a resistance to ground of not more than 25 ohms.
- E. When installing grounding rods, if resistance to ground exceeds 25 ohms, two or more rods connected in parallel, or coupled together shall be provided to meet CEC grounding resistance requirements.
- F. Ground rods shall be separated from one another by not less than ten feet.



- G. Parallel grounding rods shall be bonded together with listed fittings and grounding conductors in galvanized rigid steel conduit, buried not less than 12 inches below finish grade.

3.02 TESTING

- A. Provide the services of an approved independent testing laboratory to test grounding resistance of “made” electrodes, ground rods, bonding of building steel, water pipes, gas pipes and other utility piping. Tests shall be performed as follows:
 - 1. Visually and mechanically examine ground system connections for completeness and adequacy.
 - 2. Perform fall of potential tests on each ground rod or ground electrode where suitable locations are available per IEEE Standard No. 81, Section 8.2.1.2. Where suitable locations are not available, measurements will be referenced to a known dead earth or reference ground.
 - 3. Perform the two-point method test per IEEE No. 81, Section 8.2.1.1 to determine ground resistance between ground rod and building steel, and utility piping - such as water, gas and panelboard grounds. Metal hand railings at building entrances and at handicapped ramps shall also be tested.
 - 4. Test shall be performed in the presence of the Inspector.
- B. Submit 3 copies of test results to the Architect. Test results shall be submitted on an official form from the independent testing laboratory recording Project location, test engineer, test conditions, test equipment data, ground system layout or diagram, and final test results.

3.03 PROTECTION

- A. Protect the Work of this section until Substantial Completion.

3.04 CLEANUP

- A. Remove rubbish, debris, and waste materials and legally dispose of off the Project site.

END OF SECTION – 26 0526



SECTION 26 05 33

RACEWAYS, BOXES, FITTINGS, AND SUPPORTS

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

1. Raceways and wire ways.
2. Conduit installation.
3. Underground requirements.

B. Related Requirements:

1. Section 26 05 00: Common Work Results for Electrical.
2. Section 26 05 13: Basic Electrical Materials and Methods.

C. Applicable Standards and Codes.

1. EIA/TIA 569 Standards.
2. National American Standards Institute (ANSI).
3. National Electrical Manufacturer's Association (NEMA).
4. Nationally Recognized Testing Laboratory (NRTL).
5. California Electrical Code (CEC).
6. Uniform Building Code (UBC).
7. Underwriters Laboratory (UL).

1.02 SUBMITTALS

- ###### **A. Materials List: Provide in accordance with Division 01.**

PART 2 - PRODUCTS

2.01 RACEWAYS

A. Conduit Materials:

1. Metallic conduit, and tubing shall be manufactured under the supervision of an UL, or another NRTL factory inspection and label service program. Each ten-foot length of conduit and tubing shall bear the UL or another NRTL label and manufacturer's name.



2. Rigid metallic conduit shall be rigid steel, heavy wall, mild steel, zinc-coated, with an inside and outside protective coating manufactured in accordance with ANSI C 80.1. Couplings, elbows, bends, conduits, bushings and other fittings shall be the same materials and finish as the rigid metallic conduit. Fittings, connectors, and couplings shall be threaded type, manufactured in accordance with ANSI C 80.1 and UL 6.
 3. Electrical metallic tubing shall be steel tubing, zinc-coated with a protective enamel coating inside, manufactured in accordance with NEMA C 80.3. Fittings, couplings, and connectors shall be gland compression type, set screw couplings and connectors not permitted. All parts shall be manufactured in accordance with NEMA C80.3 and UL 6A Electrical metallic tubing is designated hereinafter as EMT. Steel and rain tight fittings shall be approved and listed for the intended application.
 4. Flexible steel conduit shall be of flexible interlocking strip construction with continuous zinc coating on strips, manufactured in accordance with UL 1.
 - a. Connectors and couplings shall be required fittings of the type, which threads into convolutions of flexible conduit.
 5. Liquid-tight flexible metal conduit shall be galvanized heavy wall, flexible locked steel strip construction, UV rated, with smooth moisture and oil-proof, abrasion-resistant, extruded plastic jacket. Connectors shall be as required for installation with liquid-tight flexible conduit and shall be installed to provide a liquid-tight connection.
 6. Non-metallic conduit shall be rigid PVC electrical conduit extruded to schedule 40 dimensions of Type II. Grade 1 high impact, polyvinyl chloride, sweeps, couplings, reducers and terminating fittings shall be listed under the UL, or another NRTL, and shall bear the manufacturer's listed marking.
 7. Multi-cell raceway shall be four inch PVC, Type 40, UL or another NRTL listed for underground use with optical fiber and signal system cables. Raceway shall be furnished with 3-1/2 inch factory installed inner ducts with required internal spacers, and required couplers, sweeps, and end bells. Multicell raceway shall be Carlon Multigard, or District approved equal.
 8. Metal Clad (MC) cable system is not allowed.
- B. Sleeves for Conduits: Sleeves shall be adjustable type by Carlon, U.S. Plastic, PEP Plastic or equal.



C. Conduit Seal Fittings:

1. Provide conduit seal fittings where indicated on the Drawings. Conduit seals shall be of rigid galvanized steel. Seals in horizontal conduit installations shall be Thomas & Betts EYS, Appleton Type ESU, Crouse Hinds Type EYS, or equal. Seals in vertical conduit installations shall be Thomas & Betts EYD, Appleton Type SF, Crouse Hinds Type EYD, or equal, with continuous drain. When installing conduit seals make provision for percent fill space reduction in accordance with CEC.
2. Install sealing compound after wire has been installed. Ensure drain is not blocked in vertical seals when installing compound. Where conduit seals are installed in hazardous area applications, there shall be no conduit coupling, fitting, etc., between seal and boundary of hazardous area.

D. Factory Pre-Wired Surface Metal Raceway:.

1. Standard non-OEM wiring devices shall be used as specified.

PART 3 - EXECUTION

3.01 CONDUIT INSTALLATION

A. General Requirements:

1. Provide complete and continuous systems of rigid metallic conduit, outlet boxes, junction boxes, fittings and cabinets for systems of electrical wiring including lighting, power, and signal systems, except as otherwise specified.
2. EMT may be installed in interior concealed applications and in areas approved by owner. EMT shall not be installed in concrete, directly buried underground, outdoors, in boiler rooms, elevator pits, or where subject to damage.
3. Flexible Steel conduit shall not exceed 1-1/2 inches in size.
4. Liquid-tight flexible steel conduit shall only be installed, except where otherwise specified, for final connection of motor terminal boxes, shop equipment, cafeteria equipment, HVAC equipment and other equipment, or for frequent interchange, and shall be of sufficient length, not exceeding 36 inches, to permit full travel or adjustment of motor on its base. Liquid-tight flexible conduit shall not be used for equipment not requiring adjustment or frequent interchange.
5. Connectors for flexible metal conduit shall be made of steel, and of the types which threads into convolutions of conduit. Connectors for watertight flexible metal conduit shall be as required for installation and shall be installed to provide a watertight connection.
6. Exposed conduit shall be installed vertically and horizontally following the general configuration of the equipment, using cast threaded hub conduit fittings



where required and shall be clamped to equipment with suitable iron brackets and one hole pipe strap.

7. If connection is from a flush wall-mounted junction box, install an approved extension box.
8. Underground feeder distribution conduits for systems may be non-metallic conduit instead of rigid conduit except where otherwise specified or indicated.
9. Conduit shall be concealed unless otherwise indicated.
10. Bends or offsets will not be permitted unless absolutely necessary. Radius of each conduit bend or offset shall be as required by ordinance. Bends and offsets shall be performed with standard industry tools and equipment or may be factory fabricated bends or elbows complying with requirements for radius of bend specified. Heating of metallic conduit to facilitate bending is not permitted. Public telephone conduit bends and offsets shall be provided with a radius which is not less than ten times trade size of conduit unless otherwise permitted. Refer to underground installation, specified in this section, for radius of bends and offsets required for underground installations.

B. Underground Requirements:

1. Conduits and multicell raceways installed underground shall be entirely encased in three inch thick concrete on all sides , except where otherwise specified. Provide required spacers to prevent any deflection when concrete is placed and to preserve position and alignment. Conduits and raceways shall be tied to spacers. Anchors shall be installed to prevent floating of conduits and raceways during placing of concrete. Provide red colored concrete to encase conduits of systems operating above 600 volts.
2. Underground conduits and raceways shall be buried to a depth of not less than 24 inches below finished grade to top of the concrete envelope, unless otherwise specified.
3. Assemble sections of conduit with required fittings. Cut ends of conduit shall be reamed to remove rough edges. Joints in conduits shall be provided liquid-tight. Bends at risers shall be completely below surface where possible.
4. Conduits and raceways in a common trench shall be separated by at least three inches of concrete. Electrical power and/or lighting conduit runs installed in a common trench with conduits containing signal system wiring such as public address, telephone, intrusion detection, fire alarm, television, computer networking, and clock systems shall maintain a separation of a minimum of six inches from these types of signal system conduits and raceways. Electrical power, lighting and signal conduits and raceways installed in a common trench with other utility lines such as gas, water, sewer and storm lines shall maintain 12 inches separation from these types of utility lines.



5. Non-metallic conduit installations shall comply with following additional requirements. Joints in PVC conduit shall be sealed by means of required solvent-weld cement supplied by conduit manufacturer. Non-metallic conduit bends and deflections shall comply with requirements of applicable electrical code, except that minimum radius of any bend or offset for conduits sized from 1/2 inch to 1 1/2-inch inclusive shall not be less than 24 inches. Bends at risers and risers shall be PVC-coated rigid steel conduit. Radius of curve of bends or offsets in non-metallic conduit for public telephone system shall be not less than ten times trade size of conduit, unless otherwise specifically permitted.
6. Underground conduit systems provided for utility companies shall be furnished to meet the requirements of the utility companies requiring service.
7. Protect inside of conduit and raceway from dirt and rubbish during construction by capping openings.
8. Add bell-end bushings for conduit stub-up including underground entries to pull boxes, and manholes. Under floor standing switchboards and motor control centers provide a four-inch galvanized nipple with ground bushing.

3.02 STUBS

B. Underground:

1. Underground conduit stubs shall be terminated at locations indicated, and shall extend five feet beyond building foundations, steps, arcades, concrete walks and paving. Rigid metallic conduit stubs and non-metallic conduit stubs shall be capped by installing a coupling flush in end wall of concrete encasement and plugging with a permitted plug. Project record drawings shall indicate location of ends of underground conduit stubs fully dimensioned and triangulated with reference to buildings or permanent landmarks. These dimensions, including depth below finished grade, shall be marked on project record drawings in presence of the Inspector before backfilling trench. Where extending existing concrete encased stubs, clean, chip and wire brush end of existing concrete and brush on a heavy coat of neat cement paste or epoxy bonding agent.
2. Over ends of individual underground conduit stubs or groups of conduit stubs, install four-inch by 18-inch deep PVC filled with concrete, flush with finished grade in concrete, and two inches above finished grade in planting areas. Cast a three-inch by three-inch brass plate engraved "ELECT" flush in top of concrete. Secure plate to concrete with brass dowels or as indicated on drawings.

3.03 PROTECTION

- A. Protect the Work of this section until Substantial Completion.

3.04 CLEANUP

- A. Remove rubbish, debris and waste materials and legally dispose of off the Project site.



Department of Neighborhood Services and Public Safety
GOLETA TRAIN DEPOT PROJECT – SOUTH LA PATERA LANE

END OF SECTION - 26 0533



SECTION 26 24 16

PANELBOARDS

PART 1 - GENERAL

1.01 SUMMARY

- A. Section Includes: Lighting and power distribution facilities, including panelboards.
- B. Related Requirements:
 - 1. Division 01 - General Requirements.
 - 2. Section 26 05 00: Common Work Results for Electrical.
 - 3. Section 26 05 13: Basic Electrical Materials and Methods.
 - 4. Section 26 50 00: Lighting.

1.02 SUBMITTALS

- A. Provide in accordance with Division 01.
- B. Shop Drawings: Include a front elevation indicating cabinet dimensions, make, location and capacity of equipment, size of gutters, type of mounting, finish, and catalog number of locks. General layout of internal devices, wiring drawings with wire numbers and device connections, vendor cut sheets of devices in enclosure and bill of materials listing description, manufacturer, part number, and quantity of items shall be included.
- C. Installation Instructions: Submit manufacturer's written installation instructions.

1.03 DESIGN REQUIREMENTS

- A. Panelboards:
 - 1. Panelboards shall be enclosure-mounted, enclosed safety type with 120/240 volt, three-wire solid neutral 277/480 volt, four-wire or 120/208 volt, four-wire solid neutral mains as indicated on Drawings or specified. First panelboard of each building shall be provided with main or sub-feeder circuit breakers where so indicated.
 - 2. Single pole branches shall be molded case, thermal magnetic circuit breakers with inverse time delay, trip free, quick-make, quick-break mechanism and silver alloy contacts. Circuit breakers shall be fully rated, with ampere rating marked on handle and shall indicate on/off and tripped positions. Ground fault



interrupters shall be incorporated into circuit breakers where indicated. They shall be listed by UL, or other NRTL as ground fault devices. Provide appropriate lug kit of sufficient size to accommodate the feeders.

3. Two- and three-pole branches shall be enclosed, and shall be thermal magnetic circuit breakers with inverse time delay, tamper-proof, ambient compensated, single handle, internal common trip, and quick-make, quick-break mechanism with silver alloy contacts. Circuit breakers shall be fully rated or as otherwise indicated on the Drawings.
4. Main and subfeeder circuit breakers shall be enclosed, thermal magnetic type with inverse time delay, single handle common trip, quick-make, quick-break mechanism, corrosion-resistant bearings and silver alloy contacts. Ampere frame size and trip rating shall be as indicated on Drawings. Breakers over 225 amperes shall be furnished with interchangeable trip units. Handles of main and subfeeder circuit breakers shall be provided cabinet door. Voltage rating shall be as indicated on Drawings.
5. Circuit breakers shall be fully rated and of one-piece, bolt-on type and shall meet short-circuit interrupting capacity requirements indicated on Drawings. Series rated circuit breaker combinations are not acceptable.
6. Internal connections shall be fabricated with plated copper bus bars and the busses shall extend for full length of space available for branch circuit breakers. Feeder cable connectors shall be installed at point of feeder entrance. Terminals shall be furnished with copper conductors. Panelboards fed by conductors having over-current protection greater than 200 amperes shall be protected on supply side by over-current devices having a rating not greater than that of panelboards. Copper bussing shall be fully rated. Heat rated bussing is not acceptable.
7. Except where otherwise indicated, circuit breakers shall be in two vertical rows connected to bus bars in a distributed phase arrangement. Two-pole branches shall be balanced on busses. Single pole branches shall be numbered adjacent to its circuit breaker, with odd numbers on left and even numbers on right.
8. Specified circuit breaker spaces shall be furnished with hardware required for future installation of circuit breakers.
9. Provide locking devices for individual circuit breakers. Padlocking devices shall be secured to circuit breakers and by panel dead front plates.

B. Panelboard Cabinets:

1. Panelboard cabinets shall be code gage galvanized steel or blue steel; fronts, doors, and trims shall be code gage furniture steel. Cabinets shall be furnished



- with at least six-inch high gutters at top and bottom where feeder cable size exceeds four gage or where feeder cable passes through cabinet vertically. Cabinets shall be furnished with top and bottom gutters sized as required by inspection department having jurisdiction, but never less than six inches where more than one feeder enters top or bottom of cabinets. Side gutters shall not be less than four inches wide. Width of cabinets shall be 20 inches, unless otherwise indicated on Drawings.
2. Doors shall be cut true, shall accurately fit opening and finish smooth across joints. Rabbets shall be inside. Hinges shall be entirely concealed except for barrels and pins. Hinge flanges shall be welded to door and trim. Doors shall be equipped with flush type, spring-latching, Corbin locks for metal doors, keyed to Corbin No. 60 keys.
 3. Where contactors, time switches, and control devices are specified or indicated to be installed within panelboard cabinets, a separate compartment and door shall be provided at top of cabinet for such devices. Door shall be sized as required to permit removal of contactor and other devices intact. Gutters shall be provided at sides and top of compartment. Doors shall be equipped with flush type, spring-latching, Corbin locks for metal doors keyed to Corbin No. 60 keys.
 4. Provide and install panelboard manufacturer's permanent circuit number kit option.
 5. Panelboards with control devices in compartment shall arrive at the Project site completely assembled with control devices installed and wired.
- C. Panelboard Schedule: Provide a neatly typewritten schedule with number or name of room or area, or load served by each panelboard circuit. Room numbers or names shall be determined at the Project site and shall not necessarily be those indicated on the Drawings. Schedule shall also indicate panel designation, voltage and phase, building and distribution panel or switchboard from which it is fed. Schedule shall be installed in a frame under transparent plastic 1/32 inch thick on inside of each panelboard cabinet door.
- D. Panelboard nameplate: Provide a nameplate identifying panelboard. Plates shall be black and white plastic nameplate stock, with character cut through black exposing white and shall bare designation of service. Name plate shall be mechanically fastened to switchboard.
- E. Provide additional labeling on dead-front of panelboard. Label shall be a P-Touch or equal with a minimum width of 3/8 inch with black letters on white background. Label shall re-identify panelboard and also identify name and location of power source feeding this panel. Location information shall include building name if located in different



building and name or room location. If power source is installed in same room, label should indicate source name and “In this Room”

- F. Panelboard Standards: Panelboards shall be UL, or other NRTL listed and labeled. Panelboards shall meet latest revisions of following standards:
1. California Electric Code, Article 384.
 2. UL 67, Panelboards.
 3. UL 50, Cabinets and Boxes.
 4. UL 943, GFCI.
 5. UL 489, Molded Case Circuit Breakers.
 6. NEMA PB1.
 7. Federal Specifications W-P- 115C and WC-375B.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Panelboards shall be manufactured by Siemens, W.A. Benjamin, General Electric, Cutler Hammer, Square D or equal.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Panelboards shall be located so they are readily accessible and not exposed to physical damage.
- B. Panelboard locations shall provide sufficient working space around panels to comply with the California Electrical Code.
- C. Panelboards shall be securely fastened to structure and mounted on surface by at least four points.
- D. Unused openings in cabinets shall be effectively closed as required by the manufacturer.
- E. Cabinets shall be grounded as specified in Article 250 of the California Electrical Code.



- F. Conduits shall be installed so as to prevent moisture or water from entering and accumulating within the enclosure.
- G. Lugs shall be suitable and listed for installation with the conductor being connected.
- H. Conductor lengths shall be maintained to a minimum within the wiring gutter space. Conductors shall be long enough to reach the terminal location in a manner that avoids strain on the connecting lugs.
- I. Maintain the required bending radius of conductors inside the cabinet.
- J. Clean the cabinet of foreign material such as cement, plaster, and paint.
- K. Distribute and arrange conductors neatly in the wiring gutters.
- L. Use the manufacturer's torque values to tighten lugs.
- M. Before energizing panelboards, the following steps shall be taken:
 - 1. Retighten connections to the manufacturer's torque specifications. Verify that required connections have been provided.
 - 2. Remove shipping blocks from component devices and panelboard interiors.
 - 3. Manually exercise circuit breakers to verify they operate freely.
 - 4. Remove debris from panelboard interior.
- O. Follow manufacturer's instructions for installation.
- P. Do not install in highly corrosive environments, unless rated for the application.

3.02 PROTECTION

- A. Protect the Work of this section until Substantial Completion.

3.03 CLEANUP

- A. Remove rubbish, debris, and waste materials and legally dispose of off the Project site.

END OF SECTION – 26 0800



SECTION 26 50 00

LIGHTING

PART 1 – GENERAL

1.01 SECTION INCLUDES

- A. Lighting fixtures.
- B. Fixture mounting hardware.
- C. Lamps.
- D. Lighting control equipment.
- E. Source quality control.
- F. Standard fixtures.

1.02 RELATED SECTIONS

- A. Lighting control panel boards (addressable panels) are specified in Section 26 09 26, Lighting Control Systems.
- B. Refer to Section 26 05 00, Common Work Results for Electrical.

1.03 REFERENCES

- A. American National Standard Institute (ANSI):
 - 1. ANSI C136 Series Standards for Roadway and Area Lighting Equipment
 - 2. ANSI C82.77-5 Lighting Equipment – Voltage Surge Requirements
 - 3. ANSI/AISC 360 Specification for Structural Steel Buildings
- B. American Society for Testing and Materials (ASTM):
 - 1. ASTM A123/A123M Standard Specification for Zinc (Hot-Dip Galvanized) Coating on Iron and Steel Products
 - 2. ASTM A1008/A1008M Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low Allow with Improved Formability, Solution Hardened, and Baked Hardenable.



- C. DesignLights Consortium (DLC)
- D. Environmental Protection Agency (EPA)
- E. International Dark Sky Association (IDA)
- F. Illuminating Engineering Society of North America (IES):
 - 1. IES Lighting Handbook, Reference and Application
 - 2. LM-79 Optical and Electrical Measurements of Solid State Lighting Products
 - 3. LM-80 Measuring Luminous Flux and Color Maintenance of LED Packages, Arrays, and Modules
 - 4. TM-21 Projecting Long-Term Lumen, Photon, and Radiant Flux Maintenance of LED Light Sources
- G. Institute of Electrical and Electronics Engineers, Inc. (IEEE):
 - 1. IEEE C62.41.1 IEEE Guide on the Surge Environment in Low-Voltage (1000 V and less) AC Power Circuits
 - 2. IEEE C62.41.2 IEEE Recommended Practice on Characterization of Surges in Low-Voltage (1000 V and less) AC Power Circuits
- H. National Electrical Manufacturers Association (NEMA):
 - 1. NEMA C81 Series Electric Lamp Bases and Holders
 - 2. NEMA WD7 Occupancy Motion Sensors Standard
- I. National Fire Protection Association (NFPA):
 - 1. NFPA 1 Fire Code
 - 2. NFPA 70 National Electrical Code
 - 3. NFPA 101 Life Safety Code
- J. Underwriters Laboratories Inc. (UL):
 - 1. UL 94 Standard for Safety Tests for Flammability of Plastic Materials for Parts in Devices and Appliances



2. UL 496 Standard for Safety Lampholders
3. UL 508 Standard for Safety Industrial Control Equipment
4. UL 773 Standard for Safety Plug-In, Locking Type Photocontrols for Use with Area Lighting
5. UL 916 Standard for Safety Energy Management Equipment
6. UL 1598 Standard for Safety Luminaires
7. UL 8750 Standard for Safety of Light Emitting Diode (LED) Equipment for use in Lighting Products

1.04 REGULATORY REQUIREMENTS

A. Federal Communications Commissions (FCC):

1. Title 47 Rules and Regulations

B. California Code of Regulations (CCR):

1. Title 8 Industrial Relations
2. Title 22 Social Security
3. Title 24, Part 2 California Building Code
4. Title 24, Part 3 California Electrical Code
5. Title 24, Part 6 California Energy Code
6. Title 24, Part 11 California Green Buildings Standards Code

1.05 SUBMITTALS

A. Refer to Section 01 33 00, Submittal Procedures, and Section 01 33 23, Shop Drawings, Product Data, and Samples, for submittal requirements and procedures.

B. Submit product data including the following:

1. Catalog sheets and specifications
2. Ratings, configurations, wiring diagrams, dimensions, service conditions, options



and features

3. Table matrix showing the specification requirement and the product data showing specifications are met
- C. Submit Shop Drawings including the following:
1. Single line, schematic, block, and wiring diagrams
 2. Equipment layout of lighting system components
 3. Plan view details and component topologies
 4. Photometric drawings and network riser diagrams
 5. Luminaire marking and labeling
- D. Installation procedures: Include tools and materials list, mounting templates, and dimensions.
- E. Calculations:
1. Lighting photometric analysis shall reference the IES recommended calculations using a lighting software tool. Report shall include the following:
 - a. Calculations at L70 and another at initial lumens.
 - b. Lighting fixture schedule shall include symbol, quantity, arrangement, lighting loss factor (LLF), manufacturer and luminaire name, luminaire type, wattage, color correlated temperature (CCT), house shield if any, distribution type, color rendering index (CRI).
 - c. Calculation areas shall include visible lighting luminaire pattern, area dimensions, and calculation points.
 - d. Calculation and statistical summary shall be separate for each area as indicated. Each statistical area shall be highlighted differently.
 - e. Rendering view of calculated areas.
 - f. Contract number and title, Contractor name, revision, date.
 - g. Surface reflectance.
 2. Submit details of lighting pole, foundation, and anchorage with supporting loads and structural design calculations.
 3. Submit details of luminaire mounting and bracket with supporting loads and structural design calculations.
- F. Submit test reports including the following:



1. Certified test reports of factory and field tests performed.
 2. Title 24 Acceptance Testing Documentation in accordance to Title 24, Part 6, as indicated.
 3. Seismic analysis report.
 4. LM-79, LM-80, and TM-21.
 5. Testing and Commissioning Testing Results.
- G. Manufacturer's certificates: Include certificate ensuring products meet or exceed specified requirements.
- H. Submit the operation and maintenance manual, in accordance with Section 01 78 23, Operation and Maintenance Data, including the submittal items mentioned above and the following:
1. Sequence of operation
 2. Preventive maintenance procedure
 3. Spare parts list and ordering form
 4. Troubleshooting guide for common issues

1.06 *LABELING*

- A. Lighting fixtures, light poles, lighting control equipment shall be labeled. Labelling shall be approved by the Engineer.
- B. Luminaire labeling information shall include panel and circuit number, and contract number.

1.07 *NAMEPLATE*

- A. Mark fixtures clearly with manufacturer's name, voltage, wattage, UL listings.

1.08 *DELIVERY HANDLING AND STORAGE*

- A. Deliver luminaires and lighting equipment to the Jobsite complete with related items, completely wired and assembled.



PART 2 – PRODUCTS

2.01 LIGHT EMITTING DIODE (LED) LIGHTING

A. LED Luminaire

1. LED fixture requirements are as described below:

- a. The LED fixture shall consist of LED lamps, driver, assembly, and mounting hardware.
- b. Each fixture shall have its own LED driver. LED drivers shall be placed within LED fixture, unless otherwise specified.
- c. Input voltage and frequency: 120 VAC to 277 VAC plus or minus 10 percent, 60Hz.
- d. Efficacy: as indicated.
- e. NEMA Rating: as indicated.
- f. Brightness and glare: Lighting systems shall be free from distracting and uncomfortable glare.
- g. Warranty: minimum 5 years.
- h. Cooling System: Cooling system shall not have fans, pumps, or liquids and shall be resistant to debris and dust buildup.
- i. LED fixtures shall be rated for Class I Division II Hazardous Locations, as indicated.
- j. Lens: as indicated.
- k. Shields: as indicated.
- l. LM-80 and TM-21 shall be used to determine lifespan outside L70 controlled lab settings.
- m. Outdoor LED Luminaires shall comply with Title 24 Part 6 – 130.2(b) for luminaire cutoff requirements.
- n. Fixture shall be UL Listed.

B. LED lamp

1. LED lamp requirements are as described below:

- a. Definition: LED lamp Assembly is the LED assembly without LED driver.
- b. Correlated Color Temperature (CCT): 3000K to 3500K indoor, 4000K to 4500K outdoor and tunnels.
- c. Color Rendering Index (CRI): greater than or equal to 80, except for parking lots where it shall be greater than or equal to 70.
- d. Operating hours shall be determined by LM-80 and TM-21. Reported L70 hours shall be minimum 50,000 hours.
- e. Difficult access areas such as on top of escalators and stairs shall have reported L70 of 60,000 hours, minimum.

C. LED Driver General Requirements:



1. LED driver general requirements as described below:
 - a. Input voltage: 120 VAC to 277 VAC (plus or minus 10 percent).
 - b. Frequency: 60Hz.
 - c. Operating temperature: minus 20 degrees Celsius to plus 50 degrees Celsius.
 - d. Minimum efficiency: 85 percent.
 - e. Driver shall be dimmable.
 - f. LED dimmable driver requirements are as described below:
 - 1) There shall be no visible change in light output with a variation of plus or minus 10 percent line voltage input.
 - 2) Driver shall provide step-free, continuous dimming from 100 percent to 10 percent; and shall respond similarly when rising from 10 percent to 100 percent.
 - 3) LED dimming driver shall provide continuous step-free, flicker free dimming over the operating range, with “Fail-Safe” 0 to 10 V dimming standard.
 - g. Driver shall be self-protected, including surge protection and short circuit protection and shall comply with ANSI or IEEE standards.
 - h. Comply to FCC CFR, Title 47, Section 15.
 - i. LED driver shall have a minimum of 50,000 operating hours under warranty.
 - j. Power Factor (PF) greater than or equal to 0.90.
 - k. Each fixture shall have its own LED driver. LED drivers shall be placed within LED fixture, unless otherwise specified.

2.02 FIXTURE MOUNTING HARDWARE

A. Requirements:

1. Luminaire mounting hardware shall be in accordance to the luminaire manufacturer’s recommended requirements.
2. When exposed to public view, fabricate and finish hardware in material matching the fixture body.

B. Light poles:

1. Provide the type, configuration, and dimensions indicated. Light pole shall resist wind loads in accordance with the California Building Code,. Maximum deflection of pole shall be five percent when fully loaded. Furnish poles as indicated with handhole and flush cover with tamper proof screw and grounding stud, luminaire mounting tenon/bracket, base cover and mounting hardware including anchor bolts, nuts, washers, and baseplate to permit accurate alignment and installation of pole and luminaire as indicated. Light pole anchor bolt covers shall have tamper



proof screw.

2. Light pole ladder and safety cable shall conform to CCR Title 8, Industrial Relations, Division 1, Chapter 4, Subchapter 7, Group 1, Article 4, Section 3277(m), Ladder Safety Systems, and CAL/OSHA.

2.03 SOURCE QUALITY CONTROL

- A. The lighting fixture to be tested shall be typical of the unit it represents, clean and free from mechanical defects, equipped with the proper fittings, and with the lamp of the size and type in the position recommended for service operation.
- B. Test UL-listed material, equipment, and components in accordance with UL standards. Test material, equipment, and components not covered by UL standards in accordance with nationally recognized standards. Provide material, equipment, and components bearing a label tag or certification of such inspection.
- C. Perform and report tests for photometric performance in accordance with the approved methods outlined by the IES Lighting Handbook for photometric testing, and include data on candlepower, distribution, zonal lumens, maximum luminance values, and luminaire efficiency, including complete coefficients of utilization tables to indicate compliance with performance requirements.
- D. Test data shall be reported on 8-1/2 inch by 11-inch sheets and shall be certified by a nationally recognized independent testing laboratory.

2.04 SPARE PARTS

- A. General: Refer to Section 01 78 44, Spare Parts and Maintenance Materials, for spare part requirements.
- B. Luminaire: Furnish 2 percent of each style of lighting luminaire, or a minimum of 5 each, whichever is greater.
- C. Light Poles: Furnish 1 percent of each style of light pole assembly, or a minimum of 2 each, whichever is greater.

PART 3 – EXECUTION

3.01 INSTALLATION OF LIGHTING FIXTURES

- A. Install lighting fixtures as indicated and in accordance with the manufacturer's installation instructions and recommendations, complete with lamps, hangers, brackets, poles, fittings, and accessories, ready for operation.



B. Align, mount, and level lighting fixtures uniformly.

Avoid interference with, and provide clearance for, the equipment. Where the indicated locations for the lighting fixtures conflict with the locations for other equipment, change the locations for the lighting fixtures by the minimum distances necessary and as approved by the Engineer.

C. Where aluminum is placed in contact with dissimilar materials, except galvanized steel, zinc, and stainless steel, treat contact surfaces as follows:

1. Dissimilar metals: Apply a prime coat of zinc chromate primer followed by two coats of aluminum and masonry paint.
2. Concrete, masonry, and plaster: Apply zinc chromate primer, bituminous paint, aluminum and masonry paint, or pressure-sensitive tape to aluminum contact surfaces.

D. Provisions for coating and electrically isolating aluminum and stainless steel, or any other dissimilar metals in contact, when exposed to salt water, water immersion, or burial shall be provided.

E. Welding:

1. Locate welds in assemblies to be anodized so as to conceal visible discoloration in the heat-affected zone.
2. Where weld metal will be exposed after anodizing, select filler alloys to closely match composition of base metal. Follow manufacturer's recommendations for such filler alloys.

F. Install fixtures to be pole-mounted in accordance with the manufacturer's installation instructions.

3.02 INSTALLATION OF DRIVERS

A. Install drivers, other than those mounted integrally within luminaries, in such a manner that the driver is protected from weather, moisture, and other atmospheric conditions, and in ambient temperatures that will not cause the temperature of the driver housing hot-spot to exceed UL requirements.

B. Voltage drop to lamp, due to remote driver mounting, shall not exceed one percent of the nominal lamp voltage. Provide secondary driver conductors with 600 V insulation. When more than one driver is mounted at one location, the minimum spacing between driver shall be 6 inches in a horizontal direction and 12 inches in a vertical direction. Mount driver components securely in such a manner as to obtain



the necessary heat dissipation.

3.03 INSTALLATION OF LIGHT POLES

- A. Determine surface and structure load ratings prior to installation of equipment.
- B. Install light poles as indicated and in accordance with the manufacturer's installation instructions and recommendations. Light poles shall be grounded as indicated on the Contract Drawings.

3.04 CONCRETE BASES

- A. Provide necessary templates and anchor kits before starting work, and coordinate installation of anchors in concrete with the work specified under Division 3 – Concrete (Train Depot Package).

3.05 FIELD QUALITY CONTROL

- A. Inspect luminaries, lamps, and associated hardware before and after installation to ensure that they are of the quality and type specified and indicated, and are free of defects and damage.
- B. Whenever practicable, test lighting systems at the same time that the distribution panelboard or switchboard is tested.
- C. Replace lamps that fail within 90 Days after final acceptance without additional cost to the District.
- D. Test light poles for continuity to the grounding system.
- E. Inspect lighting fixtures, light poles, and lighting control equipment for labelling.

3.06 TESTING AND COMMISSIONING

- A. Contractor shall test and commission installed system per testing and commissioning procedures.
 - 1. Provide checklist of individual lighting fixtures with verification that lighting fixtures are functioning.
 - 2. Provide lighting level measurements per IES or as indicated in Contract Drawings.

END OF SECTION – 26 5000



SECTION 31 1000

SITE CLEARING

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

1. Removal of vegetation, grass, grass roots, shrubs, tree stumps, trees, upturned stumps, weed growth, tree roots, brush, masonry, concrete, rubbish, debris and other materials.
2. Removal of concrete and bituminous surfaces.
3. Removal of existing fences and gates.

B. Related Requirements:

1. Division 01 - General Requirements.
2. Section 31 2200 - Grading.
3. Section 31 2300 - Earthwork.
10. Caltrans Standard Specification Division III - Earthwork and Landscape, Section 17 – General
11. Caltrans Standard Specification Division III - Earthwork and Landscape, Section 18 – Dust Palliatives
12. Caltrans Standard Specification Division III - Earthwork and Landscape, Section 19 – Earthwork
13. Caltrans Standard Specification Division IV – Subbases and Bases, Section 23 – General
14. Caltrans Standard Specification Division IV – Subbases and Bases, Section 26 – Aggregate Bases

1.02 SUBMITTALS

- ###### A. Shop Drawings: Submit site plan indicating extent of site clearing.

1.03 QUALITY ASSURANCE

- ###### A. Comply with Caltrans Standard Specifications, current edition, as a minimum requirement.



PART 2 - CALTRANS STANDARD SPECIAL PROVISIONS (SSPs)

- A. Replace the 4th paragraph in section 17-2.03A with:
Clear and grub vegetation only within the excavation and embankment slope lines.

PART 3 – PROJEC SPECIFIC PROVISIONS

3.01 TREE AND STUMP REMOVAL

- A. Remove trees and stumps indicated or required to be removed. Remove trees, together with bulk of roots, to a minimum depth of 4 feet below required grade, and within a radius of approximately 7 feet beyond perimeter of trunk at grade.
- B. Fill and compact excavation from tree and stump removal. Fill in 6 inch layers, each compacted to 90 percent of maximum density in accordance with ASTM D1557.
1. Back filling shall not commence until the excavation is inspected and tested.

3.02 CONCRETE AND BITUMINOUS SURFACING REMOVAL

- A. Break up and completely remove existing concrete surfacing, curbs, gutters, walks and bituminous surfacing to indicated limits. Cutting shall be performed to a neat and even line with proper tools or a concrete cutting saw. Minimum depth of cut shall be 1 1/2-inch, unless otherwise indicated. Remove concrete broken beyond the indicated limits to the nearest joint or score line and replace with new concrete to match existing.

3.04 CLEANUP

- A. Remove rubbish, debris and waste materials and legally dispose of off the Project site.

PART 4 – MEASUREMENT AND PAYMENT

- A. Measurement and payment must conform to Caltrans Standard Specifications.

END OF SECTION – 31 1000



SECTION 31 2200

GRADING

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

1. General exterior grading, cutting and filling, including grading for concrete and paving improvements.

B. Related Requirements:

1. Division 01 - General Requirements.
2. Section 31 1000 - Site Clearing.
3. Section 31 2300 - Earthwork.
4. Section 31 2316 – Trenching Backfill and Compaction
5. Section 32 1116 – Aggregate Base.
6. Section 32 9000 - Planting.
7. Caltrans Standard Specification Division III - Earthwork and Landscape, Section 18 – Dust Palliatives
8. Caltrans Standard Specification Division III - Earthwork and Landscape, Section 19 – Earthwork
9. Caltrans Standard Specification Division IV – Subbases and Bases, Section 23 – General
10. Caltrans Standard Specification Division IV – Subbases and Bases, Section 26 – Aggregate Bases

1.02 PROJECT REQUIREMENTS

A. General:

1. Fees: Pay as required by authorities having jurisdiction over the area.
2. Bonds: Post as required by authorities having jurisdiction over the area.
3. Haul Routes and Restrictions: Comply with requirements of authorities having jurisdiction over the area.



4. Before grading, contact Underground Service Alert of Southern California (USASC) for information on public buried utilities and pipelines. Retain the services of an underground utility locator for on-site utilities.

PART 2 - CALTRANS STANDARD SPECIAL PROVISIONS (SSPs)

- A. Replace the 2nd, 3rd, and 4th paragraphs of section 19-2.03B with:

Dispose of surplus material. Ensure enough material is available to complete the embankments before disposing of it.

PART 3 – PROJECT SPECIFIC PROVISIONS

3.01 PREPARATION

- A. Protect and maintain installed stakes until their removal is required for the Work. Provide replacement grade or location stakes lost or disturbed.
- B. Install grade stakes and compare to indicated grades. If discrepancies are found between existing grades and grades indicated on Drawings, do not proceed until discrepancies are resolved.

3.02 ROUGH AND FINE GRADING

- A. Rough grade area sufficiently high to require cutting by fine grading:
 1. Grade area for bituminous surfacing and other paving to the indicated grades, equal to the section of the indicated base and pavement.
 2. Slope banks to required finish grades as cut progresses or leave cuts full and finish grade by mechanical equipment to provide grades and soil densities indicated on the Drawings.
 3. Rough grade, fill and compact banks beyond indicated finish grades. Finish grade banks and slopes to indicated grades and specified soil densities.
 4. Grade Only Areas: In areas not indicated to receive pavement, rough grade to approximate finish grades and then scarify, moisten and roll to obtain required density and indicated finish grades.

3.03 SHORING

- A. Provide shoring as necessary to properly and safely support earth sides of excavations, and existing curbs, sidewalks, gutter, drives and stairs, against movement and collapse.
- B. Design and Calculations: Provide in accordance with requirement of CalOHSA.



- C. Remove shoring upon completion of the Work of this section or when no longer needed unless required otherwise by authorities having jurisdiction.

3.04 EXCESS MATERIAL DISPOSAL

- A. Remove rubbish, debris, and waste materials and legally dispose of off the Project site.

3.05 PROTECTION

- A. Protect the Work of this section until Substantial Completion.

PART 4 – MEASUREMENT AND PAYMENT

- A. Measurement and payment must conform to Caltrans Standard Specifications.

END OF SECTION – 31 2200



SECTION 31 23 00

EARTHWORK

PART 1 – GENERAL

1.01 DESCRIPTION OF WORK

- A. Earthwork shall conform to the provisions in Section 19, “Earthwork,” of the Caltrans Standards and the Technical Specifications.
- B. Valve boxes, manhole covers, and drainage structures within the limits of any grading operation shall be adjusted to proposed finish grade.
- C. Embankment materials shall be free from organic and otherwise deleterious materials and as provided in Section 19, “Earthwork,” of the Caltrans Standards.
- D. Surplus excavated material shall become the property of the Contractor and shall be disposed of outside the right-of-way in conformance with Federal, State, and local regulations.

PART 2 – PRODUCT

2.01 IMPORTED SOIL

- A. Import materials shall have a liquid limit of 25 or less, a plasticity index of 12 or less, and be well graded with no greater than 30 percent of the particles passing the No. 200 sieve and no particles greater than 6 inches in maximum dimension. Import materials shall be non-corrosive in accordance with the following corrosive limits as provided in Section 8.1 of the Caltrans Corrosion Guidelines, Version 2.0, 2012:
 - Minimum resistivity must be greater than 2000 ohm-cm, CT 643
 - Chloride concentration must be less than 250 ppm, CT 422
 - Sulfate concentration must be less than 500 ppm, CT 417
 - pH must be between 5.5 and 10.0, CT 643

PART 3 – EXECUTION

3.01 HAZARDOUS WASTE IN EXCAVATION

- A. If the Contractor encounters hazardous waste in excavation, as defined by Section 25117 of the Health and Safety Code, the Contractor shall immediately notify the Engineer in writing. Excavation in and around the suspected hazardous material shall be suspended until the Engineer authorizes it to be resumed. The limits of excavation shall be as directed



by the Engineer. If such suspension delays the current controlling operation, the Contractor will be granted an extension of time as provided the Special Provisions.

- B. If such suspension delays the current controlling operation more than 2 working days, the delay will be considered a right-of-way delay and the Contractor will be compensated for each such delay as provided in the Special Provisions.
- C. The City of Goleta reserves the right to use other forces for exploratory work to identify and determine the extent of such material and for removing hazardous material from such area.
- D. If hazardous material is encountered the contractor shall mobilize employees with the herein designated safety and remediation training within 24 hours of the Contractor, the City or third party determining a hazardous or contaminated soils condition exists in an excavation. The contractor shall have the trained employees available prior to the start of any hazardous material excavation and at the direction of the Engineer, the Contractor shall include a hazmat training as a scheduled task in the Contract Schedule. No additional working days shall be granted for the contractor's inability to provide and mobilize trained workers within the 24 hour time limit.
- E. The employees shall be trained through an OSHA approved Hazardous Waste Operations and Emergency Response Standard (Hazwoper) 40 Hour Training class or have a Hazwoper refresher course within one year prior to the date the work is to be performed; and possess a certificate showing successful completion of the Hazwoper training. OSHA accepted Hazwoper training shall conform to all Federal, State, and Local requirements (including those specified in 29 CFR 1910.120. In addition, workers shall have additional hands-on training in use of the Personal Protective Equipment (PPE) required for their jobsite(s) in accordance with 29 CFR 1910.120.
- F. Voids resulting from excavation of hazardous material shall be backfilled in accordance with Section 19-3, "Structure Excavation and Backfill," of the Caltrans Standards and as specified in the Technical Specifications. Backfill material shall comply with Section 2.01, "Imported Soil," above.
- G. Measurement and payment for removal of hazardous waste in excavation, including training, obtaining any necessary permits, testing and analysis, disposal, and relevant disposal fees will be made in accordance with the Special Provisions.

3.02 STRUCTURE EXCAVATION AND BACKFILL

- A. Structure excavation and backfill shall conform to the provisions in Section 19-3, "Structure Excavation and Backfill," of the Caltrans Standards and as specified in the Technical Specifications.
- B. All structural backfill shall be of the type indicated and placed to the limits shown on the plans. For all subgrade of structural backfill a relative compaction of not less than 95 percent shall be obtained for a minimum depth of 6 inches below the bottom of excavation.



- C. Placement of structural backfill shall comply with Section 19-3.02C, “Structure Backfill,” of the Caltrans Standards except that compaction shall not be performed by ponding or jetting.
- D. Excavating by blasting will not be allowed.
- E. Shoring, lagging, or other bracing shall be designed, furnished, and placed by the contractor to adequately support the excavation.
- F. Steel shoring, steel and timber lagging, and other steel bracing may remain in place, subject to the following requirements:
 - 1. The amount of bracing remaining in place shall not exceed the practical minimum that is necessary to safely support the sides of the excavation.
 - 2. Bracing shall be placed in an open type arrangement with ample clearance between adjacent braces to permit the ready flow of concrete around the bracing and provide proper clearance to the reinforcement.

3.03 TRENCH EXCAVATION AND BACKFILL

- A. Excavating and backfilling for trenches shall conform to the provisions in Section 87-1.03B(3), "Conduit Installation Underground," of the Caltrans Standards.
- B. Open trenches and excavations shall be covered or barricaded to protect pedestrians and vehicles in accordance with Section 01 55 26, “Traffic Control and Access,” of the Technical Specifications. Following excavation Contractor shall minimize exposure of public to open trenches.
- C. All surplus excavation, from whatever source, shall be disposed of outside the right of way in conformance with Federal, State, and local regulations.

3.04 TESTING EXCAVATED MATERIAL

- A. Excavated soil may be tested for potential use as fill material in compliance with Section 2.01, “Imported Soil,” above. Contractor shall submit test results prior to placement. Where excavated soil is compliant Contractor shall stockpile or place excavated soil as required. Stockpiling of compliant excavated soil shall remain within limits of work or designated offsite area.

3.05 IMPORTED SOIL AS BACKFILL

- A. Where excavated soil is insufficient or does not meet soil requirements for backfill Contractor shall import suitable backfill material complying with Section 2.01, “Imported Soil,” above.

PART 4 – MEASUREMENT AND PAYMENT



4.01 MEASUREMENT

- A. No separate measurement will be made for the requirements of this section, unless otherwise stated.

4.02 PAYMENT

- A. Unless otherwise stated full compensation for complying with the requirements of this section shall be considered as included in the contract prices paid for the various items of work involved, unless otherwise stated, and no additional compensation will be allowed therefore.

END OF SECTION – 31 2300



SECTION 31 23 16

TRENCHING, BACKFILL AND COMPACTION

PART 1 – GENERAL

1.01 REQUIREMENTS

- A. The Contractor shall perform all earthwork and trenching operations indicated and required for construction of the work, provide advance notification of the affected residents, perform preparation work. The Contractor shall secure all necessary permits to complete the requirements of this Section of the Specifications.

1.02 RELATED WORK SPECIFIED ELSEWHERE

Section 01 55 26 – Traffic Control & Access

1.03 CONTRACTOR SUBMITTALS

- A. Where shoring is required the Contractor's attention is directed to the provisions for "Shoring and Bracing Drawings" in Section 6705 of the California Labor Code. The Contractor, prior to beginning any trench or structure excavation 5 feet deep or over shall submit to the City and shall be in receipt of the City's written acceptance of the Contractor's detailed plan showing design of all shoring, bracing, sloping of the sides of excavation, or other provisions for worker protection against the hazard of caving ground during the excavation of such trenches or structure excavation. If such plan varies from the shoring system standards established in the Construction Safety Orders of the State of California, such alternative systems plans shall be prepared by a civil or structural engineer licensed in the State of California.
- B. The Contractor shall submit a copy of the excavation permit issued by the California Department of Industrial Safety.
- C. The Contractor shall submit samples of all materials to be used in the work in accordance with the requirements in Section 01 33 00.
- D. Submit CLSM mix designs which show the proportions and gradations of all materials proposed for each type of CLSM indicated. Each mix design shall be accompanied by independent laboratory test results of the indicated properties.

1.04 CONTRACTOR SUBMITTALS

- A. It shall be the sole responsibility of the Contractor to control the rate and effect of the dewatering in such a manner as to avoid all objectionable settlement and subsidence.



All dewatering operations shall be adequate to assure the integrity of the finished project and shall be the responsibility of the Contractor.

- B. Where critical structures or facilities exist immediately adjacent to areas of proposed dewatering, reference points shall be established and observed at frequent intervals to detect any settlement which may develop. The responsibility for conducting the dewatering operation in a manner that will protect adjacent structures and facilities rests solely with the Contractor. The cost of repairing any damage to adjacent structures and restoration of facilities shall be the responsibility of the Contractor.
- C. At the option of the City inspector, asphalt mix, subgrade, aggregate base course, and asphalt pavement may be tested by the City's testing laboratory and paid for by the City in accordance with Section 014200 – Reference Standards. Sample sizes shall be as determined by the testing laboratory.

PART 2 – PRODUCTS

2.01 SUITABLE FILL AND BACKFILL MATERIAL REQUIREMENTS

- A. **General:** Fill, backfill, and embankment materials shall be suitable selected or processed clean, fine earth, rock, or sand, free from grass, roots, brush, or other vegetation.
- B. Fill and backfill materials to be placed within 6 inches of any structure or pipe shall be free of rocks or unbroken masses of earth materials having a maximum dimension larger than 3 inches.
- C. **Suitable Materials:** Materials not defined as unsuitable in Section 2.3 shall be reviewed by the City and may be used in fills, backfilling, and embankment construction subject to the indicated limitations and at the City's discretion. In addition, when acceptable to the City, some of the material listed as unsuitable may be used when thoroughly mixed with suitable material to form a stable composite.
- D. Suitable materials may be obtained from on-site excavations (if applicable), may be processed on-site materials, or may be imported. If imported materials are required by this Section or to meet the quantity requirements of the project, the Contractor shall provide the imported materials at no additional expense to the City, unless a unit price item is included for imported materials in the bidding schedule.
- E. The following types of suitable materials are defined:
 - 1. **Type A (three-quarters inch minus granular backfill):** Crushed rock or gravel, and sand with the gradation requirements below. The material shall have a minimum sand equivalent value of 28 and a minimum R-value of 78. If the sand equivalent value exceeds 35 the R-value requirement is waived.



Sieve Size	Percentage Passing
3/4-inch	100
No. 4	30 - 50
No. 200	0 - 5

2. **Type B (Class I crushed stone):** Manufactured angular, crushed stone, crushed rock, or crushed slag with the following gradation requirements. The material shall have a minimum sand equivalent value of 75.

Sieve Size	Percentage Passing
3/4-inch	100
No. 4	30 - 50
No. 200	0 - 5

3. **Type C (sand backfill):** Sand with the following gradation requirements, and with a sand equivalent value not less than 30.

Sieve Size	Percentage Passing
1/2-inch	100
No. 4	85 - 100
No. 8	70 - 95
No. 200	0 - 10

4. **Type F (coarse drainrock):** Crushed rock or gravel with the size gradation for Size Number 4 in ASTM C 33.

5. **Type G (aggregate base):** See also Section 32 11 16 for Aggregate Base Specifications.

Crushed rock aggregate base material of such nature that it can be compacted readily by watering and rolling to form a firm, stable base for pavements. At the option of the Contractor, the grading for either the 1-1/2-inch maximum size or 3/4-inch maximum size gradation shall be used. The sand equivalent value shall be not less than 22, and the material shall meet the following gradation requirements:

Sieve Size	Percentage Passing	
	1-1/2-inch Max	3/4-inch Max.
2-inch	100	-
1-1/2-inch	90 - 100	-



1-inch	-	100
3/4-inch	50 - 85	90 - 100
No. 4	25 - 45	35 - 55
No. 30	10 - 25	10 - 30
No. 200	2 - 9	2 - 9

6. **Type H (graded drainrock):** Drainrock shall be crushed rock or gravel, durable and free from slaking or decomposition under the action of alternate wetting or drying. The material shall be uniformly graded and shall meet the gradation requirements for Size Number 57 in ASTM C 33. The drainrock shall have a sand equivalent value not less than 75. The finish graded surface of the drainrock immediately beneath hydraulic structures shall be stabilized to provide a firm, smooth surface upon which to construct reinforced concrete floor slabs.
7. **Type I:** Not Used.
8. **Type K (topsoil):** Stockpiled topsoil material which has been obtained at the site by removing soil to a depth not exceeding 1 foot. Removal of the topsoil shall be done after the area has been stripped of vegetation and debris.

2.02 UNSUITABLE FILL MATERIAL

A. Unsuitable materials include the materials listed below.

1. Soils which, when classified under ASTM D 2487 - Standard Classification of Soils for engineering Purposes (Unified Soil Classification System), fall in the classifications of Pt, OH, CH, MH, or OL.
2. Soils which cannot be compacted sufficiently to achieve the density specified for the intended use.
3. Materials that contain hazardous or designated waste materials including petroleum hydrocarbons, pesticides, heavy metals, and any material which may be classified as hazardous or toxic according to applicable regulations.
4. Soils that contain greater concentrations of chloride or sulfate ions, or have a soil resistivity or pH less than the existing on-site soils.
5. Topsoil, except as allowed by Section 2.4.



2.03 USE OF FILL, BACKFILL, AND EMBANKMENT MATERIAL TYPES

- A. The Contractor shall use the types of materials as designated herein for all required fill, backfill, and embankment construction hereunder.
- B. Where these Specifications conflict with the requirements of any local agency having jurisdiction or with the requirements of a pipe material manufacturer, the City shall be immediately notified. In case of conflict between types of pipe zone bedding, the Contractor shall use the agency-specified bedding material if that material provides a greater degree of structural support to the pipe, as determined by the City. In case of conflict between types of trench or final backfill types, the Contractor shall use the agency-specified backfill material if that material provides the greater in-place density after compaction.
- C. Fill and backfill types shall be used in accordance with the following provisions:
 - 1. Embankment fills shall be constructed of Type I material, as defined herein, or any mixture of Type I and Type A through Type H materials.
 - 2. Pipe zone bedding for mortar coated steel pipe, ductile iron pipe, and PVC pipe shall be Type C backfill (pipe bedding) material. Pipe zone bedding for PVC pipe, coal tar enamel coated or tape wrapped steel pipe, and polyethylene encased ductile iron pipe shall be Type C backfill (pipe bedding) material.
 - 3. Trench zone and final backfill for pipelines under paved areas, as defined under "Pipe and Utility Trench Backfill," shall be Type L backfill material unless otherwise shown or specified. Trench zone and final backfill under areas not paved shall be select native material free of rocks larger than 3 inches and free of deleterious material, or Types A, C or G, backfill materials or any mixture thereof. In agricultural or landscaped areas Type K material shall be used for final backfill unless otherwise indicated.
 - 4. Trench backfill and final backfill for pipelines under structures shall be the same material as used in the pipe zone, except where concrete encasement is required by the Contract Documents.
 - 5. Backfill around structures shall be Type A through Type H materials, or any mixture thereof, except as shown.
 - 6. Backfill materials beneath structures shall be as follows:
 - a. Drain rock materials under hydraulic structures or other water retaining structures with underdrain systems shall be Type H material.



- b. Under concrete hydraulic structures or other water retaining structures without underdrain systems, Types G or H materials shall be used.
 - c. Under structures where groundwater must be removed to allow placement of concrete, Type F material shall be used. Before the Type F material is placed, filter fabric shall be placed over the exposed foundation.
 - d. Under all other structures, Type G or H material shall be used.
7. Backfill used to replace pipeline trench over-excavation shall be a layer of Type F material with a top layer of filter fabric to prevent migration of fines for wet trench conditions or the same material as used for the pipe zone bedding if the trench conditions are not wet.
 8. The top 6 inches of embankment fills around hydraulic structures, and all other embankment fills shall consist of Type K material, topsoil.
 9. Filter fabric shall be per City or agency direction.

2.04 SOIL MATERIALS TESTING

- A. All soils testing of samples submitted by the Contractor will be done by a testing laboratory of the City's choice and at the City's expense. At its discretion, the City may request that the Contractor supply samples for testing of any material used in the work.
- B. Particle size analysis of soils and aggregates will be performed using ASTM D 422 - Standard Test Method for Particle-Size Analysis of Soils.
- C. Determination of sand equivalent value will be performed using ASTM D 2419 - Standard Test Method for Sand Equivalent Value of Soils and Fine Aggregate.
- D. **Unified Soil Classification System:** References in this Section to soil classification types and standards shall have the meanings and definitions indicated in ASTM D 2487. The Contractor shall be bound by all applicable provisions of said ASTM D 2487 in the interpretation of soil classifications.
- E. The testing for chloride, sulfate, resistivity, and pH will be done in accordance with California Test Methods 417, 422 and 643 of the California Department of Transportation.

2.05 ASPHALT CONCRETE PAVING MATERIALS

- A. See Section 32 12 16 for Asphalt Paving Specifications.



- B. All materials required for asphalt concrete pavement construction as specified herein shall conform to the Caltrans Standard Specifications:
- C. Asphalt concrete for roadway pavement shall be Type B, Grade AR-4000 as specified in Section 39 with ½” mix, unless specified otherwise. Asphalt concrete for construction of sidewalks, berms, dikes, or curbs shall be Type B, Grade AR-4000 as specified in Section 39 with 3/8” mix, unless specified otherwise. Paint binder shall be SS-1h emulsified asphalt conforming requirements of Section 94. Base course shall be treated Class 2 aggregate base material. Paint for traffic stripes and pavement markings shall conform to Section 84.

PART 3 – EXECUTION

3.01 EXCAVATION - GENERAL

- A. **General:** Except when specifically provided to the contrary, excavation shall include the removal of all materials of whatever nature encountered, including all obstructions of any nature that would interfere with the proper execution and completion of the work. The removal of said materials shall conform to the lines and grades indicated or ordered.
- B. **Sheeting, Shoring and Bracing:** The Contractor shall furnish, place, and maintain all supports and shoring that may be required for the sides of the excavations and trenches. Excavations and trenches shall be sloped or otherwise supported in a safe manner in accordance with applicable CAL/OSHA requirements and the requirements of OSHA Safety and Health Standards for Construction (29CFR1926). As a minimum, lateral pressures for design of trench sheeting, shoring, and bracing shall be based on type of soil exposed in the trench, groundwater conditions, surcharge loads adjacent to the trench, and type of shoring that will be used in the trench.

3.02 PROTECTION OF EXISTING UTILITIES AND FACILITIES

- A. **General:** The Contractor shall be responsible for the care and protection of all existing sewer pipelines, water pipelines, gas mains, electrical and communications conduits, cables, storm drains, culverts, or other facilities and structures that may be encountered in or near the area of work.
- B. **Notification:** It shall be the duty of the Contractor to notify each agency having jurisdiction and make arrangements for locating each agency's facilities prior to beginning construction.
- C. **Damage:** In the event of damage to any existing facilities during the progress of the work due to the failure of the Contractor to exercise the proper precautions, the Contractor shall be responsible for the cost of all repairs and protection to said facilities. The Contractor's work may be stopped until repair operations are complete.



- D. **Storage and Disposal of Excavated Material:** During trench excavation, store excavated material only within the work area. Do not obstruct roadways, streets, bike paths, or sidewalks. Contractor shall remove and dispose of excess excavated soil material off the Project site at no additional cost to the City, in accordance with local regulations.

3.03 ROADWAY, AND EMBANKMENT EXCAVATION

- A. **Excavation Beneath Paved Areas:** Excavation under areas to be paved shall extend to the bottom of the aggregate base or subbase, if such base is called for; otherwise it shall extend to 1 inch below the existing paving thickness. After the required excavation has been completed, the top 6 inches of exposed surface shall be scarified, brought to optimum moisture content, and rolled with heavy compaction equipment to obtain 95 percent of maximum density. The finished subgrade shall be even, self-draining, and in conformance with the slope of the finished pavement. Areas that could accumulate standing water shall be regraded to provide a self-draining subgrade.
- B. **Notification of City:** The Contractor shall notify the City at least 3 days in advance of completion of any structure excavation and shall allow the City a review period of at least one day before the exposed foundation is scarified and compacted or is covered with backfill or with any construction materials

3.04 PIPELINE AND UTILITY TRENCH EXCAVATION

- A. **General:** Unless otherwise indicated or ordered, excavation for pipelines and utilities shall be opencut trenches with widths as indicated. Trenches shall be excavated to line and grade as shown on the Plans (Construction Drawings). Excavation for water lines shall be made only after pipe and other necessary materials are delivered to the project site and inspected by the Goleta Water District's inspector. Where trenching occurs in paved areas, the pavement shall be saw cut ahead of the trenching operations. The proper tools and equipment shall be used in marking and breaking so that the pavement will be cut accurately and on neat lines parallel to the trench. Material excavated from trenches shall be placed in such a way as not to endanger the health of the workers or the public. Excavated material shall not be stockpiled within the public right-of-way, or placed in areas where it could be hazardous to traffic, or block access to roads or driveways. Excavation within the public right-of-way shall be performed in compliance with the requirements of the County of Santa Barbara Department of Public Works.
- B. **Trench Geometry:** Trenches shall be constructed to allow for safe installation of pipe and structures. Trench width shall be in accordance with GWD Standard Details except when stated otherwise on the Plans and Specifications. The bottom of the trench shall be excavated uniformly to the grade of the bottom of the pipe bedding. Trench bottom shall consist of firm native soil or imported compacted soil able to



evenly support pipe bedding for the full length of the pipe. Excavations for pipe bells and welding shall be made as required.

- C. **Abrasive Materials:** When rocks, concrete, or other hard and abrasive materials are encountered during excavation, it may be required that all or a portion of the material be removed to provide a minimum clearance of 12 inches below and on each side of pipe, valves and fittings. If in the opinion of the Goleta Water District damage to other systems or structures will occur by the removal of material, Contractor shall not proceed until receiving further instructions from the District.
- D. **Unsuitable Foundation:** If soft, spongy, unstable, or other similar material is encountered upon which the pipe bedding material is to be placed, an additional 12 inches in depth of this unsuitable material shall be removed and replaced with bedding material placed in the manner specified for pipe bedding material. Tree roots are to be removed.
- E. **Protection of Property:** Tree, shrubs, fences and all other property and surface structures shall be protected during construction unless the Plans and Specifications call for their removal.
- F. **Temporary Supports:** When other structures, pipes, conduits, cables, wires or any underground improvements are encountered during excavation they shall be temporarily supported as necessary to prevent damage to or disturbance of said improvements.
- G. Exploratory Excavation
1. The Contractor shall excavate and expose buried points of connection to existing utilities where indicated on the Drawings. Excavation shall be performed prior to preparation of Shop Drawings for connections and before fabrication of pipe, and the data obtained shall be used in preparing Shop Drawings.
 2. Data, including dates, locations excavated, and sketches, shall be submitted to the City within one week of excavation.
 3. Damage to utilities from excavation activities shall be repaired by the Contractor.
- H. **Open Trench:** The maximum amount of open trench permitted in any one location shall be 300 feet, or a length equivalent to the amount of pipe able to be installed in a single day, whichever is less. Trenches shall not remain open overnight. All trenches shall be fully backfilled at the end of each workday, or shall be properly shored and covered by heavy steel plates adequately braced and capable of supporting vehicular traffic in those locations where it is impractical to backfill at the end of each day. The above requirements for backfilling or use of steel plates may be waived at the discretion of the INSPECTOR in cases where the trench is located further than 100



feet from any traveled roadway or occupied structure. In such cases, however, barricades and warning lights meeting safety requirements shall be provided and maintained.

- I. **Over Excavation:** Any over-excavation carried below the grade ordered or indicated, shall be backfilled and compacted to the required grade with the indicated material

3.06 EXCAVATION IN LAWN AND LANDSCAPED AREAS

- A. Where excavation occurs in landscaped areas, Contractor shall protect all trees, shrubs, sidewalk, walls, fences, and other landscape items adjacent to or within the work area unless directed otherwise by the Contract Documents. In the event of damage to landscape items, Contractor shall replace the damaged items in a manner satisfactory to the City at no cost to the City.
- B. Where excavation occurs in lawn areas, the sod shall be carefully removed, dampened, and stockpiled to preserve it for replacement. Excavated material may be placed on the lawn; provided, that a drop cloth or other suitable method is employed to protect the lawn from damage. The lawn shall not remain covered for more than 72 hours. Immediately after completion of backfilling [and testing of the pipeline], the sod shall be replaced and lightly rolled in a manner so as to restore the lawn as near as possible to its original condition. Contractor shall provide new sod if stockpiled sod has not been replaced within 72 hours.
- C. Except where trees are indicated to be removed, trees shall be protected from injury during construction operations. No tree roots over 2 inches in diameter shall be cut without express permission of the City. Trees shall be supported during excavation by any means previously reviewed by the City.

3.07 BACKFILL - GENERAL

- A. Backfill shall not be dropped directly upon any structure or pipe. Backfill shall not be placed around or upon any structure until the concrete has attained sufficient strength to withstand the loads imposed. Backfill around water retaining structures shall not be placed until the structures have been tested, and the structures shall be full of water while backfill is being placed.
- B. Except for drain rock materials being placed in over-excavated areas or trenches, backfill shall be placed after all water is removed from the excavation, and the trench sidewalls and bottom have been dried to a moisture content suitable for compaction.
- C. Immediately prior to placement of backfill materials, the bottoms and sidewalls of trenches and structure excavations shall have all loose sloughing, or caving soil and rock materials removed. Trench sidewalls shall consist of excavated surfaces that are in a relatively undisturbed condition before placement of backfill materials.



3.08 PLACING AND SPREADING OF BACKFILL MATERIALS

- A. Backfill materials shall be placed and spread evenly in layers. When compaction is achieved using mechanical equipment, the layers shall be evenly spread so that when compacted each layer shall not exceed 6 inches in thickness.
- B. During spreading, each layer shall be thoroughly mixed as necessary to promote uniformity of material in each layer. Pipe zone bedding materials shall be manually spread around the pipe so that when compacted the pipe bedding will provide uniform bearing and side support.
- C. Where the backfill material moisture content is below the optimum moisture content, water shall be added before or during spreading until the proper moisture content is achieved. Where the backfill material moisture content is too high to permit the specified degree of compaction the material shall be dried until the moisture content is satisfactory.

3.09 PLACING AND SPREADING OF BACKFILL MATERIALS

- A. Each layer of Types A, B, C, G, H, I, and K backfill materials as defined herein, where the material is graded such that 10 percent or more passes a No. 4 sieve, shall be mechanically compacted to the indicated percentage of density. Equipment that is consistently capable of achieving the required degree of compaction shall be used and each layer shall be compacted over its entire area while the material is at the required moisture content.
- B. Each layer of Type F backfill materials shall be compacted by means of at least 2 passes from a flat plate vibratory compactor. When such materials are used for pipe zone backfill, vibratory compaction shall be used at the top of the pipe zone or at vertical intervals of 24 inches, whichever is the least distance from the subgrade.
- C. Flooding, ponding, or jetting shall not be used for backfill around structures, for final backfill materials, or aggregate base materials.
- D. Equipment weighing more than 10,000 pounds shall not be used closer to walls than a horizontal distance equal to the depth of the fill at that time. Hand operated power compaction equipment shall be used where use of heavier equipment is impractical or restricted due to weight limitations.
- E. Backfill around and over pipelines that is mechanically compacted shall be compacted using light, hand operated, vibratory compactors and rollers. After completion of at least two feet of compacted backfill over the top of pipeline, compaction equipment weighing no more than 8,000 pounds may be used to complete the trench backfill.



3.10 PLACING AND SPREADING OF BACKFILL MATERIALS

- A. **Methods:** Classification of pipe bedding and trench backfill materials shall be determined in accordance with ASTM D 2487. The density of soil in place shall be determined by the sand cone method, ASTM D 1556, or by the nuclear method, ASTM D 2922 or D 3017. When ASTM D 2922 is used and a one-sack slurry is not used to backfill the trench, the calibration curves shall be checked and adjusted using the sand cone method. ASTM D 2922 results in a wet unit weight of soil and when using this method, ASTM D 3017 (Nuclear Gauge Method for Water Content) shall be used to determine the moisture content of the soil. The calibration curves furnished with the moisture gauges shall be checked along with density calibration checks, as described in ASTM D 3017. The calibration checks of both the density and moisture curves shall be made at the beginning of the job and on each different type of material used. Copies of calibration curves, results of calibration tests, and results of laboratory tests shall be furnished to the City prior to performing any field tests. Field test results shall be furnished to the City within 48 hours of the testing. Trenches improperly compacted shall be reopened to the depth directed by the City, then filled and compacted to the density specified at no additional cost to the City.
- B. **Soil Moisture-Density Relationship:** Laboratory moisture-density relations of soils shall be determined per ASTM D 1557.
- C. **Cohesionless Materials:** Relative density of cohesionless materials by ASTM D 4253 and D 4254.
- D. **Sampling:** Sample backfill materials per ASTM D 75.
- E. **Relative Compaction:** "Relative compaction" shall be defined as the ratio, expressed as a percentage, of the in place dry density to the laboratory maximum dry density.
- F. **Compaction Compliance:** Compaction shall be deemed to comply with the specifications when none of the tests falls below the specified relative compaction. Notify the City 24-hours in advance of when backfill lifts are ready for testing to allow inspection by the City. The Contractor shall pay the costs of any re-testing of work not conforming to the Specifications.
- G. **Testing Frequency:** Testing shall be performed by a certified soils testing service. All tests shall be performed at locations specified by the City. A minimum of one soil classification and one moisture-density relation test shall be performed for each different type of soil material used for pipe bedding and trench backfill. These tests shall also be performed for every 1500 cubic yards of material placed. A minimum of one field density test shall be performed for each soil type, and at least one test for each 24" compacted thickness. These test requirements shall be repeated for every 300 feet of trench length.



H. **Compaction Requirements:** The following compaction test requirements shall be in accordance with ASTM D 1557 - Test Method for Laboratory Compaction Characteristics of Soils Using Modified Effort (56,000 ft - lbf/ft³) (2,700 kN-m/m³) for Type A, B, C, G, H, I, K, M, and N materials and in accordance with ASTM D 4253 - Standard Test Method for Maximum Index Density and Unit Weight of Soils Using a Vibratory Table, and D 4254 - Standard Test Method for Minimum Index Density and Unit Weight of Soils and Calculation of Relative Density, for Type B, E, F, and J materials. Where agency or utility company requirements govern, the highest compaction standards shall apply.

<u>Location or Use of Fill</u>	<u>Percentage of Maximum Density</u>	<u>Percentage of Relative Density</u>
Pipe bedding and over-excavated zones under bedding for flexible pipe, including trench plugs.	95	70
Pipe bedding and over-excavated zones under bedding for rigid pipe.	90	55
Final backfill, beneath paved areas or structures.	95	70
Final backfill, not beneath paved areas or structures.	90	55
Trench zone backfill, beneath paved areas and structures.	95	70
Trench zone backfill, not beneath paved areas or structures.	90	55
Embankments and fills.	90	55
Embankments and fills beneath paved areas or structures.	95	70
Backfill beneath structures and hydraulic		



structures.	95	70
Topsoil (Type K material)	80	N.A.
Aggregate base or sub-base (Type G or M material)	95	N.A.

3.11 PIPE AND UTILITY TRENCH BACKFILL

A. Pipe Zone Bedding

1. The pipe zone is defined as that portion of the vertical trench cross-section lying between the trench bottom and a plane 12-inches above the top surface of the pipe as indicated. The pipe bedding is defined as backfill material within the pipe zone. Bedding shall be placed across the entire trench extending from a minimum of four inches below the bottom of the pipe to 12 inches above the top of pipe. Bedding shall be placed in layers not exceeding six inches loose thickness for compaction by hydraulic or hand operated mechanical compactors, and eight inches loose thickness when compacted by other mechanical compactors. Bedding shall be compacted to at least 90% of its maximum dry density as determined by ASTM D 1557. Bell holes in bedding shall be provided for each joint, but shall be no larger than necessary to allow joint assembly and to ensure that pipe will lie flat on the bedding. Contractor shall ensure that pipe is not being supported by the bell portion of the pipe at any joint and shall ensure that no less than 2 inches of bedding is provided for yokes, restraints, bells and all other extensions of fittings and joints.
2. The pipe zone shall be backfilled with the indicated backfill material. The Contractor shall exercise care to prevent damage to the pipeline coating, cathodic bonds, and the pipe itself during the installation and backfill operations

- B. Trench Zone Backfill: After the pipe zone backfill has been placed, backfilling of the trench zone may proceed. The trench zone is defined as that portion of the vertical trench cross-section from 12 inches above the top of the pipe to the bottom of the pavement zone if the trench is under pavement, or to within 12 inches of finished grade if the trench is in an unpaved area. Where slurry backfill is not used, material shall be compacted to at least 95% of maximum dry density as determined by ASTM D 1557. Trench shall be backfilled in lifts not exceeding eight inches, uncompacted depth, and then compacted by mechanical means prior to placement of succeeding lifts. Where the pipeline is located within an existing paved street within the public right of way, trench shall be backfilled with Type L backfill material as described above.



- C. **Pavement Zone Backfill and Final Backfill:** The pavement zone includes the asphalt concrete and aggregate base pavement section. Final backfill applies to trenches not beneath paved areas and is all backfill in the trench cross-sectional area within 12 inches of finished grade.
- D. **Identification Tape:** Install identification tape as indicated.

3.12 FILL AND EMBANKMENT CONSTRUCTION

- A. The area where a fill or embankment is to be constructed shall be cleared of all vegetation, roots, and foreign material. Following this, the surface shall be moistened, scarified to a depth of six inches, and rolled or otherwise mechanically compacted. Embankment and fill material shall be placed and spread evenly in approximately horizontal layers. Each layer shall be moistened or aerated, as necessary. Unless otherwise approved by the City, each layer shall not exceed 6 inches of compacted thickness. The embankment, fill, and the scarified layer of underlying ground shall be compacted to 95 percent of maximum density under structures and paved areas, and 90 percent of maximum density elsewhere.
- B. When an embankment or fill is to be made and compacted against hillsides or fill slopes steeper than 4:1, the slopes of hillsides or fills shall be horizontally benched to key the embankment or fill to the underlying ground. A minimum of 12 inches normal to the slope of the hillside or fill shall be removed and re-compacted as the embankment or fill is brought up in layers. Material thus cut shall be re-compacted along with the new material. Hillside or fill slopes 4:1 or flatter shall be prepared in accordance with Paragraph A, above.
- C. Where embankment or structure fills are constructed over pipelines, the first 4 feet of fill over the pipe shall be constructed using light placement and compaction equipment that does not damage the pipe. Heavy construction equipment shall maintain a minimum distance from the edge of the trench equal to the depth of the trench until at least 4 feet of fill over the pipe has been completed.

3.13 FIELD TESTING

- A. **General:** All field soils testing will be done by a testing laboratory of the City's choice at the City's expense except as indicated below.
- B. Where soil material is required to be compacted to a percentage of maximum density, the maximum density at optimum moisture content will be determined in accordance with Method C of ASTM D 1557. Where cohesionless, free draining soil material is required to be compacted to a percentage of relative density, the calculation of relative density will be determined in accordance with ASTM D 4253 and D 4254. Field density in-place tests will be performed in accordance with ASTM D 1556 - Standard Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method,



ASTM D 2922 - Standard Test Methods for Density of Soil and Soil-Aggregate in Place By Nuclear Methods (Shallow Depth), or by such other means acceptable to the City.

- C. In case the test of the fill or backfill show non-compliance with the required density, the Contractor shall accomplish such remedy as may be required to ensure compliance. Subsequent testing to show compliance shall be by a testing laboratory selected by the City and paid by the Contractor.
- D. The Contractor shall provide test trenches and excavations including excavation, and trench support for the City's field soils testing operations. The trenches and excavations shall be provided at the locations and to the depths required by the City.

3.14 ASPHALT CONCRETE

- A. General: Furnishing, placing, shaping, rolling, and finishing asphalt concrete for resurfacing of pavement after trenching shall be performed in accordance with local jurisdiction's Standards and Section 39 of the Caltrans Standard Specifications.
- B. Wherever required by the governing agency, the Contractor shall place temporary surfacing promptly after backfilling and shall maintain such surfacing for the period of time fixed by said agency before proceeding with the final restoration of improvements.
- C. All paved areas, including curbs and berms, cut or damaged during construction shall be replaced with similar materials and of equal thickness to match the existing adjacent undisturbed areas, except where specific resurfacing requirements have been called for in the Contract Documents or in the permit of the governing agency. All temporary and permanent pavement shall conform to the requirements of the governing agency.
- D. In order to obtain a satisfactory junction with adjacent surfaces, the Contractor shall saw cut back and trim the edge so as to provide a clean, sound, vertical joint before permanent resurfacing of an excavated or damaged portion of pavement. Damaged edges of pavement along excavations and elsewhere shall be trimmed back by saw cutting in straight lines.
- E. Pavement and base shall be constructed to the line, grade and thickness shown on the Construction Drawings. All pavement restoration and other facilities restoration shall be constructed to finish grades compatible with adjacent undisturbed pavement.

3.15 BASE AND SUBGRADE BELOW ASPHALT CONCRETE

- A. The preparation of the subgrade to receive aggregate base course, and preparation and construction of aggregate base for construction of asphalt concrete paving shall



conform to the requirements of the applicable sections of the Caltrans Standard Specifications.

- B. Spreading and compacting of base material shall conform to the requirements of Section 26 of the Caltrans Standard Specifications.
- C. Base course shall be maintained until asphalt pavement is placed. Areas of base course which are damaged or do not conform to the requirements herein shall be conditioned, reshaped, and recompact in accordance with the requirements herein.
- D. Compaction tests will be performed by the City, in accordance with the requirements of the applicable sections of the Caltrans Standard Specifications

3.16 TACK COAT

- A. An asphalt tack coat shall be applied to all existing asphalt concrete or concrete surfaces upon or against which asphalt concrete is to be placed. Application of tack coat shall conform to the requirements of Section 39 of the Caltrans Standard Specifications.

3.17 ASPHALT CONCRETE PAVING

- A. Asphalt concrete paving shall be constructed in accordance with the requirements of Section 39 of the Caltrans Standard Specifications.

3.18 ASPHALT CONCRETE PAVEMENT MARKING AND STRIPING

- A. Asphalt concrete pavement shall be marked and striped to replace all markings and striping disturbed by the paving operation in accordance with Section 84 of the Caltrans Standard Specifications.

END OF SECTION – 31 2316



SECTION 32 01 90

OPERATIONS AND MAINTENANCE OF PLANTING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, shall apply to all work in this Section with the same force and effect as though repeated in full herein.

1.2 SUMMARY

- A. After landscape planting work have been completed, reviewed and accepted by OAR, furnish materials, labor, transportation, services and equipment necessary to provide landscape maintenance as indicated on Drawings and as specified herein.
- B. Work included in this Section:
 - 1. Continuous maintenance of plant material during specified landscape maintenance period.
- C. Work related in other Sections:
 - 1. Section 32 90 00 - Planting.

1.3 LANDSCAPE MAINTENANCE PERIOD

- A. Landscape Maintenance Period: 90 days from Final Acceptance by OAR. Contractor may, at discretion of OAR, be allowed to proceed into landscape maintenance period if planting is deemed "substantially complete" by OAR.
- B. Continuously maintain areas involved in this Contract during progress of Work and during landscape maintenance period until Final Acceptance by OAR has been granted.
- C. Improper landscape maintenance or possible poor condition of planting at termination of the scheduled landscape maintenance period may cause landscape maintenance period to be continued at no cost to Owner.
- D. In order to carry out plant establishment work, furnish sufficient labor and adequate equipment to perform Work during landscape maintenance period.



- E. Request an observation of Work by OAR to begin landscape maintenance period after planting and related work has been completed in accordance with Contract Documents. A prime requirement is that groundcover areas be planted and show a consistent and healthy appearance. If such criteria are met to satisfaction of OAR, a field report may be issued to OAR recommending a start date to begin landscape maintenance period.
- F. Any day that Contractor fails to adequately perform landscape maintenance, as determined necessary by OAR, that day will not be credited as one of landscape maintenance working days.
- G. Prior to being placed on landscape maintenance, submit a schedule of activities planned during landscape maintenance period. This schedule needs to be accepted by OAR prior to start of landscape maintenance. Document scheduled changes and obtain acceptance by OAR.

PART 2 - PRODUCTS

2.1 GENERAL

- A. Provide materials used during landscape maintenance work in accordance with requirements of Section 32 90 00 - Planting. Provide fertilizer per soil's test recommendation and following:
 - 1. Shrub and Groundcover Planting Fertilizer:
 - a. Consisting of following minimum percents by weight:
 - 14% Nitrogen
 - 4% Phosphoric Acid
 - 9% Potash
 - 30% Humus
 - 6% Humic Acid
 - 3% Sulfur
 - b. Acceptable Manufacturers:
Gro-Power Hi Nitrogen; Gro-Power (909) 393-3744 or approved equivalent.
- B. Submit a list of materials that are to be used during landscape maintenance that are not specified in Section 32 90 00 in written form to OAR for review and approval.

PART 3 - EXECUTION

3.1 LANDSCAPE MAINTENANCE

- A. Keep landscape areas free of debris.
- B. Keep planted areas weed-free. Cultivate at intervals of not more than 10 days.



- C. Maintain adequate protection of Work area. Repair damaged areas.
- D. Sweep clean paved areas on once a week intervals or less, if deemed necessary.

3.2 TREE AND SHRUB CARE

A. Watering:

- 1. Maintain a large enough water basin around trees and shrubs so that enough water can be applied to establish moisture through major root zone.
- 2. When hand watering, use a water wand to break water force.
- 3. Replenish wood mulches to reduce evaporation and frequency of watering.
- 4. Regulate watering times to minimize erosion and gullyng.

B. Pruning:

- 1. Trees:
 - a. Prune Trees To:
 - 1) Select and develop permanent scaffold branches that are smaller in diameter than trunk or branch to which they are attached which have vertical spacing of from 18-inches to 48-inches and radial orientation so as not to overlay one another.
 - 2) To eliminate diseased or damaged growth.
 - 3) To eliminate narrow V-shaped branch forks that lack strength.
 - 4) To reduce toppling and wind damage by thinning out crowns.
 - 5) To maintain growth within space limitations.
 - 6) To maintain a natural appearance and to balance crown with root mass.
 - b. Under no circumstances, will stripping of lower branches "raising-up" of young trees be permitted.
 - c. Retain lower branches in a "tipped-back" or pinched condition with as much foliage as possible to promote caliper trunk growth.
 - d. Cut lower branches flush with trunk only after tree is able to stand erect without staking or other support.
 - e. Remove sucker growth.
 - f. Thin evergreen trees and shape when necessary to prevent wind and storm damage.
- 2. Shrubs:
 - a. Overall objective of shrub pruning is same as for trees.
 - b. Do not clip shrubs into balled or boxed forms unless approved initially by OAR.
 - c. Make pruning cuts on lateral branches or buds flush with trunk.
 - d. Do not "stub" branches.

C. Tree Staking and Guying:



1. Restake, tighten and repair damaged ties and guys.
 2. Reset to proper grades or upright position, trees that are not in their proper growing position.
 3. Inspect stakes and guys to prevent girdling of trunks or branches and to prevent rubbing that may cause bark wounds.
- D. Weed Control:
1. Keep planted and aggregate areas free of weeds.
 2. Use recommended legally approved herbicides.
 3. Avoid frequent soil cultivation that destroy shallow surface roots.
 4. Replenish lost wood mulch to reduce weed growth.
- E. Insect and Disease Control:
1. Maintain insect and disease control during landscape maintenance period.
- F. Fertilization:
1. Fertilize planting areas with application of Gro-Power Hi-Nitrogen 14-4-9, or approved equivalent. Commercial fertilizer at the rate of 7 1/2 pounds per 1,000 square feet 30 days after planting.
 2. Repeat fertilizer application at 30-day intervals until end of the landscape maintenance period.
- G. Replacement of Plants:
1. Replace dead, dying and missing plants of a like size and condition as to those that were originally installed at no cost to Owner.
- H. Replacement of Soil
1. Replacement of soil to maintain height of 2” below top of planter.
- 3.3 GROUND COVER CARE
- A. Weed Control:
1. Control weeds with chemical systemic spray or by hand so as to cause minimal damage to planted materials.
- B. Watering:
1. Water enough so that moisture penetrates throughout root zone and only as frequently as necessary to maintain healthy growth.
- C. Fertilizing:
1. Fertilize as specified under Tree and Shrub care of this Specification.
- D. Edge groundcover to keep in bounds and trim top growth as necessary to achieve an overall even appearance.



- E. Replace dead, dying and missing plants of a like size and condition as to those that were originally installed.

3.4 WATERING DURING ESTABLISHMENT PERIOD

- A. Provide periodic watering and other activities required during landscape maintenance period to keep plants thriving.

3.5 FINAL WALKTHROUGH

- A. At completion of landscape maintenance period, schedule a Final Walkthrough with OAR.
- B. OAR, General Contractor and others deemed necessary by OAR may be present at Final Walkthrough.
- C. If, during Final Walkthrough OAR is of opinion that landscape maintenance has been substantially completed in accordance with this Section, written notice of recommendation to allow Contractor to be released from Project will be submitted to OAR for approval. This report will note any incomplete punch list items from Final Walkthrough and a date on which these items must be completed. Complete remaining punch list items within 5 working days after Final Walkthrough was performed by OAR.

3.6 CLEAN UP

- A. Upon completion of landscape maintenance, remove rubbish, waste and debris resulting from Contractor's operations.
- B. Repair scars, ruts or other marks in landscaped areas caused by Contractor.
- C. Remove equipment, implements of service, and leave Work area in a neat and clean condition. Sweep clean paved areas.

END OF SECTION – 32 01 90



AGGREGATE BASE

32 11 16

PART 1 – GENERAL

1.01 SUMMARY

- A. This Section specifies the material and work requirements for aggregate base to be furnished and place to the lines, grades, and dimensions in accordance with the Plans, Specifications and as directed by the Engineer.
- B. Class 2 Aggregate Base must conform to Caltrans Standard Specification Division IV – Subbases and Bases, Section 26 – Aggregate Bases,

1.02 RELATED SECTIONS

- A. 31 23 16 – Trenching Backfill and Compaction
- B. 32 12 16 – Asphalt Paving
- C. Caltrans Standard Specification Division IV – Subbases and Bases, Section 23 – General
- D. Caltrans Standard Specification Division IV – Subbases and Bases, Section 26 – Aggregate Bases

1.4 SUBMITTALS

- A. Section 01 3300 – Submittal Procedures: Procedures for submittals.
- B. Samples: Submit, in air-tight containers, 10 l. sample of each type of fill material to testing laboratory for evaluation.
- C. Materials Source: Submit name of imported materials suppliers and location of material source.

1.5 QUALITY ASSURANCE

- A. Perform Work in accordance with this Section and referenced standards. Maintain one copy of test results on-site.

PART 2 – CALTRANS STANDARD SPECIAL PROVISIONS (SSPs)

- A. None.



PART 3 – MEASUREMENT AND PAYMENT

- A. Measurement and payment must conform to Caltrans Standard Specification Section 26 – Aggregate Bases.

END SECTION - 32 11 16



ASPHALT PAVING

32 12 16

PART 1 – GENERAL

1.01 SUMMARY

- A. This Section specifies the material and work requirements for asphalt paving to be furnished and place to the lines, grades, and dimensions in accordance with the Plans, Specifications and as directed by the Engineer.

Asphalt paving shall include all street paving, and street rehab paving in the public right of way along Hollister Avenue, South La Patera Lane and Lindmar Drive must conform to Caltrans Standard Specification Division V – Surfacing and Pavements, Section 39 – Asphalt Concrete.

1.02 RELATED SECTIONS

- A. 31 23 00 – EARTHWORK
- B. 32 11 16 – AGGREGATE BASE
- C. Caltrans Standard Specification Division III - Earthwork and Landscape, Section 19 – Earthwork
- D. Caltrans Standard Specification Division IV – Subbases and Bases, Section 23 – General
- E. Caltrans Standard Specification Division IV – Subbases and Bases, Section 26 – Aggregate Bases
- F. Caltrans Standard Specification Division V – Surfacing and Pavements, Section 36 – General
- G. Caltrans Standard Specification Division V – Surfacing and Pavements, Section 39 – Asphalt Concrete
- H. Caltrans Standard Specification Division IX – Traffic Control Devices, Section 84 – Markings

1.1 REFERENCES

- A. Work shall comply with the rules and regulations of the City of Goleta, Santa Barbara County and the State of California.
- B. Reference to the "Caltrans Standard Specifications" shall mean 2023 Caltrans Standard Specifications.



- C. ASTM Standards.

1.2 PROJECT CONDITIONS

- A. The Contractor shall keep his work area clean, and in a safe and workmanlike condition so that rubbish, waste and debris do not interfere with the work of other trades.
- B. Apply prime and tack coats when ambient temperature is above 50 degrees F and when temperature has not been below 35 degrees F for 12 hours immediately prior to application. Do not apply when base is wet or contains an excess of moisture.
- C. Construct asphalt concrete surface course only when atmospheric temperature is above 40 degrees F and when base is dry. Base course may be placed when air temperature is above 30 degrees F.

1.3 COORDINATION

- A. The Contractor shall notify the General Contractor and all other contractors related to the installation of his Work in ample time, so as to allow sufficient time for those contractors to perform their portion of the Work.

PART 2 – CALTRANS STANDARD SPECIAL PROVISIONS (SSPs)

- A. Minor HMA in the public right of way including Hollister Avenue, South La Patera Lane and Lindmar Drive must conform to Caltrans Standard Specification Section 39 – Asphalt Concrete. This includes coatings (tack coat, etc.).
- B. All HMA is Minor Type A.
- C. Replace section 39-2.01B(2)(b) with:

39-2.01B(2)(b) Hot Mix Asphalt Treatments

Determine the plasticity index of the aggregate blend under California Test 204. Use only the aggregate blend with plasticity index equal to or less than 10.

- D. Replace section 39-2.01C(3)(c) with:

39-2.01C(3)(c) Prime Coat

Apply a slow-setting asphaltic emulsion as a prime coat to AB areas designated by the Engineer and at a spread rate from 0.15 to 0.40 gal/sq yd. Do not apply more prime coat than can be absorbed completely by the AB in 24 hours.

You may modify the prime coat application rates if authorized.



Close areas receiving prime coat to traffic. Do not allow tracking the prime coat onto pavement surfaces beyond the job site.

- E. Replace Reserved in section 39-2.02B(3) with:

The grade of asphalt binder for Type A HMA must be PG 64-10.

For Type A HMA using RAP substitution of greater than 15 percent of the aggregate blend, the virgin binder grade must comply with the PG binder grade specified above with 6 degrees C reduction in the upper and lower temperature classification.

For Type A HMA using RAP substitution of 15 percent or less of the aggregate blend, the grade of the virgin binder must comply with the PG binder grade specified above.

- F. Replace section 39-2.07B(3) with:

39-2.07B(3) Asphalt Binder

The grade of asphalt binder for minor HMA must be PG 64-10.

For minor HMA using RAP substitution of greater than 15 percent of the aggregate blend, the grade of the virgin binder must comply with the binder grade specified above with a 6-degree reduction in the upper and lower temperature classification.

For minor HMA using RAP substitution of 15 percent or less of the aggregate blend, the grade of the virgin binder must comply with the binder grade specified above.

- G. Cold Plane Asphalt Concrete Pavement

- a. Caltrans Standard Specification Section 39-3.04 includes specifications for cold planing asphalt concrete pavement.
- b. Replace the 3rd paragraph of section 39-3.04A with:
- c. Schedule cold planing activities such that not more than 7 days has elapsed between the time the pavement is cold planed and the HMA is placed. Items 2 and

PART 3 – MEASUREMENT AND PAYMENT

- A. Measurement and payment must conform to Caltrans Standard Specification Section 39 – Asphalt Concrete.

END SECTION - 32 12 16



SECTION 32 13 13

PORTLAND CEMENT CONCRETE PAVING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, shall apply to all work in this Section with the same force and effect as though repeated in full herein.

1.02 DESCRIPTION OF WORK

- A. Furnish materials, labor, transportation, services, and equipment necessary to install portland cement concrete paving as indicated on Drawings and as specified herein.
- B. Work included in this Section:
 - 1. Natural colored concrete paving.
 - 2. Materials and accessories.
 - 3. Preparation of subgrade, subbase, or base.
 - 4. Formwork.
 - 5. Placing concrete reinforcement.
 - 6. Placing concrete.
 - 7. Joints.
 - 8. Finishing.
 - 9. Curing and protection.
 - 10. Installation of joint seals.
 - 11. Field quality control.
- C. Work related in other Sections:
 - 1. Section 32 11 16 – Aggregate Base

1.03 DEFINITIONS

- A. The Owner in this Section will refer to the City of Goleta.
- B. The Owner's Authorized Representative (OAR) in this Section will refer to CM as the Point of Contact, retained by the Owner.

1.02 REFERENCES

- A. ACI 117 - Standard Tolerances for Concrete Construction and Materials.
- B. ACI 318 - Building Code Requirements for Reinforced Concrete.



- C. ACI 211.1 - Standard Practice for Selecting Proportions for Normal, Heavyweight, and Mass Concrete.
- B. ACI 304R - Recommended Practice for Measuring, Mixing, Transporting and Placing Concrete.
- C. ACI 305R - Hot Weather Concreting.
- D. ACI 309R - Guide for Consolidation of Concrete.
- E. ASTM A 615 - Deformed and Plain Billet-Steel for Concrete Reinforcement.
- F. ASTM C 31 - Standard Specification for Making and Curing Concrete Test Specimens in the Field.
- G. ASTM C 33 - Standard Specification for Concrete Aggregates.
- H. ASTM C 39 - Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens.
- I. ASTM C 94 - Standard Specification for Ready Mix Concrete.
- J. ASTM C 143 - Standard Specification for Hydraulic Hydrated Cement Concrete.
- K. ASTM C 150 - Standard Specification for Portland Cement.
- L. ASTM C 172 - Standard Practice for Sampling Freshly Mixed Concrete.
- M. ASTM C 231 - Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method.
- N. ASTM C 260 - Standard Specification for Air-Entraining Admixtures for Concrete.
- O. ASTM C 309 - Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete.
- P. ASTM C 494 - Standard Specification for Chemical Admixtures for Concrete.
- Q. ASTM C 1064 - Standard Test Method for Temperature of Freshly Mixed Portland Cement Concrete.

1.03 SUBMITTALS

- A. In accordance with Section 01340 - Shop Drawings, Samples and Product Data: Procedures for submittals.
- B. Provide Shop Drawings for the Following:
 - 1. Paving Jointing and Pour Sequence Plan - submit six blueprints indicating the following:
 - a. Proposed layout of contraction, construction and isolation joints. Clearly delineate the three different joint types.



- b. Layout of paving types as indicated on Drawing Paving Schedule. Give overall dimensions of each paving type.
 - c. Concrete pour sequence. Indicated sequence of paving pour installation.
- C. Paving Mix Designs: Provide documentation for each paving type specified on Drawings that will enable Owner to better match replaced concrete:
- 1. Laboratory and Cement Test Reports: Submit six (6) copies of laboratory test reports for concrete materials and a certificate with each concrete mixer truck, stating mix design, PSI rating, slump, water and cement quantity, cement/water ratio, fine and coarse aggregates.
 - 2. Cement:
 - a. Manufacturer and plant location.
 - b. Cement type, i.e. Type I, II or V.
 - 3. Admixtures:
 - a. Manufacturer and plant location.
 - 4. Sand:
 - a. Source and type.
 - 5. Aggregates:
 - a. Source and type.
 - 6. Signed certification from a licensed structural engineer.
- D. Submit specification data “Cut Sheets” for release agent, plastic dowel sleeve.

1.04 QUALITY ASSURANCE

- A. Pre-Bid Conference: Prior to submitting bid, attend pre-bid conference with Owner and to review requirements and artistic effect desired.
- B. Mock-Ups:
- 1. Install a 4-foot wide x 4-foot long mock-up of sample paving indicating all joint types and finishes at location as directed by The OAR.
 - 2. This mock-up will be the standard from which future work will be judged.
 - 3. Remove Mock-up completely prior to Final Payment.
- C. Concrete Manufacturer Qualifications: Manufacturer of ready-mixed concrete products complying with ASTM C 94 requirements for production facilities and equipment.
- D. Installer: Provide evidence to indicate successful experience in providing patterned concrete work similar to that specified herein and can demonstrate successful experience through past project documentation and references.
- 1. Experience: Minimum 5 years experience in the installation of seeded concrete paving.
 - 2. Demonstration of Experience: 10 projects which have been completed within the past 36 months utilizing similar products, scope, and complexity.



3. Supervision: Perform placement and finishing of concrete work under supervision of a person having a minimum of 5 years of experience in placement and finishing of products specified herein.
 4. Submit qualifications to Owner for information purposes. Submit a resume of Project Manager and Superintendent who will be overseeing the Work.
- E. Slip Resistance: Provide a finish surface slip resistance coefficient of friction equal or greater than 0.6 for flat surfaces and 0.8 for ramps, when tested in accordance with ASTM F 489.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. In accordance with Section 01 6000 – “Products, Materials, Equipment & Substitutes” - Product Handling and Protection: Transport, handle, store, and protect.
- B. Store materials in dry and protected locations and protect from damage.
- C. Do not change brand of cement nor source of aggregate during course of Work.

1.06 SITE CONDITIONS

- A. Do not place concrete when subbase surface temperature is less than 40 degrees F, nor when surface is wet.

1.07 COORDINATION

- A. In accordance with Section 01 3113 - Project Coordination.
- B. Ensure that irrigation sleeves, electrical conduit, outlets and other utility elements are accommodated and as-built located prior to pouring concrete.

1.08 INSPECTION OF SITE

- A. Verify conditions at site that affect Work of this Section, and take field measurements as required. Report major discrepancies between Drawings and field dimensions to Owner prior to commencing work.

PART 2 - PRODUCTS

2.01 FORMS

- A. Form Materials: Plywood, metal, metal-framed plywood, or other acceptable panel-type materials to provide full-depth, continuous, straight, smooth exposed surfaces.



- B. Provide metal forms, weighing not less than 18 pounds per linear foot for pavement 8 inches thick, not less than 20 pounds per linear foot for pavement 9 inches thick, and not less than 22 pounds per linear foot for pavement 10 inches thick, and in no case less than 7/32 inch thick.
- C. Provide side forms having a depth equal to the prescribed edge thickness of the pavement, without horizontal joints.
- D. Provide forms having a base not less than 8 inches wide and a flanged tread or top surface not less than 2 inches wide. For multiple lanes, provide base width at least equal to height.
- E. Use flexible or curved forms for curves of 200-foot or less radius.
- F. Provide forms not less than 10 feet long except where shorter forms are necessary for curves. Use metal keyway forms for the full length of roadway form to which attached. Provide wood bulkheads for the full width of pavement lane equipped with keyway form.
- G. Provide holes for bars and dowel assemblies where required.
- H. Provide at least three stake pockets to accommodate a 1-inch diameter stake in each section of form 10 feet or more in length, and at least two such pockets in each section of form less than 10 feet long.
- I. Provide each section of form with a positive locking device that will secure it tightly to the adjoining section.
- J. Provide forms free from warp and of sufficient strength to resist, without visible springing or settlement, all loads applied in the paving process.

2.02 REINFORCING MATERIAL

- A. Synthetic Fiber Reinforcement: 100% pure synthetic polypropylene fibers, engineered and designed for secondary reinforcement of concrete slabs, complying with ASTM C 1116 - Type III. Maximum length of fibers to be 3/4-inch.
 - 1. Acceptable Manufacturers:
 - a. Fibermesh: Stealth (800)348-9348.
 - b. Forta Fiber: Microfiber (800)245-0306.
 - c. W.R. Grace: Monofiliment (800)433-0020.
 - d. Bomanite; Monofiliment (800)854-2094.
- B. Reinforcing Bars and Tie Bars: ASTM A 615 - Grade 60, deformed.
- C. Plain, Cold-Drawn Steel Wire: ASTM A 82.



- D. Fabricated Bar Mats: Welded or clip-assembled steel bar mats, ASTM A 184. Use ASTM A 615, Grade 60 steel bars.
- E. Construction Joint Dowel Bars: Plain steel bars, ASTM A 615, Grade 60. Cut bars true to length with ends square and free of burrs.
- F. Epoxy-Coated Construction Joint Dowel Bars: ASTM A 775 over ASTM A 615, Grade 60 plain steel bars.
- G. Joint Dowel Alignment Sleeves: Polypropylene plastic sleeve dowel to ensure proper alignment of steel dowels.
- H. Hook Bolts: ASTM A 307, Grade A bolts, internally and externally threaded. Design hook bolt joint assembly to hold coupling against pavement form and in position during concrete operations, and to permit removal without damage to concrete or hook bolt.
- I. Supports for Reinforcement: Chairs, spacers, dowel bar supports and other devices for spacing, supporting, and fastening reinforcing bars in place. Use wire bar-type supports.
 - 1. Benches and Chairs: ACI 318
 - 2. Use supports with sand plates or horizontal runners where base material will not support chair legs.

2.03 CONCRETE MATERIALS

- A. Portland Cement: ASTM C 150 - Type I.
- B. Concrete Aggregate: ASTM C 33 - Class 4, and as follows. Provide aggregates from a single source:
- C. Water: Clean and free from injurious amounts of oils, acids, alkalis, salts, organic materials, or other substances that may be deleterious to concrete or reinforcement.

2.04 ADMIXTURES

- A. Provide concrete admixtures that contain not more than 1 percent chloride ions and no calcium chloride.
- B. Water-Reducing Admixture: ASTM 4 94, Type A.
- C. High-Range Water-Reducing Admixture: ASTM C 494, Type F or Type G.
- D. Water-Reducing and Retarding Admixture: ASTM C 494, Type D or E.



- E. Acceptable Manufacturers:
1. Water-Reducing Admixtures:
 - a. ChemMasters Corp; Chemtard.
 - b. Cormix Construction Chemicals; Type A Series.
 - c. Euclid Chemical Company; Eucon WR-75.
 2. High-Range Water-Reducing Admixtures:
 - a. Anti-Hydro Co. Inc.; Super P.
 - b. Cormix Construction Chemicals; Cormix 2000, PSI Super.
 - c. Euclid Chemical Company; Eucon 37.
 3. Water-Reducing and Acceleration Admixtures:
 - a. Conspec Marketing & Manufacturing Company; Q-Set.
 - b. Cormix Construction Chemicals; Gilco Accelerator or Lub NCR.
 - c. Euclid Chemical Company; Accelguard 80.
 4. Water-Reducing and Retarding Admixtures:
 - a. Cormix Construction Chemicals; Type D Series.
 - b. Euclid Chemical Company; Eucon Retarder 75.
 - c. W.R. Grace Company; Daratard-17.

2.05 CURING MATERIALS

- A. Absorptive Cover: Burlap cloth made from jute or kenaf, weighing approximately 9 oz. per sq. yd., complying with AASHTO M 182, Class 2.
- B. Moisture-Retaining Cover: One of the following complying with ASTM C 171:
1. Waterproof paper.
 2. Polyethylene film.
 3. White burlap-polyethylene sheeting.
- C. Clear, Waterborne Membrane-Forming Curing Compounds:
1. Provide curing materials that have a maximum volatile organic compound (VOC) rating of 350 g/l.
- D. Evaporation Control: Monomolecular film-forming compound applied to exposed concrete slab surfaces for temporary protection from rapid moisture loss.
1. Clear, Waterborne Membrane-Forming Curing Compounds Acceptable Manufacturers:
 - a. Anti-Hydro Company; Clear Cure Water Base.
 - b. The Burke Company; Spartan Cote WB.
 - c. Cormix Construction Chemicals; Sealco VOC.
 2. Acceptable Evaporation Control Manufacturers:
 - a. Conspec Marketing and MFG. Company; Aquafilm.
 - b. Euclid Chemical Company; Eucobar.
 - c. L&M Construction Chemicals; E-Con.



2.06 RELATED MATERIALS

- A. Bonding Agent: Acrylic or styrene butadiene.
- B. Epoxy Adhesive: ASTM C 881, two-component material suitable for dry or damp surfaces. Provide material type, grade, and class to suit requirements.
- C. Miscellaneous Materials: Miscellaneous specialty materials, acids, or other materials required to achieve the specialized effects indicated on the mock-up or as required by Owner.
- D. Concrete Finish Retarder: Spray applied, film forming, water based top surface retarder, calibrated for specific sized aggregate and finish requirements.
 - 1. Acceptable Materials: “Top Cast” by Grace Construction Products. Customer Service Center - 888-336-9303, www.graceconstructionproducts.com or Owner approved equivalent.

2.07 CONCRETE

- A. Prepare design mixes for each type and strength of normal-weight concrete by either laboratory trial batch or field experience methods as specified under ACI 301.
- B. Proportion mixes according to ACI 211.1 and ACI 301 to provide normal-weight concrete with the following properties:
 - 1. Compressive Strength at 28 days: 3,000 psi.
 - 2. Maximum Water-Cement Ratio at Point of Placement: 0.55.
 - 3. Slump Limit at Point of Placement: 3-inches. Slump limit for concrete containing high-range water-reducing admixture: Not more than 8-inches after adding admixture to site-verified 2 to 3-inch slump concrete.
 - 4. Air Content: 2 1/2 to 4 1/2 percent.
- C. Synthetic Fiber Reinforcement: 1 lb. per cu. yd of mix added only at batch plant.
- D. Adjustment to Concrete Mixes: Mix design adjustments may be requested by Contractor when characteristics of materials, project conditions, weather, test results, or other circumstances warrant.

2.08 CONCRETE MIXING

- A. Ready-Mixed Concrete: Comply with requirements of ASTM C 94.
 - 1. Reduce mixing and delivery time when air temperature is between 85 degrees F and 90 degrees F and reduce mixing and delivery time from 1-1/2 hours to 75 minutes.
 - 2. Reduce mixing and delivery time to 60 minutes when air temperature is above 90 degrees F.



PART 3 - EXECUTION

3.01 SURFACE PREPARATION

- A. Prepare subgrade per geotechnical report.
- B. Verify that paving subgrade extends 1-foot beyond the outside edge of paving or curbing and has a positive outfall for trapped water.
- C. Proof-roll prepared subbase surface to check for unstable areas and verify need for additional compaction. Do not begin paving work until such conditions have been corrected and are ready to receive paving.
- D. Remove loose material from compacted subbase surface immediately before placing concrete.
- E. Provide necessary chairs or supports, and maintain position of reinforcing bars.
- F. Wet a minimum of 2 inches of sand subgrade prior to placing concrete.
- G. Place 1” minimum of washed concrete sand over prepared subgrade.

3.02 EDGE FORMS AND SCREED CONSTRUCTION

- A. Set, brace, and secure edge forms, bulkheads, and intermediate screed guides for paving to required lines, grades, and elevations.
- B. Install forms to allow continuous progress of Work and so that forms can remain in place at least 24 hours after placing concrete.
- C. Check completed formwork and screeds for grade and alignment to following tolerances:
 - 1. Top of Forms: Not more than 1/8-inch in 10-feet.
 - 2. Vertical Face on Longitudinal Axis: Not more than 1/4-inch in 10-feet.
- D. Clean forms after each use and coat with form release agent to ensure separation from concrete.

3.03 PLACING REINFORCEMENT

- A. Comply with Concrete Reinforcing Steel Institute’s recommended practice for “Placing Reinforcing Bars” for placing and supporting reinforcement.



- B. Clean reinforcement of loose rust and mill scale, earth, ice, and other bond-reducing materials.
- C. Arrange, space, and securely tie bars and bar supports to hold reinforcement in position during concrete placement. Maintain minimum cover over reinforcement.
- D. Install fabricated bar mats in lengths as long as practicable. Handle units to keep them flat and free of distortions. Straighten bends, kinks, and other irregularities or replace units as required before placement. Set mats for a minimum 2-inch overlap to adjacent mats.

3.04 CONCRETE PLACEMENT

- A. Inspection: Before placing concrete, inspect and complete formwork installation, reinforcing steel, and items to be embedded or cast in. Notify other trades to facilitate installation of their work.
- B. Moisten subbase to provide a uniform dampened condition at the time concrete is placed. Do not place concrete around manholes and other utility structures until they are at the required finish elevation and alignment.
- C. Comply with requirements and with ACI 304R for measuring, mixing, transporting, and placing concrete.
- D. Deposit and spread concrete in a continuous operation between construction joints. Do not push, drag, or use vibrators to move concrete into place.
- E. Consolidate concrete by mechanical vibrating equipment supplemented by hand-spading, rodding, or tamping. Use equipment and procedures to consolidate concrete complying with ACI 309 R.
 - 1. Consolidate concrete along face of forms with an internal vibrator. Keep vibrator away from joint assemblies, reinforcement, or side forms. Use only square-faced shovels for hand-spreading and consolidation. Prevent dislocating reinforcing and dowels.
- F. Screed paved surfaces with a straightedge and strike off. Use bull floats or darbies to form a smooth surface plane before excess moisture or bleed water appears on surface. Do not further disturb concrete surfaces prior to beginning finishing operations.
- G. Hot-Weather Placement: Place concrete complying with ACI 305R when hot weather conditions exist.
 - 1. Cool ingredients before mixing to maintain concrete temperature at time of placement 90 degrees F and below. Mixing water may be chilled or chopped ice may be used to control temperature, provided water equivalent of ice is calculated to total amount of mixing water.



2. Cover reinforcing steel with water-soaked burlap if it becomes too hot, so that steel temperature will not exceed the ambient air temperature immediately before embedding in concrete.
 3. Fog-spray forms, reinforcing steel, and subgrade just before placing concrete. Keep subgrade moisture uniform without standing water, or soft or dry areas.
- H. Cold Weather Placement: Adhere to ACI 306R - Cold Weather Concreting for installing concrete paving during cold weather.

3.05 CONCRETE FINISHING

- A. General: Wetting of concrete surfaces during screeding, initial floating, or finishing operations is prohibited.
- B. Float Finish: Begin the second floating operation when bleed-water sheen has disappeared and the concrete surface has stiffened sufficiently to permit operations. Float surface with power-driven floats, or by hand floating if area is small or inaccessible to power units. Finish surfaces to true planes. Cut down high spots, and fill low spots. Refloat surface immediately to uniform granular texture.
1. Medium-to-Fine-Textured Broom Finish: Draw a soft bristle broom across float-finished concrete surface perpendicular to line of traffic to provide a uniform, fine-line texture.
 2. Medium-to-Coarse-Textured Broom Finish: Provide a coarse finish by striating float-finished concrete surface 1/16 to 1/8 inch (1.6 to 3 mm) deep with a stiff-bristled broom, perpendicular to line of traffic.
- C. Concrete Retarder Application:
1. Grace Construction Products (888) 336-9303.
 2. Provide for containment of retarder during finishing procedures so as to protect adjacent improvements. Repair damage to adjacent improvements at no cost to Owner.
 3. Perform retardant finish in two separate stages:
 - a. First Stage: Primary wash to take place within 3 days after concrete pour. Apply retarder with a low-pressure sprayer at a rate of 250-350 sq.ft./ gal. per manufacturers' requirements.
 - b. Second stage: Wash with water rinse/light broom or pressure wash with power equipment within 6 – 24 hours after the retarder is applied. Retarder removal intervals depend on strength of mix, exposed aggregate size and desired washing techniques. Earlier washing for light etch finishes may be necessary.
- D. Exposed Aggregate Finish:
1. Water-wash;
 - a. Surface layer of mortar is removed with a light, controlled spray of water and scrubbed with a stiff brush to expose aggregate fines.



2. Retardant;
 - b. Surface layer of mortar is removed by applying an approved retardant to the finished concrete, to effect the setting of the top mortar paste, and then removing it by water-wash and/or brushing to expose aggregate to the desired finish.
- E. Sand Blast Finish:
1. Blasting Operations and Requirements:
 - a. Apply sandblasted finish to exposed surfaces where indicated.
 - b. Perform sand blasting at least 72 hours after placement of concrete.
 2. Coordinate with formwork construction, concrete placement schedule, and formwork removal to ensure that surfaces to be blast finished are blasted at the same age for uniform results.
 3. Determine type of nozzle, nozzle pressure, and blasting techniques required to match the SCRRA's control samples.
 4. Abrasive-blast corners and edges of patterns carefully, using back-up boards, to maintain uniform corner or edge line.
 5. Depths of Cut: Use an abrasive grit of the proper type and gradation to expose aggregate and surrounding matrix surface, to match the SCRRA's control samples as follows:
 - a. Brush Sand Blast Finish: Remove cement matrix to expose face of fine aggregate, no reveal (slab accents - must maintain non-slip coefficient for walking surfaces).
 - b. Light Sand Blast Finish: Expose fine aggregate with occasional exposure of coarse aggregate; max 1/16-inch reveal (wall accents).
 - c. Medium Sand Blast Finish: Generally expose coarse aggregate; 3/16-inch to 1/4-inch reveal.
 6. Surface Continuity: Perform sand blast finishing in as continuous an operation as possible, utilizing the same work crew to maintain continuity of finish on each surface or area of work. Maintain patterns of variances in depths of cuts as indicated.
 7. Construction Joints: Use technique acceptable to the SCRRA to achieve uniform treatment of construction joints.
 8. Protection and Repair:
 - a. Protect adjacent materials and finishes from dust, dirt, and other surface or physical damage during abrasive-blast finishing operations. Provide protection as required and remove from site at completion of the work.
 - b. Repair or replace other work damaged by finishing operations.
 9. Clean-Up: Maintain control of concrete chips, dust, and debris in each work area. Clean up and remove such material at the completion of each day of operation. Prevent migration of airborne materials by use of tarpaulins, wind breaks, and similar containing devices.
- G. Finish surface texture to match texture and pattern as indicated in Owner mock-up.



3.06 JOINTING

- A. Construct contraction, construction, and isolation joints to match irregular edge pattern of stamping tools with faces perpendicular to surface plane of concrete.

- B. Contraction Joints: Provide contraction joints as indicated on Drawings (or to not exceed 10-feet in either direction), to minimize random surface cracking and as indicated on approved Paving Jointing and Pour Sequence Plan provided by Contractor. Match irregular pattern of stamping tools, sectioning concrete into areas as indicated on Drawings. Construct contraction joints for a depth equal to at least one fourth of concrete thickness, as follows:
 - 1. Hand-tooled Joints: Form contraction joints in fresh concrete by grooving and finishing each joint edge with a radiused jointer tool.
 - 2. Machine-Sawn Joints: Machine-sawn joints are not permitted unless otherwise indicated on Drawings. Provide saw cut joints as soon as concrete has sufficient strength to support sawing equipment.
 - 3. Do not exceed 1/4-inch in joint width.

- C. Doweled Construction Joints: Construct doweled construction joints at end termination's of paving where paving operations are stopped for more than 1/2 hour, unless paving terminates at an isolation joint and at all edges of different paving types. Locations of doweled construction joints to adhere as closely as possible to Contractor's Paving Jointing and Pour Sequence Plan.
 - 1. Steel Dowels:
 - a. Provide smooth steel dowels across construction joints to reduce differential movement across the joint. Utilize smooth steel dowels based upon the following:
 - 1) 6-inch Thick Pavement:
 - (i) Diameter: 3/4-inch.
 - (ii) Length: 24-inches.
 - (iii) On-center Spacing: 18-inches.
 - 2) 4-inch Thick Pavement:
 - (i) Diameter: 1/2-inch.
 - (ii) Length: 24-inches.
 - (iii) On-center Spacing: 18-inches.
 - b. To assist in correct alignment of steel dowels along construction joints use plastic dowel sleeves:
 - 1) Insure that wood edge forms are true to line and grade prior to installing plastic dowel sleeves.
 - 2) Install plastic dowel sleeves on wood forms at the specified on-center dowel spacing, centered between top and bottom of wood form.
 - 3) Contact plastic dowel sleeve manufacturer for complete installation requirement.
 - 2. Do not continue tie-reinforcement through sides of strip paving.



3. Use a bond breaking agent on cured concrete edges that will be joined with fresh concrete.
 4. Immediately before new concrete is placed, wet construction joint and remove standing water.
 5. Tool edges of construction joints to match decorative field jointing.
- D. Isolation Joints: Provide isolation joints to permit horizontal and vertical movement between slab and fixed vertical edges such as building walls, steps, columns, and other vertical restraints. Locations of isolation joints to adhere as closely as possible to Contractor's Paving Jointing and Pour Sequence Plan.
1. Provide 1/4-inch thick pre-molded asphalt impregnated fiber board, backup, and caulking along edges of isolation joints.
 2. Extend pre-molded asphalt impregnated fiber board to full-width and depth of joint, not less than 1/4-inch or more than 1-inch below finished surface of slab.
 3. Furnish pre-molded asphalt impregnated fiber board in one-piece lengths for full width being placed. Where more than one length is required, lace or clip pre-molded asphalt impregnated fiber board sections together.
 4. Protect top edge of pre-molded asphalt impregnated fiber board during concrete placement with a metal, plastic, or other temporary cap. Remove protective cap after concrete has been placed on both sides of joint to facilitate installation of caulking backup.
 5. Joints for Non-Stamped Special Flooring: Tool to profile and dimensions detailed; fill with specified grout, tool grout to a concave profile.

3.07 CONCRETE PROTECTION AND CURING

- A. Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with the recommendations of ACI 305R for hot weather and ACI 306R for cold weather protection during curing.
- B. Evaporation Control: In hot, dry, and windy weather, protect concrete from rapid moisture loss before and during finishing operations with an evaporation-control material. Apply according to manufacturer's instructions after screeding and bull floating, but before floating.
- C. Begin curing after finishing concrete but not before free water has disappeared from concrete surface.
- D. Curing Methods: Cure concrete by moisture curing, moisture retaining cover curing, curing compound, or a combination of following:
1. Moisture Curing: Keep surfaces continuously moist for not less than 7 days with following materials:
 - a. Water.
 - b. Continuous water fog spray.
 - c. Absorptive cover, water saturated, kept continuously wet.



2. Cover concrete surfaces and edges with a 12-inch lap over adjacent absorptive covers.
3. Curing Compound:
 - a. Apply uniformly in continuous operation by power spray or roller according to manufacturer's directions.
 - b. Recoat areas subjected to heavy rainfall within 3 hours after initial application.
 - c. Maintain continuity of coating and repair damage during curing period.

3.08 REPAIRS AND PROTECTION

- A. Remove and replace concrete paving that is broken, damaged, defective, or does not meet the requirements of this Section.
- B. Protect concrete from damage until Final Payment. Exclude traffic from paving for at least 14 days after placement. When construction traffic is permitted, maintain paving as clean as possible by removing surface stains and spillage of materials as they occur.
- C. Maintain concrete paving free of stains, discoloration, dirt, and other foreign material until Final Payment.

3.09 CLEANUP

- A. At completion of Work, remove concrete stains from adjacent work, including but not limited to dissimilar paving types, walls, columns, railing posts, light fixtures, plant materials, to satisfaction of Owner.

3.10 PAVING FINISH SCHEDULE

- A. Provide paving finishes, as indicated on Paving Schedule on Drawings.

PART 4 MEASUREMENT AND PAYMENT

- 1.01 General: Measurement and payment for portland cement concrete paving will be either by the lump-sum method or by the unit-price method as determined by the listing of the bid item for portland cement concrete paving indicated in the Bid Schedule of the Bid Form.
- 1.02 Lump sum: If the Bid Schedule indicates a lump sum for portland cement concrete paving, the lump-sum method of measurement and payment will be in accordance with Section 01 29 73.
- 1.03 Unit Price: If the Bid Schedule indicates a unit price for portland cement concrete paving, the unit-price method of measurement and payment will be as follows:



- A. Measurement:
1. Portland cement concrete pavement will be measured for payment by the square yard for each specified class of concrete and thickness.
 2. Reinforcing steel, dowels, and tie bars will be measured separately for payment as specified in Section 03 20 00 - Concrete Reinforcing.
 3. Subgrade paper, transverse expansion joints, weakened-plane joints, and joints sawed within 5 feet of volunteer cracks, longitudinal and transverse construction joints, and longitudinal weakened-plane joints will not be measured separately for payment, and all costs in connection therewith will be considered included in the measurement of portland cement concrete pavement.
- B. Payment: Portland cement concrete paving will be paid for at the indicated Contract unit prices for the computed quantities as determined by the measurement Method specified in Article 1.03.C.1.

**END OF SECTION – 32 1313
SOUTH LA PATERA LN.**



CURBS, GUTTERS, SIDEWALKS AND DRIVES

32 16 00

PART 1 – GENERAL

1.01 SUMMARY

- A. This work includes furnishing materials, labor, transportation, services, and equipment necessary to furnish and install Minor Concrete as indicated on drawings and as specified in these Technical Specifications.
- B. Minor concrete shall include sidewalks, driveways, gutters, curbs, cross-gutters, spandrels, and curb ramps and must conform to Caltrans Standard Specification Section 73 – Concrete Curbs and Sidewalks.

1.02 RELATED SECTIONS

- A. 32 13 13 - Portland Cement Concrete Paving (Pedestrian)
- B. 31 23 00 – Earthwork
- C. 32 11 16 – Aggregate Base
- D. 32 12 16 – Asphalt Paving
- C. Caltrans Standard Specification Division VIII – Miscellaneous Construction, Section 73 – Concrete Curbs and Sidewalks

PART 2 – CALTRANS STANDARD SPECIAL PROVISIONS (SSPs)

- A. None.

PART 3 – PROJECT SPECIFIC PROVISIONS

3.02 SIDEWALKS

- A. Where indicated sidewalks shall receive scoring in accordance with the dimensions shown on the plans.

3.03 CURB RAMPS

- A. All curb ramps shall be constructed with a slope of no greater than 8.33 percent (1:12) and no less than 5% (1:20), and include the specified detectable warning surfaces as shown on the Plans and concrete aprons where shown on the Plans. Transition from bottom of ramp to gutter or apron shall be smooth with no abrupt change resulting in a flush condition between surfaces. No scoring of concrete shall be applied to top of ramp. Curb ramp slopes shall be checked using a properly calibrated digital level.



Curb ramps that do not meet the slope criteria shall be removed and reinstalled at no cost to the Owner. Any deviations from the Caltrans Standard Plans, the City Standards, these Technical Specifications, or the Plans will require approval by the Engineer.

- B. Curb ramps shall be both Caltrans Standard, City standard and modified City standard as indicated on the Plans.
- C. Concrete shall have a broom finish.

3.04 CONSTRUCTION CONTACT JOINTS

- A. A transverse (contact) construction joint shall be constructed at the end of each day's work where concrete work is to continue or where concrete placement is interrupted for more than 30 minutes, to coincide with the next weakened plane joint location.
- B. If sufficient concrete has not been mixed to form a slab to match the next weakened plane joint, when an interruption occurs, the excess concrete shall be removed and disposed of back to the last preceding joint. The cost of removing and disposing of any excess concrete shall be at the Contractor's expense. Any excess material shall become the property of the Contractor and shall be properly disposed of.
- C. A metal or wooden bulkhead (header) shall be used to form the joint. The bulkhead shall be designed to accommodate the installation of dowel bars.

PART 4 – MEASUREMENT AND PAYMENT

- A. Measurement and payment must conform to Caltrans Standard Specification Section 73 – Concrete Curbs and Sidewalks.

END SECTION - 32 16 00



PAVEMENT MARKINGS

32 17 23

PART 1 – GENERAL

1.1 SUMMARY

- A. The following items are covered in this Section:
1. For the purposes of these Specifications, traffic striping shall be defined as longitudinal centerlines and lane lines that separate traffic lanes in the same or opposing direction of travel, and longitudinal edge lines that mark the edge of the traveled way or the edge of the lanes. Curb markings shall be defined as colored markings on the curb that denote parking restrictions. Pavement markings shall be defined as transverse markings which include, but are not limited to, word and symbol markings, limit lines (stop lines), crosswalks, shoulder markings, parking stall markings, and railroad crossing markings.
 2. Pavement delineation (striping), markings and markers in the public right of way along Hollister Avenue, South La Patera Lane and Lindmar Drive must conform to Caltrans Standard Specification Division IX – Traffic Control Devices, Section 84 – Markings.

1.2 REFERENCE SPECIFICATIONS, CODES, AND STANDARDS

- A. California Manual on Uniform Traffic Control Devices (CA-MUTCD)
- B. Caltrans Standard Specification Division IX – Traffic Control Devices, Section 84 – Markings

1.3 CONTRACTOR SUBMITTALS

- A. CONTRACTOR shall submit to the City, for review, all materials specified herein in accordance with Section 013300 - Contractor Submittals and Caltrans Standard Specification Division IX – Traffic Control Devices, Section 84 – Markings.
- B. Product Data: Submit paint formulation for each type of paint or thermoplastic.

PART 2 – CALTRANS STANDARD SPECIAL PROVISIONS (SSPs)

Pavement striping including pavement delineation, marking and markers in the public right of way including Hollister Avenue, South La Patera Lane and Lindmar Drive must conform to Caltrans Standard Specification Section 84 – Markings.



All pavement delineation and marking must be thermoplastic, except the green pavement marking may be painted (2 coats).

Add to section 84-2.01C:

Submit surface frictional properties test results for each lot or batch of preformed thermoplastic.

Submit the manufacturer’s material data for the surface preparation adhesive before it is applied to precondition the pavement surface.

Add to section 84-2.01D(2):

Within 30 days of application, test the skid resistance of the preformed thermoplastic pavement markings under ASTM E303.

Replace section 84-2.02H:

4-2.02H Preformed Thermoplastic Pavement Markings

Preformed thermoplastic pavement markings must:

1. Conform to AASHTO designation M249, except it must be supplied in a preform state and may be a color other than white or yellow
2. Be on the Authorized Material List for signing and delineation materials
3. Be free from lead, chromium, arsenic, cadmium, barium, and other toxic metals
4. Have glass beads embedded to depth of 60 percent of their diameters
5. Have resealing characteristics and be capable of fusing with itself
6. Be resistant to sunlight, water, salt, or adverse weather conditions and must be impervious to motor fuels, lubricants, hydraulic fluids, oil, and gasoline

The application of preformed thermoplastic pavement markings must not damage the underlying pavement.

Preformed thermoplastic pavement markings must be sufficiently flexible and cohesive at temperatures above 50 degree F and must not fracture prior to application.

Preformed thermoplastic pavement markings must have a minimum thickness of 90 mils.

Preformed thermoplastic pavement markings must affix to all types of pavements and must not lift, shift, smear, spread, flow, or tear by traffic.

Add to section 84-2.03B(1):

The retroreflectivity of applied preformed thermoplastic pavement markings must comply with the requirements shown in the following table:

Preformed Thermoplastic Retroreflectivity Requirements

Traffic stripe material	White (min, mcd ^{m-2} lx ⁻¹)	Yellow (min, mcd ^{m-2} lx ⁻¹)	Other colors (min, mcd ^{m-2} lx ⁻¹)
Preformed thermoplastic	250	125	125



The applied preformed thermoplastic pavement marking must have a skid resistance value of 60.

Add to section 84-2.03B(2):

84-2.03B(2)(e) Preformed Thermoplastic Pavement Markings

After cleaning the surfaces, apply sealer or primer as recommended by the manufacturer.

Apply the preformed thermoplastic under the manufacturer's instructions. You may use a surface preparation adhesive to precondition the pavement surface.

Preformed thermoplastic pavement markings must be ready for traffic immediately after application.

Add to section 84-2.03B(7):

Contrast for preformed thermoplastic pavement markings consists of a black border with a width from 2 to 4 inches. The borders must be nonreflective film bonded to the outer edge of the marking.

Replace the 2nd paragraph of section 84-2.03B(2)(b) with:

Apply extruded thermoplastic for traffic stripes in a single pass at a rate of at least 0.405 lb/ft of 6-inch-wide solid stripe. The applied thermoplastic must be at least 0.080 inch thick.

PART 3 – MEASUREMENT AND PAYMENT

- A. Measurement and payment must conform to Caltrans Standard Specification Section 84 – Markings.

END OF SECTION - 32 17 23



SECTION 32 90 00

PLANTING

PART 1 – GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, shall apply to all work in this Section with the same force and effect as though repeated in full herein.

1.02 SUMMARY

- A. Furnish all materials, labor, transportation, services, and equipment necessary to install landscape planting as shown on the Drawings and as specified herein.
- B. Work included in this Section:
 - 1. Fine grading.
 - 2. Soil preparation.
 - 3. Pre-plant weed control.
 - 4. Tree, shrub and ground cover planting.
 - 5. Tree staking and guying.
 - 7. Mulching.
 - 9. Concrete mowstrip installation.
 - 10. Hydroseeding
 - 11. Clean-up.
- C. Work related in other Sections:
 - 1. Section 32 01 90 – Operations and Maintenance of Planting

1.03 REQUIREMENTS OF REGULATORY AGENCIES

- A. All Federal, State, and local laws and regulations governing this work are hereby incorporated into and made part of this Section. When this Section calls for certain materials, workmanship or a level of construction that exceeds the level of Federal, State, or local requirements, the provisions of this Section shall take precedence.

1.04 REFERENCE STANDARDS

- A. All plant material shall be true to botanical and common name as indicated in "An Annotated Checklist of Woody Ornamental Plants of California, Oregon and Washington", (Number 4091)" published by the University of California School of Agriculture - 1979.



- B. "American Standard for Nursery Stock" edition 1985 by The American National Standards Institute for plant materials.
- C. Hortus Third", 1976; Cornell University for plant nomenclature.
- D. All plant material shall conform to the California State Department of Agriculture's regulation for nursery inspections, rules and ratings.

1.05 QUALITY CONTROL

- A. Manufacturer's Directions - manufacturer's directions and drawings shall be followed in all cases where the manufacturers of articles used in this Specification furnish directions covering points not shown in the Drawings and Specifications.
- B. Permits, Fees, Bonds and Inspections - the Contractor shall pay for any and all permits, fees, bonds and inspections necessary to perform and complete his portion of the Work.
- C. Plant Source Quality - submit written documentation to the Owner's Authorized Representative within 25 days of Contract award that the plant material listed on the Drawings is available. Any substitutions required due to unavailability must be requested in writing prior to confirmation of ordering.
- D. Upon execution of the order, the Owner's Authorized Representative has the option of either inspecting the plant material at the source of growth, requesting representative color photos, or inspecting the material as it is being delivered to the site for conformity to the Drawings and Specifications. Such approvals shall not impair the right of additional inspections during further progress of the Work.
- E. Any tagging of plant material by the Owner's Authorized Representative does not constitute his approval of the plant materials' health and vigor. The health and vigor of the plant material is the sole responsibility of the Contractor.
- F. Submit written request to the Owner's Authorized Representative for inspection of the specified plant material, either at the place of growth or by color photographs. Requests for inspection shall state the place of growth and the quantity and variety of plant material.
- G. The Owner's Authorized Representative reserves the right to refuse inspection if in his judgment, a sufficient quantity of plant material at that time is not available for inspection.



H. Topsoil Inspection

1. Within 25 days of contract award, furnish source of topsoil to the Owner's Authorized Representative for purpose of soil inspection.
2. Take representative soil samples from areas identified in the Drawings.
3. Soil samples shall be tested for pH, alkalinity, total soluble salts, porosity, sodium content, organic matter and soil preparation recommendations.
 - i. Soil Fertility: Half-saturation percent, pH, salinity, nitrate, ammonium, phosphate, potassium, calcium, magnesium.
 - ii. Agricultural Suitability: pH, salinity, boron, Sodium Absorption Ratio (SAR) using saturation paste extract.
 - iii. Particle Size/Appraisal: pH, salinity, organic percent, USDA Particle size.
 - iv. Germination (bio-assay) test.
 - v. Tendency towards compaction.

I. Within 25 days of contract award, furnish source of topsoil to the Owner's Authorized Representative for purpose of soil inspection.

J. Take representative soil samples from areas identified in the Drawings.

K. The Soil Analysis Report shall include a statement that the laboratory has reviewed the planting plan and the planting specifications, and that its recommendations respond to the specific needs of the project.

L. Certificates: certify compliance with accepted soil mixes and amendments, including Rates of applications.

1.06 QUALIFICATIONS

A. The applicator of all weed control materials shall be licensed by the State of California as a Pest Control Operator and a Pest Control Advisor in addition to any subcontractor licenses that are required.

B. Landscape Contractor shall have a minimum 5-years experience installing plants for similar project types.

1.07 SUBMITTALS

A. The Contractor shall submit no later than 30 days after the award of Contract (2) bound booklets containing the following landscape information:



1. List of all proposed landscape materials indicated by description, manufacturer and model number. Include catalog cuts of all items.
 2. List of all trees indicated by botanical name, common name, quantity, size, nursery and location and any specific remarks, i.e. "unable to locate", "photo submitted", etc. The tree list is to be accompanied with color photographs of each tree type and size with specifications, i.e. height, spread and caliper. Include a person in each photograph for scale purposes.
 3. List of all shrubs and ground covers indicated by botanical name, common name, size, nursery and location and specific remarks, i.e. "unable to locate", "photo submitted", etc.
 4. Soil amendment receipts containing analytical data and physical samples of all specified amendments.
 5. Receipts from the soil supplier of all soil mixes specified in this section.
- B. The Contractor shall submit no later than 30 days after the award of Contract the following physical samples sent to the Owner's Authorized Representative in plastic bags:
1. Shredded bark mulch.
 2. Certificates
 3. Compliance with State of California and federal quarantine restrictions.
- C. Weed, Insects & Pest Control
1. Prior to the installation of any weed control materials, the Pest Control Advisor shall submit to the Owner's Authorized Representative, a list of the weed control materials and quantities per acre intended for use in controlling the weed types prevalent and expected on the site.
 2. The Pest Control Advisor shall furnish data to demonstrate the compatibility of the weed control materials and methods with the intended planting and seed varieties.
 3. Submit to Owner's Authorized Representative proof of required governmental permits for the use of pesticides, insecticide and herbicides.

1.08 SUBSTITUTIONS

- A. Substitutions shall be in accordance with "General Provisions".
- B. Specific reference to manufacturer's names and products specified in this Specification are used as standards of quality, this implies no right to the Contractor to substitute other materials without prior written approval by the Owner's Authorized Representative.
- C. Any materials installed without written approval by the Owner's Authorized Representative may be rejected.
- D. If an approval is granted for a substitution, adjustment in the Contract amount will be made in accordance with the Contract Conditions.

1.09 SAMPLES, TESTS AND MOCK-UPS



- A. The Owner’s Authorized Representative reserves the right to take and analyze selected samples of plant material for conformity to this Specification at any time. Rejected plant material shall be removed from the site and be replaced by the Contractor at no cost to the Owner.

1.10 PROJECT CONDITIONS

- A. Perform planting operations only when weather and soil conditions are suitable in accordance with locally accepted practice.

1.11 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Delivery
 1. Deliver all plant material with legible and durable identification labels.
 2. Deliver fertilizer to the site in original, unopened containers bearing the manufacturer's name, guaranteed chemical analysis, and its conformance to California State Law.
 3. Notify the Owner’s Authorized Representative within seven (7) days of the delivery of plant material to the site. Indicate the quantity and type of plant material in each delivery.
- B. Storage
 1. Store plant materials in the shade and protect from the weather.
 2. Maintain and protect plant material not planted within four (4) hours of delivery.
- C. Protection
 1. Protect plant material during delivery and to the site and after, in order to prevent damage to the root ball or desiccation of leaves.
- D. Handling
 1. Take extreme care in the loading and unloading of plant material. Do not pick up container plants by the stems or trunks.
 2. Any plant material that has been damaged due to mishandling shall be removed and replaced with new material.

1.12 REJECTION OF PLANT MATERIAL

- A. All plant material not conforming to the requirements herein, shall be considered defective. Such plants, whether in place or not, shall be marked as rejected and immediately removed from the site and replaced with new material at the full expense of the Contractor.

Replacement plant material shall be of the same size, specie and condition as that indicated on the Drawings.

1.13 PROTECTION OF THE SITE



- A. Protect previously installed work and materials which may be affected by work of this Section. Provide safeguards and exercise caution against injury or defacement of existing site improvements.
- B. The Contractor shall be responsible for any damage resulting from his landscape planting operations. Repair damage and return the area to the previous condition at no additional cost to the Owner.

1.14 COORDINATION

- A. The Contractor shall notify the General Contractor and all other trades related to the installation of his work, so as to allow sufficient time for those contractors' to perform their portion of the work.
- B. Determine the locations of underground utilities and perform work in a manner which will avoid damage to the utilities.

1.15 GUARANTEE

- A. The manufacturer's warranty shall not relieve the Contractor of his own liability under the guarantee. Such warranties shall only supplement the guarantee.
- B. All plant material installed under this Contract shall be guaranteed against poor, inadequate and inferior quality and installation for a period of 1 year from the date of Final Acceptance. Any plant material not meeting the satisfaction of the Owner's Authorized Representative shall immediately be removed and replaced at no cost to the Owner. Replaced plant material will also be guaranteed for a period of 1 year upon installation.
- C. Replace without cost to the Owner and as soon as weather permits, all dead plants and all plants not found in a vigorous, thriving condition, as determined by the Owner's Authorized Representative during and at the end of the plant warranty period. Replacement of plants shall closely match adjacent specimens of the same specie and shall be subject to all requirements of this section.
- D. Repair damage to adjacent plant material caused by the Contractor's work at no cost to the Owner. All repairs shall be made with materials, varieties, sizes "in kind" with adjacent existing materials.

E. **Guarantee for Planting**



We hereby guarantee that the planting we have furnished and installed is free from defects in materials and workmanship and the work has been completed in accordance with the drawings and specifications, ordinary wear and tear and unusual abuse or neglect excepted. We agree to replace plants 15 gallons and larger for one (1) year after acceptance due to plant's dying or partially dying, thereby damaging shape, size or symmetry. Including damages consequential to defects in materials and workmanship and repair or replacement, which develop during one (1) year after Final Acceptance of the work, at no additional cost to the Owner. We agree to make such repairs and replacements within thirty (30) days after receipt of written notice. In the event of our failure to make such repairs and replacements within thirty (30) days of written notice, we authorize the Owner to proceed to have such repairs and replacements made at our expense and will pay all costs and charges upon demand:

Date of Final Acceptance:

Signed:

Company Name:

Address:

PART 2 - PRODUCTS

2.01 PRE-EMERGENT WEED CONTROL

- A. Pre-emergent weed control to be EPA registered and recommended by a licensed Pest Control Advisor. Ronstar-G, Treflan, Eptam, Vegitex, or approved equivalent.

2.02 PLANTING SOIL

- A. Reuse of Stockpiled On-Site Soil
Stockpiled on-site soil may be available from the Owner's stockpile for use if it complies with the criteria in 2.02B. Soils for miscellaneous landscape areas are classified as 2-inch minus.
- B. Topsoil shall be obtained from sources within the site of the work, or shall consist of imported topsoil obtained from sources outside the site, or from both such sources. Stripped site soil, if used as topsoil, shall meet the requirements specified herein.
- C. Topsoil shall consist of fertile, friable soil of loamy character, and shall contain organic matter in amounts normal to the region. Imported topsoil shall be obtained from well-drained arable and fertile agricultural land and shall be free from refuse, roots, heavy or stiff clay, stones larger than one inch in size, coarse sand, noxious seeds, sticks, brush, litter, grasses, weeds, toxic waste, and other deleterious substances detrimental to the health of plants, animals, and humans. Imported topsoil



shall be capable of sustaining healthy plant life.

- D. Topsoil shall have no inherent tendency towards compaction due to texture or soil structure or both as indicated in the soils analysis.
- E. Soil Characteristics for Stockpiled Native Soil
1. Composition for 3/8-inch minus topsoil - fertile, friable, well-drained soil of uniform quality, free of materials larger than 3/8" in diameter such as sticks, rocks, concrete, oils, chemicals and other deleterious materials.
 2. Composition for 2-inch minus topsoil - fertile, friable, well-drained soil of uniform quality, free of materials larger than 2" in diameter such as sticks, rocks, concrete, oils, chemicals and other deleterious materials.
 3. Soil Analysis - If soil has not been tested within 30 days of the date of delivery to the project, obtain an agricultural suitability and chemical analysis of the proposed soil from a company as determined by the Owner's Authorized Representative. Cost of the testing will be paid for by the Contractor. The soil report is to include the following information:
 4. Elemental Analysis: Nitrate Nitrogen, Phosphorus, Potassium, Calcium, Magnesium, Sulfur, Sodium Zinc, Iron, Copper, Manganese, Boron and free Lime.
 5. Other: pH factor, % base saturation, electrical conductivity, mechanical analysis, % of organic content, cation exchange capacity (C.E.C.).
 6. Recommendations: Type and quantity of additives required to establish satisfactory pH factor and supply of nutrients to bring topsoil to a satisfactory level for planting.
 7. All stockpiled native soil to be used from 3/8-inch minus topsoil is to be amended at the levels listed in this Section as part of the base bid. Additional amendments, if requested by the Owner's Authorized Representative are not part of the contract and the Contractor will be compensated for this work on a Time and Materials basis. Rates for labor and equipment will be charged according to the Construction Contract.
- C. Imported Top Soil
1. In order to insure conformance with this Specification, soil samples shall be taken by the Contractor and submitted to a qualified soil testing laboratory for analysis prior to planting i.e., Wallace Laboratories, (310) 615-0116 or approved equivalent. The Owner's Authorized Representative shall monitor the Contractor's soil sampling.
 2. Use natural friable soil of the local region, free from lumps, toxic substances sticks, debris, vegetation or stones over 1-inch in diameter.
 3. Silt plus clay content shall not exceed 20% by weight with a minimum 95% passing the 2.0 millimeter sieve.
 4. Sodium absorption ratio (SAR) shall not exceed 6.



5. Electrical conductivity (ECe) of the saturated extract of this soil shall not exceed 3.0 millimeters per centimeter at 25 centigrade.
6. Boron content shall not exceed (1) part per billion as measured on the saturation extract.
7. Thoroughly blend the planter mix and amendments through a soil blender before placing the soil.

2.03 SOIL AMENDMENTS

- A. Peat Moss - natural product of sphagnum moss, reed, or sedge peat, taken from a fresh water site, free from lumps, woody material, stones and other foreign matter.
- B. Soil Sulfur - agricultural grade sulfur containing a minimum of 99% sulfur (expressed as elemental).
- C. Iron Oxide - 45% iron (expressed as metallic iron), derived from iron oxide with micronutrients.
- D. Calcium Carbonate - 95% lime as derived from oyster shells.
- E. Gypsum - agricultural grade product containing 98% minimum calcium sulfate.
- F. Iron Sulfate - 20% iron (expressed as metallic iron), derived from ferric and ferrous sulfate, 100% sulfur (expressed as elemental).
- G. Ground Limestone - agricultural limestone containing not less than 85% of total carbonates, ground to such fineness that 50% will pass a #1000 sieve and 90% will pass a #20 sieve.
- H. Dolomite Lime - agricultural grade mineral soil conditioner containing 35% minimum magnesium carbonate and 49% minimum carbonate, 100% passing the #65 sieve.
- I. Sulfate of Potash - agricultural grade product containing 50% to 53% of water soluble potash.
- J. Single Superphosphate - commercial grade product containing 20% to 25% available phosphoric acid.
- K. Ammonium Sulfate - commercial grade product containing approximately 21% ammonia.
- L. Ammonium Nitrate - commercial grade product containing approximately 34% ammonia nitrogen.



- M. Urea Formaldehyde - granular commercial product containing 38% nitrogen.
- N. IBDU (Iso Butldiene Diurea) - commercial grade product containing 31% nitrogen.
- O. Iron: Gro-Power Premium Green Iron - 45% Fe, non-staining.

2.04 FERTILIZERS

- A. General Purpose Soil Conditioner Fertilizer (5-3-1)
 - 1. Consisting of the following minimum percents by weight:
 - 5% Nitrogen
 - 3% Phosphoric Acid
 - 1% Potash
 - 50% Humus
 - 15% Humic Acids
 - 1% Soluble Metallic Iron
 - 2. Soil Conditioner Fertilizer shall be "Gro-Power Plus", as manufactured by Gro-Power (909) 393-3744 or approved equivalent.
 - 3. General Purpose Soil Conditioner Fertilizer with Soil Penetrant (5-3-1)
 - 4. Soil conditioning fertilizer for use in areas of clay, adobe soils or soils high in salt, sodium boron or pH consisting of the following minimum percents by weight:
 - 5% Nitrogen
 - 3% Phosphoric Acid
 - 1% Potash
 - 50% Humus
 - 15% Humic Acids
 - 4% Sulfur
 - 1% Soluble Metallic Iron
- B. Pre-Plant Fertilizer (16-20-0)
 - 1. Ammonium phosphate consisting of the following minimum percentages by weight:
 - 16% Nitrogen
 - 20% Phosphoric Acid
 - 0% Potash
 - 2. Pre-Plant Fertilizer shall be Best "16-20-0", as manufactured by J.R. Simplot Company (800) 992-6066, or approved equivalent.
- C. General Purpose Planting Fertilizer (12-12-12)
 - 1. Pelleted or granular form shall consist of the following minimum percents by weight:



- 12% Nitrogen
 - 12% Phosphoric Acid
 - 12% Potash
 - 2. General Purpose Planting Fertilizer shall be Best "Triple Twelve", as manufactured by J.R. Simplot Company (800) 992-6066, or approved equivalent.
- D. Controlled Release Fertilizer (12-8-8)
- 1. Consisting of the following minimum percents by weight:
 - 12% Nitrogen
 - 8% Phosphoric Acid
 - 8% Potash
 - 25% Humus
 - 5% Humic Acids
 - 2. Acceptable product - "Gro-Power Controlled Release", as manufactured by Gro-Power (909) 393-3744, or approved equivalent.
- E. Planting Tablets (20-10-5)
- 1. Shall be 7 gram, 24-month release, non-burning tablets containing the following percentages of nutrients by weight:
 - 20% Nitrogen
 - 10% Phosphoric Acid
 - 5% Potassium
 - 2.5% Humic acids
 - 2. Acceptable product - "Gro-Power Planting Tablets", as manufactured by Gro-Power (909) 393-3744, or approved equivalent.

2.05 PLANT MATERIAL

- A. General Plant Condition
- 1. Furnish nursery-grown trees and shrubs conforming to ANSI Z60.1, with healthy root systems developed by transplanting or root pruning. Provide well-shaped, fully-branched, healthy, vigorous stock free of disease, insects, eggs, larvae, and defects such as knots, sun scald, injuries, abrasions, or other objectionable disfigurements.
 - 2. Grade: Provide trees and shrubs of sizes and grades conforming to ANSI Z60.1 for type of trees and shrubs required. Trees and shrubs of a larger size may be used if acceptable to the City of Goleta, with a proportionate increase in size of roots or balls.
 - 3. Plant material shall be grown under climatic conditions similar to those in the locality of the project unless approved otherwise by the Owner's Authorized Representative.



4. Label at least 1 tree and 1 shrub of each variety and caliper with a securely attached, waterproof tag bearing legible designation of botanical and common name.
5. The use of plant material larger than that specified on the Drawings may be used, pending approval from the Owner's Authorized Representative, however, there will be no change in the Contract amount if the larger plant material is approved and used.

B. Trees and Shrubs

1. Tree and shrub trunks shall be sturdy and well hardened with vigorous and fibrous root systems which are not root-bound.
2. In the event of a disagreement as to the condition of the root system, the root conditions of the plants furnished by the Contractor will be determined by the removal of soil around the roots of not less than 10 plants or more than 2% of the total number of plants of each specie.
3. When container grown plants are supplied from several sources, the roots of not less than 10 plants of each species from each source will be inspected. In case the plants sampled are found to be defective, the Owner's Authorized Representative has the right to reject the entire lot represented by the defective sample. Any plant material rendered unsuitable for use because of this inspection will be considered as samples and will be provided at the full expense of the Contractor.

C. Nursery Grown and Collected Stock

1. Nursery grown and collected stock shall be grown under climatic conditions similar to that found in the locality of the site.

D. Container Grown Stock

1. Container grown stock shall be in a vigorous and healthy condition, not root bound or with the root system hardened off.

2.06 AUXILIARY ACCESSORIES

A. Tree Stakes and Guys

1. Wood stakes - 2" diameter by 10 feet Lodgepole Pine stake without splits or bowing. Refer to the Drawings for which trees receive wood stakes.
2. Guy and Tie Wire: ASTM A 641 (ASTM A 641M), Class 1, galvanized-steel wire, 2-strand, twisted, 0.106 inch (2.7 mm) in diameter.
3. Guy Cable: 5-strand, 3/16-inch (4.8-mm) diameter, galvanized-steel cable, with zinc-coated turn buckles, 3-inch- (75-mm-) long minimum, with two 3/8-inch (10- mm-) galvanized eyebolts.



4. Hose Chafing Guard: Reinforced rubber or plastic hose at least 1/2 inch (13 mm) in diameter, black, cut to lengths required to protect tree trunks from damage.
 5. Flags: Standard surveyor's plastic flagging tape, white, 6 inches (150 mm) long.
 6. Turnbuckles - 6" long, galvanized eye/hook type.
 7. Wire Clamps - 3/4" galvanized "U" clamps.
- B. Top Dressings
1. Organic Mulch: Organic mulch, free from deleterious materials and suitable as a top dressing of trees and shrubs, consisting of one of the following:
 - a. Type: Ground or shredded bark.
 - b. Type: Wood and bark chips.
 2. Fiber Mulch: Biodegradable dyed-wood cellulose-fiber mulch, nontoxic, free of plant growth- or germination-inhibitors, with maximum moisture content of 15 percent and a pH range of 4.5 to 6.5.
- C. Erosion Control Materials
1. Blankets: Biodegradable wood excelsior, straw, or coconut-fiber mat enclosed in a photodegradable plastic mesh. Include manufacturer's recommended steel wire staples, 6 inches (150 mm) long.
 2. Staples - 11-gauge, 6" x 1" looped wire.
 3. Fiber Mesh: Biodegradable twisted jute or spun-coir mesh, 0.92 lb per sq. yd. (0.5 kg per sq. m) minimum, with 50 to 65 percent open area. Include manufacturer's recommended steel wire staples, 6 inches (150 mm) long.
- D. Weed Barrier Fabric
1. Permeable weed barrier fabric "Typar" as manufactured by Reemay approved equivalent.
- E. Tree Root Barriers
1. Tree root barriers as supplied by Deep Root Corporation (Catalog #UB 24-2) or Root Solutions Root Guide Barrier by Root Solutions, Inc. (415)434-3072, or approved equivalent. Provide commercially available manufactured root barriers, consisting of polyvinyl chloride or polypropylene sheeting having ultraviolet inhibitors and a minimum thickness of 0.085 inch. Barriers shall be either factory preformed into the circular shape shown, or have an integrated joining system for instant assembly into the final shape. Glued joints will not be acceptable.

Root barrier sheeting shall have horizontal tabs to prevent root growth from lifting the barrier. These tabs shall be spaced vertically not less than 8 inches



on centers, and horizontally not less than 8 inches on centers. Depth of these tabs shall be not less than 3/8 inch at its widest point.

Root barrier sheeting shall have vertical fins running the full length on the inside face of the barrier at 90 degrees to the inside face, to direct root growth downwards. These fins shall be not less than 6 inches on centers, and its width shall be not less than 1/2 inch.

F. DECOMPOSED GRANITE

1. Decomposed granite shall be crushed granite rock screenings, graded from 1/4-inch particles to dust, with uniform tan or buff color. Decomposed granite shall conform with the following aggregate gradation:

<u>Sieve Size</u>	<u>% Passing</u>
No. 4	95-100
No. 30	30-50
No. 200	5-15

2. Binder/Stabilizer shall be a polymer based, water resistant (once cured), non-toxic, and clear in color. Compressive strength of the decomposed granite mixed with the binder/stabilizer shall result in a minimum 5,000 pounds stability per ASGTMD 1559, per manufacturer's data.

G. Concrete Header

1. Refer to construction details as specified on the drawings.

G. Wood Header

1. 2" x 4" Pressure – treated redwood.
2. Nails shall be hot dipped galvanized common nails.

PART 3 - EXECUTION

3.01 RENOVATION AND PREPARATION OF EXISTING SOIL

- A. Contractor shall prepare Horticultural soil samples taken in (6) selected locations for initial horticultural analysis and soil amendment recommendations. See drawings for locations.
- B. The contractor's Soil Scientist shall examine the site prior to preparing recommendations.
- C. Contractor shall perform soil renovation procedures to the soil as required by soils report.



3.02 CULTIVATION OF EXISTING SOIL

- A. In areas where topsoil will not be applied, rip or cultivate the existing soil that will be receiving planting to a depth of at least 10-inches immediately prior to applying soil amendments.
- B. In areas where topsoil will be applied the following procedures are to be followed:
- C. Verify that subgrades for installation of topsoil have been established under rough grading, subgrade depth plus specified depth of topsoil should equal finished grade. Do not spread topsoil prior to the Owner's Authorized Representative acceptance of all subgrade work.
- D. Rip or cultivate subgrade in all planting areas to a minimum depth of 10-inches immediately prior to spreading topsoil.
- E. Remove all rocks, stones, sticks and debris larger than 1-inch in diameter from the surface of the subgrade prior to applying topsoil.

3.03 SOIL SCARIFICATION

- A. Planting areas which become compacted in excess of 85% relative compaction due to construction activities, shall be thoroughly cross-ripped to a minimum depth of 9-inches to alleviate the condition, taking care to avoid existing subsurface utility lines, if present.

3.04 VERIFICATION OF EXISTING CONDITIONS

- A. Prior to the work in this Section, examine previously installed work from other trades and verify that such work is complete and as required, to the point where this installation may commence properly.

3.05 ROUGH GRADING CERTIFICATION

- A. Obtain the Owner's Authorized Representative's written certification that indicates that final rough grade has been set by previous contractors to plus or minus 0.10-foot prior to commencing fine grading operations.

3.06 FINE GRADING OPERATIONS

- A. Ensure that the top 2-inches of soil is free of stones, roots, stumps, wire, or other deleterious matter 1-inch in diameter and larger. Dispose of debris offsite.
- B. All planting areas to be fine graded to within 1-1/2-inches of paved areas and concrete mowstrips.
- C. Upon acceptance of rough grade by the Owner's Authorized Representative and prior to beginning planting operations, finish grade all planting areas, fill as needed and remove



surplus soil and float areas to a smooth, uniform grade to elevations as indicated on the Drawings. Obtain the Owner's Authorized Representative approval of the fine grading prior to commencing planting operations.

3.07 SURFACE DRAINAGE OF PLANTING AREAS

- A. The Contractor shall bear final responsibility for properly draining all planting areas. Any discrepancy in the Drawings or Specifications, obstructions on the site, or prior work done by another contractor, which the Contractor feels precludes establishing proper drainage, shall be brought to the immediate attention of the Owner's Authorized Representative for correction or relief of said responsibility. The Contractor is to insure proper drainage of all planting areas at a minimum of 2% slope.

3.08 SOIL PREPARATION

- A. After finish grades for all landscaped areas have been established and approved by the Owner's Authorized Representative perform the following operations:
- B. Cross-rip all area to a depth of 9-inches.
- C. Spread organic amendments uniformly on the surface of the soil and cultivate thoroughly into the top 4-6 inches in a minimum of two directions with a mechanical rototiller.
- D. The following soil amendments and fertilizers are to be used for bid purposes only. Specific amendment recommendations will be made after horticultural soil samples are taken and paid for by the Contractor and analyzed. Application rates per 1,000 square feet shall be as follows:
 - Nitrolized Fir bark - 6 cu. yds.
 - Planting fertilizer - 200 lbs. of Gro-Power Plus.
 - Agricultural gypsum - 100 lbs.
 - Soil sulfur - 20 lbs.
- E. After applying soil amendments and prior to planting, water with overhead spray so that a minimum of 1-3 inches of good quality water passes through the soil profile.

3.09 BACKFILL MIX FOR SHRUBS AND TREES

- A. The following backfill mix is for bid price basis only. Final backfill recommendations will be made only after rough and fine grading operations are completed and horticultural soil testing has been performed and paid for by the Contractor and approved by the Owner's Authorized Representative.
 - 7 parts by volume on-site soil.
 - 3 parts by volume nitrolized stabilized Fir bark.
 - 2 lbs. iron sulfate per cubic yard of mix.
 - 18 lbs. of Gro-Power Plus per cubic yard of mix (or approved equivalent).
 - Planting tablets - quantity based on size of plant.



- B. Thoroughly blend the backfill mix prior to placement.
- C. Do not apply iron sulfate over paved materials since severe staining is likely to occur.

3.10 PRE-PLANT WEED CONTROL

- A. Clear and remove existing weeds by mowing or grubbing to at least 1/4-inch below the soil surface.
- B. Fertilize areas to receive planting with urea 46-0-0 commercial fertilizer at the rate of 1/2-pound per 1,000 square feet.
- C. Water area thoroughly and continuously for a period of 3 consecutive weeks. Employ a specific watering duration and frequency program designed to germinate all residual weeds.
- D. After sufficient weed germination is present, apply a post-emergent contact weed killer according to the directions of the manufacturer.
- E. Allow for a sufficient period of time to ensure that the weeds are dead and the weed killer has dissipated before applying a second weed kill.
- F. Water planting areas thoroughly and continuously for a period of 3 weeks. Discontinue the watering process for 1 day prior to the second application of the herbicide. Reapply the spraying operation with a straight contact weed killer according to the pest control adviser's recommendations. Avoid any watering for a minimum of 4 days for effective weed kill.
- G. After the second weed kill, water planting areas thoroughly and continuously for 3 consecutive days to saturate upper layers of soil prior to commencing planting operations.

3.11 TREE PIT PERCOLATION TESTING

- A. Due to the potential of standing water in the tree pits, Contractor is to perform a tree pit percolation test (for trees larger than 15 gallon only) in each tree pit prior to planting the tree. Fill the tree pit to the top with water. If the water has not drained by more than 95% within 24 hours, do not plant the tree and bring this to the immediate attention of the Owner's Authorized Representative. The Contractor may be required to install a drainage sump in the existing plant pit. Substitute plant pits are the responsibility of the Contractor under the Base Bid. Drainage sumps are not part of the Base Bid and compensation will be awarded to the Contractor based on an itemized amount to be provided by the contractor in the Construction Agreement.
- B. Submit written results of each plant pit percolation test with locations, date and time of test to the Owner's Authorized Representative.

3.12 CONCRETE MOWSTRIP LAYOUT



- A. Concrete mowstrips shall be laid true to line and grade. Protect adjacent improvements and existing landscape from damage.
- B. Refer to construction details as specified on the drawings.

3.13 PLANTING OPERATIONS

- A. Planting Layout
 - 1. It is the Contractor's responsibility to verify with the Owner's Authorized Representative's site superintendent and local governing agencies the location and depth of all underground utilities. If any underground construction or utility lines are encountered in the excavation of planting holes, alternative planting locations may be selected by the Owner's Authorized Representative.
 - 2. Locations for all shrubs and trees shall be marked on the ground either by flagged grade stakes indicating plant type and size or the actual plants themselves for the Owner's Authorized Representative's review and approval prior to planting.
- B. General Planting Guidelines
 - 1. Plant only as many plants that can be planted and watered on that same day in a given planting area.
 - 2. Protect the planting area from excessive vehicle compaction.
 - 3. Face plant material with fullest growth into the prevailing wind and/or the primary direction of view.
 - 4. Center plant material in the planting hole.
 - 5. Set plant material plumb and hold rigidly in place until soil has been tamped firmly around the rootball.
 - 6. Planting pits shall have vertical sides and roughened surfaces. The size of the plant pit shall be twice the diameter and only as deep as the rootball itself.
- C. Container Removal
 - 1. Plant containers shall be opened and removed in such a manner that the soil surrounding the rootball shall not be broken.
 - 2. Do not injure the root ball while removing the container. After removing plant, superficially cut edge roots with a knife on three (3) sides.
- D. Tree Box Removal
 - 1. Remove the bottom of the box before planting.
 - 2. Remove the sides of the box without damaging the rootball after positioning the tree and partially backfilling the plant pit.
- E. Shrub and Tree Installation
 - 1. Apply backfill mix to the plant pit up to 1/2 the height of the rootball. Add water to the top of the remaining plant pit and let soak in before completing the remainder of backfilling.
- F. Placement of Plant Tablets



1. Prior to planting, place the required amount of planting tablets per plant size on top of each root ball while the plants are still in their containers so that the Owner's Authorized Representative can easily verify their existence and quantity.
 2. After obtaining approval by the Owner's Authorized Representative on plant tablet quantity and after water has completely drained from the plant pit, add plant tablets to the planting pits in the following quantities:
 - 1 gallon - 3 tablets
 - 5 gallon - 8 tablets
 - 15 gallon - 14 tablets
 - 24" box - 15 tablets
 - 36" box - 19 tablets
 - 48" box – 24 tablets
 3. Dig planting pit to the recommended depth.
 4. Backfill the plant pit to attain the proper level for the plant.
 5. Place the specified amount of plant tablets between the bottom of the rootball but not higher than 1/3 of the way up the rootball. Space the plant tablets equally around the perimeter of the rootball approximately 2" from the rootball.
 6. Finish backfilling of the planting pit by tamping the soil firmly around the rootball and watering thoroughly.
- G. Final Backfilling
1. Once the water has soaked in thoroughly, place the remaining backfill and tamp firmly.
 2. After final backfilling, construct an earthen basin around the base of each plant with backfill mix sufficient to hold water for the following plant sizes:
 - 1 gallon - 2-inches of water.
 - 5 gallon through 24" box - 3-inches of water.
 - 36" box and larger - 4-inches of water.
- H. Plant Settling
1. Any plant material that has settled deeper than the surrounding grade shall be raised to the correct level.
- I. Ground Cover Planting
1. Ground cover flats shall contain sufficient moisture to reduce soil separation when lifting out the plants.
 2. Plant ground covers in straight rows, evenly, triangular spaced, and at an on-center spacing as indicated on the Drawings.
 3. Each rooted ground cover plant shall be planted with its proportional amount of soil.
 4. Apply a 2-inch layer of wood mulch at the completion of planting.

3.14 WATERING

- A. All planting shall be watered immediately after planting. After the first watering, water shall be applied to all plants as conditions may require keeping the plants in a healthy and vigorous growing condition until the completion of the Contract.



3.15 TREE STAKING

- A. Staking of trees shall be completed immediately after planting trees. Trees shall stand plumb before stakes are applied.
- B. All stakes shall be installed plumb when tied to the tree. Stakes may be located in a specific location to the trunk - refer to the Drawings.
- C. When locating a single stake, locate it on the windward side of the tree and as close to the main trunk as possible without damaging the trunk.
- D. Stakes shall be driven at least 3' into the ground or as specified on the plans.
- E. Tie the tree trunk to the stake with the specified tree guy. Cut off stake after installation 4-inches above the upper tie.

3.16 TREE GUYING

- A. Guying of trees shall be completed immediately after planting trees. Trees shall stand plumb before guys are applied.
- B. Trees shall stand plumb once guys are installed.
- C. Guy trees at points of branching with guys spaced 120 degrees apart.
- D. Guys shall be covered with black rubber hose at points of contact with bark positioned at crotches and fastened to a deadman. One turnbuckle shall be provided for each guy wire. Use (2) cable clamps at each cable terminus.
- E. Install a warning guy wire tube on each guy wire.

3.17 PRUNING

- A. At no time shall plant material be pruned, trimmed or topped prior to delivery. Any alteration to their shape shall be conducted only on-site and in the presence of the Owner's Authorized Representative.
- B. All planted material requiring pruning shall be done under the observation of the Owner's Authorized Representative. Prune planted material only when necessary and under standard horticultural practices to preserve the natural character of the plant.

3.18 WOOD MULCH INSTALLATION

- A. Spread a 3" deep layer of shredded bark mulch in all landscaped areas.

3.19 CLEANUP



- A. Contractor shall remove all trash caused from his Work on a weekly basis throughout the duration of the Project.
- B. Upon completion of his Work under this Section, the Contractor shall remove all rubbish, waste and debris resulting from his operations offsite or as directed by the Owner's Authorized Representative.
- C. All scars, ruts or other marks in the ground caused by the Contractors work shall be repaired.
- D. Remove all equipment and implements of service, and leave the entire work area in a neat, clean, and Owner's Authorized Representative-accepted condition. All sidewalks and other paving areas shall receive a broom-clean treatment.

3.20 SITE VISIT SCHEDULE

- A. The Contractor shall be responsible for notifying the Owner's Authorized Representative in advance to schedule the following site visits:
 - 1. Pre-construction "Kick-Off" meeting - 7 days.
 - 2. At completion of fine grading - 2 days.
 - 3. At completion of soil preparation - 2 days.
 - 4. Delivery of plant material - 2 days.
 - 5. Plant layout prior to plant pit excavation - 2 days.
 - 6. At start of tree planting, staking and guying - 2 days.
 - 7. Final walkthrough prior to going on contracted maintenance period - 7 days.
 - 8. Final walkthrough for project acceptance - 7 days.
- B. The Owner's Authorized Representative may or may not attend all of the above mentioned site visits. He may also elect to attend more than is listed above, and without notice to the Contractor.
- C. When site visits are made by other than the Owner's Authorized Representative, the Contractor shall show evidence in writing of when and by whom the site visit was made.
- D. No site visit will commence without all previous punch list items being completed, unless compliance has been waived by the Owner's Authorized Representative. Failure to accomplish the timely execution of previous field report punch list items and preparing adequately for the next site visit shall make the Contractor potentially liable for reimbursing the Owner's Authorized Representative's for his labor and reimbursable expenses. No further site visits will be made until outstanding charges have been paid to the Owner by the Contractor.

END OF SECTION – 32 90 00